



# solutions catalogue

**SUPPLIER OF SOLUTIONS**

THE BROADLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2013  
2014







# „...what do I need?“

## ...I want to be informed!

- regularly electronic product newsletter into your e-mail box
- printed SOS news magazine
- daily updated web site
- actual informations immediately at you (usage of RSS readers)
- personal meetings (exhibitions, conferencies, roadshows, seminars)
- fast information direct from manufacturers



## ...I want a satisfaction guarantee!

- we verify origin of electronic components
- professional workers team at expedition department (we use appropriate packaging materials, transport damage protection, ...)
- in case of necessity, a quick reclaiming using on-line web form
- satisfied customers in more than 90 countries of the world
- we operate a Quality Management System which has been approved to the ISO 9001:2009



## ... I want a help!

- flexible and professional support from our engineers team
- knowledge suggestions for your projects and application design



## ...I want fast delivery!

- complex unified information system and central logistic center for all the SOS electronic group enable us in many cases to send the shipment already in the day of order



## ... I want to order quickly and simply!

- OnLine Shop with updated stock status
- quick ordering on the web via „favourite items“
- quick electronic orders processing
- on-line informations about orders status and invoices

## ... I want competitive prices!

- we negotiate optimal prices from producers for you, which we are reaching by cumulative purchases for all the SOS electronic group
- optimized price levels for particular customers groups and sale volumes



## ... I want somebody who understands me!

- we build our cooperation on an individual personal approach
- each of our customer has an assigned sales representative or referee, whom he can contact anytime
- we communicate in 8 languages



## ... I want something in addition!

- free samples for your projects
- loyalty program with bonuses for OnLine Shop purchases
- direct meetings and consultations with representatives of components manufacturers
- emotional experiences through the unique marketing communication (interesting events, competitions, shows, SOS cinema, etc.)



## ...I want something more...

- we don't know words „it is not possible“, together we will surely find a solution!



# Welcome to the **World** of **electronic components** **solution!**




Jan Sesztak, CEO

You are holding the 10th edition of our catalog. Maybe it's symbolic, but right by this issue we want to confirm our strategy to move from products to solutions.


In today's electronic age can be the most up-to-date information of the highest quality found on the web, not on paper. Therefore, the purpose of this catalogue is not to introduce you all of our components as it was before, but rather to show you the solutions for your electronic manufacturing applications. Specific components can be found on our website by using QR codes and keywords for web searching.

This catalogue should further underline the fact that in reality we are able to help with our solution at the design of your applications. We believe that it will be an important tool of all hardware developers.

 V rukou držíte jubilejní desáté vydání našeho katalogu. Možná je to symbolické, ale právě tímto vydáním chceme potvrdit naši strategii posunu od zboží k řešením.


V dnešní elektronické době jsou nejvyšší kvalita a nejaktuálnější informace na webu, ne na papíru. Proto účelem tohoto katalogu není tak jako dosud představit Vám všechny skladové součástky, ale spíše nastínit řešení v dodávkách pro Vaši výrobu elektronických aplikací. Konkrétní součástky následně najdete na našich webových stránkách pomocí QR kódů a klíčových slov pro webový vyhledávač.

Tento katalog by měl ještě více podtrhnout fakt, že ve skutečnosti Vám umíme našimi řešeními pomoci při návrhu a designování Vašich aplikací. Věříme, že bude významnou pomůckou všech hardwarových vývojářů.

 In den Händen halten Sie die 10te Jubiläumsausgabe unseres Katalogs. Es mag vielleicht symbolisch sein, jedoch wollen wir gerade mit dieser Ausgabe unsere Strategie des Fortschreitens von der Ware zu Lösungen bekräftigen.


In der heutigen elektronischen Zeit findet man qualitativste und aktuellste Informationen im Internet, nicht auf Papier. Deshalb dient dieser Katalog nicht dem Zweck, Ihnen wie bisher sämtliche lagerverfügbare Komponenten zu präsentieren, vielmehr sollen damit Lösungen bezüglich Lieferungen für Ihre Produktion von elektronischen Anwendungen skizziert werden. Die konkreten Komponenten finden Sie nachfolgend auf unseren Web-Domains mithilfe von QR-Codes und Schlüsselwörtern für die Web-Suchmaschine.

Dieser Katalog sollte einmal mehr den Fakt unterstreichen, dass wir Ihnen mit unseren Lösungen in der Tat bei Entwurf und Design Ihrer Anwendungen behilflich sein können. Wir sind zuversichtlich, dass er ein bedeutendes Hilfsmittel für alle Hardware-Entwickler wird.

 Ön most katalógusunk jubileumi 10. kiadását tartja kezében. Lehet, hogy szimbolikus, de pont ezzel a kiadással szeretnénk meg erősíteni „terméktől a megoldásig” stratégiánkat.


Ma, az elektronika korában a legbővebb és legfrissebb információk a weben találhatóak, nem papíron. Ezért, ezen katalógusunk célja nem az, hogy bemutassuk Önöknek az összes raktári alkatrészünket, mint eddig, hanem hogy megoldásokat ajánljunk fel Önöknek az anyagbeszerzésre elektronikus berendezéseik gyártásához. A konkrét alkatrészeket megtalálhatják weboldalainkon a QR kódok vagy a keresés megkönnyítésére szolgáló kulcsszavak segítségével.

Ez a katalógus még jobban kiemeli a tény, miként is tudunk Önöknek valójában segíteni berendezéseik megtervezésében és kivitelezésében. Bízunk benne, hogy katalógusunk minden hardvertervező jelentős segítségére lesz.

 W rękach trzymają Państwo jubileuszowe 10-te wydanie naszego katalogu. Być może jest ono symboliczne, ale właśnie tym wydaniem chcemy potwierdzić naszą strategię przejsia od towaru do rozwiązań.

W dzisiejszej erze elektronicznej, najbardziej wartościowe i najaktualniejsze informacje znajdują się na Internecie, a nie na papierze. Dlatego celem tego katalogu nie jest jak dotychczas wyliczenie wszystkich elementów magazynowych, ale raczej przedstawienie rozwiązań dostaw dla Państwa produkcji z zakresu aplikacji elektronicznych. Konkretnie elementy znajdują Państwo następnie na naszych domenach internetowych za pomocą kodów QR oraz słów kluczowych dla wyszukiwarki.

Katalog ten powinien jeszcze bardziej podkreślić fakt, że w rzeczywistości potrafimy poprzez nasze rozwiązania pomóc w rozwoju i zaprojektowaniu Państwa aplikacji. Wierzymy, że będzie on ważną pomocą dla wszystkich projektantów sprzętu.


 Dețineți cea de-a 10-a ediție a catalogul nostru. Poate e simbolic, dar chiar prin acest aspect dorim să confirmăm strategia noastră de a trece de la produse la soluții.

În epoca electronică de astăzi, cele mai recente informații de cea mai înaltă calitate pot fi găsite pe internet, nu pe hârtie.

Prin urmare, scopul acestui catalog nu este să vă prezente toate componentele noastre așa cum era înainte, ci mai degrabă ca să vă ofere soluții pentru aplicațiile dumneavoastră electronice de fabricație.

Componente specifice pot fi găsite pe site-ul nostru, prin utilizarea codurilor QR și a cuvintelor cheie pentru căutarea web.

De asemenea, acest catalog subliniază și faptul că, în realitate, suntem capabili de a vă ajuta cu soluția noastră în realizarea aplicațiilor dumneavoastră. Noi credem că va fi un instrument important al tuturor dezvoltatorilor de hardware.

 V rukách držíte jubilejné 10-te vydanie nášho katalogu. Možno je to symbolické, ale práve týmto vydáním chceme potvrdiť našu stratégiu posunu od tovaru k riešeniam.

V dnešnej elektronickej dobe sú najkvalitnejšie a najaktuálnejšie informácie na webe, nie na papieri. Preto účelom tohto katalogu nie je tak ako doteraz predstaviť Vám všetky skladové súčiastky, ale skôr načrtnúť riešenia v dodávkach pre Vašu výrobu elektronických aplikácií. Konkrétne súčiastky následne nájdete na našich webových stránkach pomocou QR kódov a kľúčových slov pre webový vyhledávač.

Tento katalog by mal ešte viac podčiarknúť fakt, že v skutočnosti Vám vieme našimi riešeniami pomôcť pri návrhu a dizajnovaní Vašich aplikácií. Veríme, že bude významnou pomôckou všetkých hardvérových vývojárov.

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## Who we are?

We are a broadline stocking distributor of electronic components in Europe

Supplies cover primarily the European Union market, but we also realize the deliveries to the rest of the world. The Headquarters and main logistics center is located in Slovakia, in town Kosice. Our trading group SOS electronic europe comprises four distribution companies in Germany, Czech Republic, Slovakia and Hungary. We have direct sales representation in Poland and Romania.



## What we do?

Our trading group SOS electronic deals with **wholesale distribution of electronic components** for industrial production.



### We supply a wide range of:

- semiconductor,
- passive,
- optoelectronic,
- and electromechanical components,
- sophisticated functional units like for example communication modules, intelligent displays and similar,
- as well as tools, measuring and soldering equipment.

In our offer can be found more than 200,000 types of electronic components, of which more than 15 000 we have in stock for immediate delivery.

## Why us?

### The quality of our products and service is our priority

We cooperate with the world's largest manufacturers of electronic components, for which we provide exclusive distribution of their products. Our satisfied customers in more than 90 countries worldwide are the confirmation of quality.

### We bring a comprehensive solution

As one of the European market leaders in distribution of electronic components, we provide our customers not only with electronic components, but with the complexity of the solutions. This means that we provide our customers with comprehensive services from training, initial support, sampling supplies to the 0-series to mass production rather than only with passive sales.

SOS electronic is a synonym of electronic components of high quality, but this means also people, which daily bring the solution to your business with the smile upon their faces.



## Our selected references:

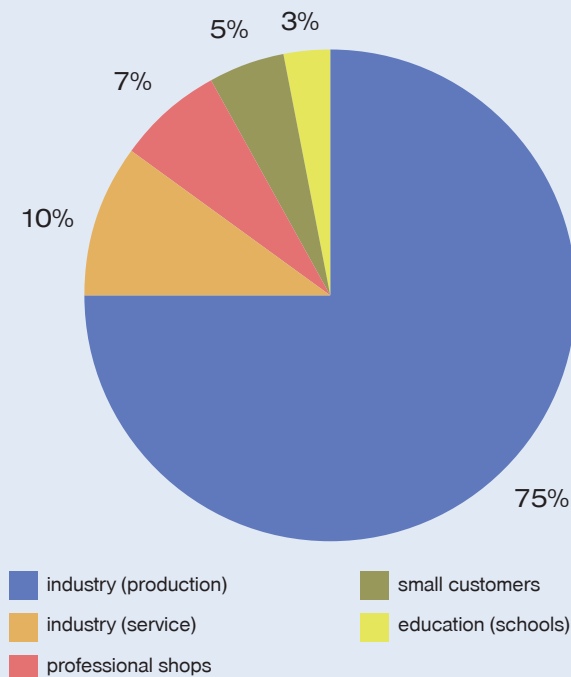






## Who are our customers?

Our customers are mainly manufacturers of industrial electronic equipment for various industries producing computer peripherals, communications technology, mobile devices, measuring and control technology, as well as products for the automotive, medical and military industry. We cooperate also with development companies, wholesalers and retailers of electronic components.



## Quality and certificates

### What does quality mean to us?

- Cooperation with world producers
- Verification of components origin
- Adequate packing materials and protection against damage in transit
- Less than 0.2% error in the preparation and packaging of goods for shipment to the customer
- If necessary, prompt settlement of the claim via the online form on our website
- Current customer information through the online shop, newsletter and a regularly updated website (the status of orders, product news ...)

### ISO 9001:2009

Certificate for treatment of waste electrical and electronic equipment

Certificate for processing of packaging waste

Recycling Fund - Certificate of registration as an importer of electrical and electronic goods



## Did You Know?

- We are on the market for 22 years.
- We have direct sales representation in 7 countries.
- Our satisfied customers are in more than 90 countries worldwide.
- In our offer can be found more than 200 000 typ of electronic components.
- More than 15 000 selected components type directly in our stock for immediate delivery.
- Goods is issued at the day of order.
- We provide a flexible and professional technical support from our team of engineers.
- Our customers are rewarded for their purchases in the loyalty programme.
- We have multi-lingual support (EN, CZ, DE, HU, PL, RO, SK).







## Kdo jsme?

Jsme jedním z největších nezávislých distributorů elektronických součástek v Evropě.

Dodávkami pokrýváme především trh Evropské unie, avšak realizujeme dodávky i do zbytku světa. Centrálu a hlavní logistické centrum máme na Slovensku v Košicích. Naše obchodní skupina SOS electronic europe sdružuje čtyři distribuční společnosti v Německu, České republice, na Slovensku a v Maďarsku. Přímé obchodní zastoupení máme také v Polsku a Rumunsku.



## Čím se zabýváme?

Naše obchodní skupina SOS electronic se zabývá velkoobchodní distribucí elektronických součástek pro průmyslovou výrobu.



### Dodáváme široké spektrum

polovodičových, pasivních, optoelektronických a elektromechanických součástek, sofistikovaných funkčních celků, jako např. komunikační moduly, inteligentní displeje a pod., jakož i nástrojů, měřicí a pájecí techniky.

V naší nabídce produktů najdete více než 200 000 typů elektronických součástek, z nichž více než 15 000 máme skladem k okamžitému odběru.

## Proč my?

### Kvalita našich produktů a služeb je pro nás prioritou

Proto spolupracujeme s největšími světovými výrobci elektronických součástek, pro které zajišťujeme výhradní distribuci jejich produktů. Potvrzením kvality jsou především spokojení zákazníci ve více než 90 zemích světa.

### Přinášíme komplexnost řešení

Jako jeden z lídrů na evropském trhu distribuce elektronických součástek poskytujeme našim zákazníkům nejen elektronické součástky, ale komplexnost řešení. To znamená, že našim zákazníkům namísto pasivního prodeje poskytujeme komplexní služby od školení, prvotní technické podpory, vzorkování, dodávek do nulté série až po sériovou výrobu.

SOS electronic je synonymem pro kvalitní elektronické součástky, ale jsou to i lidé, kteří pro Vás denně s úsměvem dodávají řešení pro Vaše podnikání.

## Kdo jsou naši zákazníci?

Našimi zákazníky jsou především průmysloví výrobci elektronických zařízení z různých odvětví, vyrábějících počítačové periferie, komunikační technologie, přenosná zařízení, měřicí a regulační techniku, jakož i produkty určené do automobilového a vojenského průmyslu nebo pro zdravotnictví. Spolupracujeme také s vývojářskými společnostmi, velkoobchodními a maloobchodními prodejci elektronických součástek.



## Věděli jste že?

- Jsme již 22 let na trhu
- Máme přímé zastoupení v 7 zemích
- Naši spokojení zákazníci jsou ve více než 90 zemích světa
- V nabídce máme více než 200 000 elektronických součástek
- Více než 15 000 vybraných typů součástek máme skladem v našem distribučním centru
- Zboží Vám odešleme ještě v den objednávky
- Poskytujeme flexibilní a profesionální technickou podporu od našeho týmu manažerů
- Naši zákazníci jsou odměňováni za své nákupy ve Věrnostním programu
- Máme multijazyčnou podporu (EN, CZ, DE, HU, PL, RO, SK).

## Kvalita a certifikáty

### Co pro nás znamená kvalita?

- Spolupráce se světovými výrobci
- Ověřování původu součástek
- Adekvátní obalové materiály a ochrana před poškozením při přepravě
- Méně než 0,2 % chybovost při přípravě a balení zboží k expedici pro zákazníka
- V případě potřeby rychlé vybavení reklamace prostřednictvím online formuláře na našem webu
- Aktuální informace pro zákazníky prostřednictvím OnLine shopu, newsletteru a pravidelně aktualizované webové stránky (stav objednávek, produktové novinky...)

### ISO 9001:2009

Certifikát o zpracování odpadu z elektrozařízení

Certifikát o zpracování odpadu z obalů

Recyklační fond - potvrzení o registraci jako dovozce elektrozařízení

## Naše vybrané reference:





## Wer sind wir?

Wir sind einer der größten unabhängigen Distributoren von elektronischen Bauelementen in Europa

Wir decken in erster Linie den EU-Markt mit Lieferungen ab, jedoch führen wir Lieferungen auch in die anderen Teile der Welt durch. Unser Hauptsitz und das Hauptlogistikzentrum befinden sich in Košice in der Slowakei. Unsere Handelsgruppe SOS electronic europe vereint vier Distributionsgesellschaften in Deutschland, Tschechien, der Slowakei und in Ungarn. Eine direkte Handelsvertretung haben wir auch in Polen und Rumänien.

## Was wir machen?

Unsere Handelsgruppe SOS electronic beschäftigt sich mit der Distribution (Großhändler) von elektronischen Bauelementen für die industrielle Fertigung.

### Wir liefern ein breites Spektrum von:

- Halbleiter-,
- passiven,
- optoelektronischen,
- und elektromechanischen Bauelementen,
- durchdachter Funktionseinheiten wie z. B. Kommunikationsmodule, intelligente Displays u. ä.,
- sowie Werkzeugen, Mess- und Löttechnik.

In unserem Produktangebot finden Sie mehr als 200 000 Typen von elektronischen Bauelementen, davon haben wir mehr als 15 000 zur sofortigen Abnahme auf Lager.

## Warum wir?

### Die Qualität unserer Produkte und Dienstleistungen ist unsere Priorität

Deshalb arbeiten wir mit größten weltweiten Produzenten von elektronischen Bauelementen zusammen, für die wir den ausschließlichen Vertrieb deren Produkte sicherstellen. Eine Bestätigung der Qualität stellen insbesondere zufriedene Kunden in mehr als 90 Ländern der Welt dar.

### Wir bringen Lösungskomplexität

Als eines der führenden Unternehmen auf dem europäischen Markt für den Vertrieb von elektronischen Bauelementen bieten wir unseren Kunden nicht nur elektronische Bauelemente, sondern auch eine Lösungskomplexität. Das bedeutet, dass wir unseren Kunden anstelle eines passiven Verkaufs komplexe Dienste anbieten. Von Schulungen, primärer technischer Hilfe, Mustertesterprobung, Lieferungen in die Nullserie bis hin zur Serienproduktion.

SOS electronic ist ein Synonym für qualitative elektronische Bauelemente. Es sind aber auch Menschen, die für Sie täglich mit einem Lächeln Lösungen für Ihre unternehmerische Tätigkeit liefern.

## Wer sind unsere Kunden?

Unsere Kunden sind vor allem industrielle Hersteller von elektronischen Geräten aus verschiedenen Branchen, die Computerperipherien, Kommunikationstechnologien, tragbare Geräte, Mess- und Regelungstechnik sowie Produkte für die Automobil- und Militärindustrie oder für das Gesundheitswesen produzieren. Ebenfalls arbeiten wir mit Entwicklungsunternehmen, mit Groß- und Kleinhandlern von elektronischen Bauelementen zusammen.

## Qualität und Zertifikate

### Was bedeutet für uns die Qualität?

- Zusammenarbeit mit weltweiten Herstellern
- Prüfung der Komponentenherkunft
- Angemessene Verpackungsmaterialien und Schutz vor transportbedingter Beschädigung
- Weniger als 0,2%ige Fehlerquote bei Vorbereitung und Verpackung der Ware für die Auslieferung an Kunden
- Bei Bedarf schnelle Reklamationsabwicklung mittels des Online-Formulars auf unserer Webseite
- Aktuelle Kundeninformationen mittels Online-Shop, Newsletter und regelmäßig aktualisierter Webseite (über Status der Bestellung, Produktneuheiten...)

### ISO 9001:2009

Zertifikat über die Entsorgung des Elektromülls  
Zertifikat über die Entsorgung des Verpackungsmülls

Rezyklierungsfonds - Bestätigung der Registrierung als Elektrogeräteimporteur



## Wussten Sie, dass?

- Wir sind seit 22 Jahren auf dem Markt
- Wir haben direkte Vertretungen in 7 Ländern
- Unsere zufriedenen Kunden stammen aus mehr als 90 Ländern der Welt
- Im Angebot haben wir mehr als 200 000 elektronische Bauelemente
- Mehr als 15 000 ausgewählte Komponententypen halten wir vorrätig in unserem Distributionszentrum
- Die Ware versenden wir an Sie gleich am Tag der Bestellung
- Wir bieten einen flexiblen und professionellen technischen Support seitens unseres Ingenieurteams
- Unsere Kunden werden für ihre Einkäufe im Vertrauensprogramm belohnt
- Wir bieten multilinguale Unterstützung (EN, CZ, DE, HU, PL, RO, SK).

## Unsere ausgewählte Referenzen:





## Kik vagyunk?

### Mi vagyunk Európa egyik legnagyobb független elektronikai alkatrész forgalmazója

Szállítványainkkal elsősorban az Európai Unió piacát fedjük le, de küldünk csomagot a világ többi részére is. Cégünk fő logisztikai központja Kassán található. Az SOS electronic europe cégcsoport négy forgalmazó céget fog össze: Magyarországon, Németországban, Csehországban, és Szlovákiában. Továbbá Lengyelországban és Romániában közvetlen üzleti képvisellel rendelkezünk.



## Mivel foglalkozunk?

Az SOS electronic cégcsoport az ipari gyártáshoz szükséges elektronikai alkatrészek nagykereskedelmi forgalmazásával foglalkozik.



### Széles kínálatunk van

félvezető, passzív, optoelektronikai, és elektro-mechanikus alkatrészekből csakúgy, kifinomult működő egységek, mint például kommunikációs modulok, intelligens kijelzők és hasonló, mint szerszámokból, mérő és forrasztó berendezésekből.

Termékinálatunkban több mint 200 000 elektronikai alkatrész típust talál, melyekből több mint 15 000-ből saját raktárkészletünk van az azonnali szállításhoz.

## Miért mi?

### Termékeink és szolgáltatásaink minősége nálunk alapvető fontosságú

Ezért a világ legnagyobb elektronikai alkatrész gyártóival dolgozunk, akiknek biztosítjuk termékeik forgalmazását. A minőséget elsősorban az elégedett ügyfeleink igazolják a világ több mint 90 országából.

### Komplex megoldásokat nyújtunk

Mint az európai piac egyik vezető elektronikai alkatrész forgalmazója ügyfeleinknek nemcsak elektronikai alkatrészeket kínálunk, hanem komplex megoldásokat is. Ez azt jelenti, hogy ügyfeleinknek a passzív eladás helyett komplex szolgáltatásokat kínálunk az elsődleges műszaki támogatáson, termékmintákon, a 0. szériához való szállításon át egészen a sorozatgyártásig.

Az SOS electronic a minőségi elektronikai alkatrészek szinonimája, de közben a név olyan embereket takar, akik nap mint nap mosollyal nyújtanak Önöknek megoldásokat vállalkozásukhoz.

## Kik az ügyfeleink?

Ügyfeleink elsősorban elektronikai berendezés gyártók különböző ipari ágazatokból, mint a számítógépes perifériák, kommunikációs technológiák, hordozható berendezések, mérési és szabályozótechnika, valamint az autópárba, hadi iparba és egészségügybe szánt berendezések gyártói. Ugyanakkor együttműködünk fejlesztőcégekkel, nagykereskedelmi és kiskereskedelmi viszonteladókkal is.



## Tudta, hogy?

- Már 22 éve vagyunk a piacon
- Közvetlen képvisellel rendelkezünk 7 országban
- A világ több mint 90 országában vannak elégedett ügyfeleink
- Kínálatunkban több mint 200 000 elektronikai alkatrész található
- Több mint 15 000 kiválasztott alkatrésztípusból tartunk raktárkészletet elosztó központunkban
- Megrendelését még a megrendelése napján postázzuk Önnek
- Rugalmas és professzionális műszaki támogatást nyújt Önnek mérnökökből álló csapatunk
- Ügyfeleinket a vásárlásaik után jutalmazzuk Hűségprogramunkban
- Többnyelvű támogatást nyújtunk (EN, CZ, DE, HU, PL, RO, SK).

## Minőség és tanúsítványok

### Mit jelent számunkra a minőség?

- Vezető gyártókkal való együttműködés
- Ellenőrizzük alkatrészeink eredetét
- Megfelelő csomagolóanyagok használata és védelem a sérülések ellen a szállítás során
- A hibaszázalék kevesebb, mint 0,2 % az ügyfélnek küldött termékek előkészítése és csomagolása során
- Szükség esetén a reklamációk gyors intézése a weboldalunkon található online űrlap segítségével.
- Naprakész információk ügyfeleink számára az OnLine shop, a hírlevelek és a rendszeresen frissített weboldal (rendelések állapota, termékújdonságok...) segítségével.

### ISO 9001:2009

Tanúsítvány az elektronikai hulladék feldolgozásról  
Tanúsítvány a csomagolásból adódó hulladékfeldolgozásról  
Újrahasznosítási alap – igazolás elektromos berendezés forgalmazói regisztrációról

## Főbb referenciáink:





## Kim jesteśmy?

Jesteśmy jednym z największych niezależnych dystrybutorów elementów elektronicznych w Europie

Pokrywamy dostawami przede wszystkim rynek Unii Europejskiej, ale realizujemy również dostawy do reszty świata. Centrala i główne centrum logistyczne znajduje się na Słowacji, w Koszycach. Nasza grupa handlowa SOS electronic europe zrzesza cztery spółki dystrybucyjne w Niemczech, Czechach, na Słowacji i na Węgrzech. Przedstawicielstwo handlowe mamy również w Polsce i w Rumunii.

## Co robimy?

Nasza grupa handlowa SOS electronic zajmuje się dystrybucją hurtową elementów elektronicznych dla produkcji przemysłowej.

### Dostarczamy szeroki zakres elementów:

- półprzewodnikowych,
- pasywnych,
- optoelektronicznych,
- oraz elektromechanicznych,
- wyrafinowanych jednostek funkcjonalnych takich jak moduły komunikacyjne, inteligentne wyświetlacze, itp.,
- jak również narzędzi, techniki pomiarowej i lutowniczej.

W naszej ofercie produktów znajdują Państwo ponad 200.000 typów elementów elektronicznych, z których ponad 15.000 mamy na magazynie do natychmiastowego odbioru.

## Dlaczego my?

### Jakość naszych produktów i usług jest dla nas priorytetem

Dlatego współpracujemy z największymi światowymi producentami elementów elektronicznych, dla których zapewniamy wyłączną dystrybucję ich produktów. Potwierdzeniem jakości są przede wszystkim zadowoleni klienci z ponad 90 krajów świata.

### Przynosimy kompleksowość rozwiązań.

Jako jeden z liderów na europejskim rynku dystrybucji elementów elektronicznych, oferujemy naszym klientom nie tylko części elektroniczne, ale kompleksowość rozwiązań. To znaczy, że naszym klientom oferujemy, zamiast samej tylko pasywnej sprzedaży, usługi kompleksowe, od szkolenia, wstępnego wsparcia technicznego, dystrybucji próbek, dostaw dla serii 0 aż po produkcję seryjną.

SOS electronic to synonim jakościowych części elektronicznych, ale są to równocześnie ludzie, którzy na co dzień z uśmiechem na twarzy dostarczają dla Państwa rozwiązania dla Państwa biznesu.

## Kim są nasi klienci?

Naszymi klientami są przede wszystkim przemysłowi producenci urządzeń elektronicznych z różnych dziedzin, produkujący peryferie komputerowe, technologie komunikacyjne, urządzenia przenośne, technikę pomiarową i regulacyjną, jak również produkty przeznaczone dla przemysłu motoryzacyjnego, zbrojeniowego lub dla służby zdrowia. Współpracujemy również ze spółkami projektowymi, hurtowymi i detalicznymi dystrybutorami elementów elektronicznych.

## Jakość i certyfikaty

### Co znaczy dla nas jakość?

- Współpraca ze światowymi producentami
- Sprawdzanie pochodzenia elementów
- Odpowiednie materiały opakowań i ochrona przed uszkodzeniami podczas transportu
- Mniej niż 0,2% błędności podczas transportu i pakowania towaru dla ekspedycji od klienta
- W razie konieczności szybkie załatwienie reklamacji, za pośrednictwem OnLine formularza na naszych stronach
- Aktualne informacje dla klientów poprzez OnLine Shop, biuletyn i regularnie aktualizowaną stronę internetową (o stanie zamówień, nowościach produktowych...)

### ISO 9001:2009

Certyfikat o utylizacji odpadów z urządzeń elektronicznych

Certyfikat o utylizacji odpadów z opakowań Fundusz recykacyjny – potwierdzenie o rejestracji jako importer urządzeń elektronicznych



## Wiedzieli Państwo że ...?

- Jesteśmy na rynku już od 22 lat
- Mamy bezpośrednich przedstawicieli w 7 krajach
- Nasi zadowoleni klienci znajdują się w ponad 90 krajach świata
- W ofercie mamy ponad 200.000 elementów elektronicznych
- Ponad 15.000 wybranych typów mamy w magazynie w naszym centrum logistycznym
- Towar wysyłamy do Państwa jeszcze w dniu zamówienia
- Udzielamy prężnego i profesjonalnego wsparcia technicznego od zespołu inżynierów
- Nasi klienci nagradzani są za swoje zakupy w ramach programu wiernościowego
- Mamy wsparcie wielojęzyczne (EN, CZ, DE, HU, PL, RO, SK).

## Nasze wybrane referencje:



LEONI Panasonic



SAMSUNG



YAZAKI



## Cine suntem?

Suntem un distribuitor pentru o gamă largă de componente electronice din Europa

Furnizările acoperă în principal piața Uniunii Europene dar livrăm produse și în restul lumii. Sediul principal și centrul de logistică din Slovacia se află în Kosice. Grupul nostru de comercializare SOS electronic Europe cuprinde patru companii distribuitoare din Germania, Republica Cehă, Slovacia și Ungaria. Avem agenții de vânzări directe în Polonia și România.



## Ce facem?

Grupul SOS electronic se ocupă de distribuția în gros de componente electronice pentru producție industrială.



### Furnizam o gamă vastă de

semiconductoare, componente pasive, optoelectronice, și electromecanice, unități funcționale sofisticate, cum ar fi, de exemplu, module de comunicare, display-uri inteligente și similare, precum și instrumente, tehnici de măsurare și lipire.

În oferta noastră puteți găsi peste 200.000 de tipuri de componente electronice dintre care peste 15.000 se află în stoc pentru livrare imediată.

## De ce noi?

### Prioritatea noastră este calitatea produselor și serviciilor furnizate!

Cooperăm cu cei mai importanți producători mondiali de componente electronice, ale căror produse sunt exclusiv distribuite de către noi. Clienții noștri mulțumiți din peste 90 de țări vă pot oricând confirma calitatea produselor oferite.

### Vă oferim soluții complete!

Fiind unul din liderii de pe piața europeană în distribuția de componente electronice, noi oferim clienților noștri nu numai componente electronice, ci și o complexitate de soluții. Aceasta înseamnă că, spre deosebire de competitorii noștri care realizează doar vânzări pasive, noi prestăm servicii complete - de la instruire practică, asistență tehnică, furnizare de mostre seria 0 la producție în masă.

SOS electronic înseamnă componente electronice de calitate superioară dar și resursa umană care este mereu pregătită să vă ofere soluția optimă afacerii dumneavoastră.

## Cine sunt clienții noștri?

În principal, printre clienții noștri se numără producătorii de echipamente electronice industriale din diverse sfere industriale, care produc elemente periferice pentru calculatoare, tehnologii de comunicații, dispozitive portabile, tehnologii de măsurare și control precum și produse pentru industria automobilă și militară sau din domeniul medical. Colaborăm de asemenea și cu companii de dezvoltare, intermediari și comercianți de componente electronice.



## Știați că?



- Suntem pe piață de 22 de ani
- Avem agenții de vânzări directe în 7 țări
- Avem clienți mulțumiți în peste 90 de țări
- În oferta noastră puteți găsi peste 200.000 de tipuri de componente electronice
- Avem în stoc peste 15.000 din tipurile de componente gata a fi livrate imediat
- Bunurile sunt livrate în ziua comenzii
- Furnizam asistență tehnică flexibilă și profesionistă prin echipa noastră de ingineri
- Clienții noștri sunt recompensați pentru achizițiile lor în cadrul programului de loialitate
- Putem furniza asistență în mai multe limbi (engleză, cehă, germană, maghiară, poloneză, română, slovacă).

## Calitate și certificate

### Ce înseamnă pentru noi calitatea?

- Cooperarea cu producători internaționali
- Verificarea originii componentelor
- Materiale adecvate de ambalare și protecția împotriva deteriorării în timpul tranzitului
- Mai puțin de 0,2% eroare în pregătirea și ambalarea mărfurilor pentru expedierea la client
- Dacă este necesar, rezolvarea promptă a cererii prin formularul online de pe site-ul nostru web
- Informații actuale pentru clienți prin magazinul online, newsletter și un site web actualizat cu regularitate (stadiul comenzilor, noutăți despre produse, etc.)

### ISO 9001:2009

Certificat pentru tratarea deșeurilor de la echipamente electrice și electronice

Certificat pentru prelucrarea deșeurilor de la ambalaje

Fondul de reciclare - Certificat de înregistrare ca importator de aparatură electrică și electronică

## Referințe selectate:





## Kto sme?

Sme jedným z najväčších nezávislých distribútorov elektronických súčiastok v Európe.

Dodávkami pokrývame predovšetkým trh Európskej únie, avšak realizujeme dodávky aj do zvyšku sveta. Centrálu a hlavné logistické centrum máme na Slovensku v Košiciach. Naša obchodná skupina SOS electronic europe združuje štyri distribučné spoločnosti v Nemecku, Čechách, na Slovensku a v Maďarsku. Priame obchodné zastúpenie máme aj v Poľsku a Rumunsku.

## Čo robíme?

Naša obchodná skupina SOS electronic sa zaoberá veľkoobchodnou distribúciou elektronických súčiastok pre priemyselnú výrobu.

### Dodávame široké spektrum:

- polovodičových,
- pasívnych,
- optoelektronických,
- a elektromechanických súčiastok,
- sofistikovaných funkčných celkov ako napr. komunikačné moduly, inteligentné displeje a pod.,
- ako aj nástrojov, meracej a spájkovacej techniky.

V našej ponuke produktov nájdete viac ako 200 000 typov elektronických súčiastok, z ktorých viac ako 15 000 máme skladom pre okamžitý odber.

## Prečo my?

### Kvalita našich produktov a služieb je pre nás prioritou

Preto spolupracujeme najväčšími svetovými výrobcami elektronických súčiastok, pre ktorých zabezpečujeme výhradnú distribúciu ich produktov. Potvrdením kvality sú predovšetkým spokojní zákazníci vo viac ako 90 krajinách sveta.

## Vedeli ste že?

- Sme už 22 rokov na trhu.
- Máme priame zastúpenie v 7 krajinách.
- Naši spokojní zákazníci sú vo viac ako 90 krajinách sveta.
- V ponuke máme viac ako 200 000 elektronických súčiastok.
- Viac ako 15 000 vybraných typov súčiastok máme skladom v našom distribučnom centre.
- Tovar Vám odošleme ešte v deň objednávky.
- Poskytujeme flexibilitu a profesionálnu technickú podporu od nášho tímu inžinierov.
- Naši zákazníci sú odmeňovaní za svoje nákupy vo Vernostnom programe.
- Máme multijazyčnú podporu (EN, CZ, DE, HU, PL, RO, SK).

### Prinášame komplexnosť riešení

Ako jeden z lídrov na európskom trhu distribúcie elektronických súčiastok poskytujeme našim zákazníkom nie len elektronické súčiastky, ale komplexnosť riešení. To znamená, že našim zákazníkom namiesto pasívneho predaja poskytujeme komplexné služby od školení, prvotnej technickej podpory, vzorkovania, dodávok do 0-tej série až po sériovú výrobu.

SOS electronic je synonymom pre kvalitné elektronické súčiastky, ale sú to aj ľudia, ktorí pre Vás denno denne s úsmevom odávajú riešenia pre Vaše podnikanie.

## Kto sú naši zákazníci?

Našími zákazníkmi sú predovšetkým priemyselní výrobcovia elektronických zariadení z rôznych odvetví vyrábajúcich počítačové periférie, komunikačné technológie, prenosné zariadenia, meraciu a regulačnú techniku, ako aj produkty určené do automobilového a vojenského priemyslu alebo pre zdravotníctvo. Spolupracujeme takisto aj s vývojárskymi spoločnosťami, veľkoobchodnými a maloobchodnými predajcami elektronických súčiastok.

## Kvalita a certifikáty

### Čo pre nás znamená kvalita?

- spolupráca so svetovými výrobcami
- overovanie pôvodu súčiastok
- adekvátne obalové materiály a ochrana pred poškodením pri preprave
- menej ako 0,2 % chybovosť pri príprave a balení tovaru na expedíciu pre zákazníka
- v prípade potreby rýchle vybavenie reklamácie prostredníctvom online formulára na našom webe
- aktuálne informácie pre zákazníkov prostredníctvom OnLine shopu, newslettera a pravidelne aktualizovanej webovej stránky (o stave objednávok, produktové novinky...)

### ISO 9001:2009

Certifikát o spracovaní odpadu z elektrozariadení

Certifikát o spracovaní odpadu z obalov  
Recyklačný fond - potvrdenie o registrácii ako dovozca elektrozariadení



## Naše vybrané referencie:





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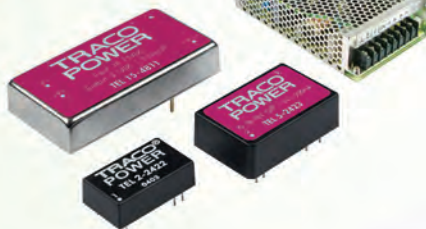


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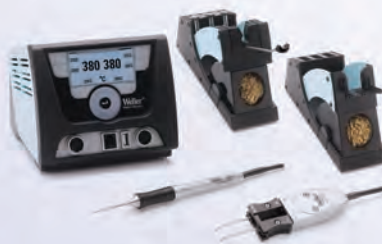
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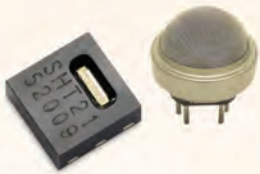


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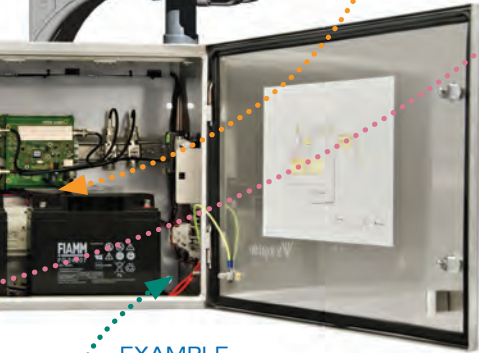
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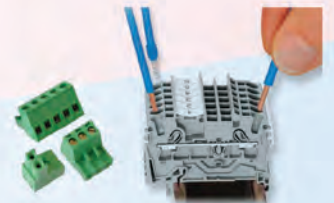
EXAMPLE  
Customer: Telegrafía, a.s.  
Product: Electronic siren PAVIAN



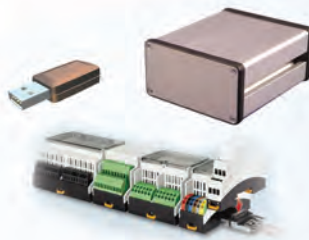
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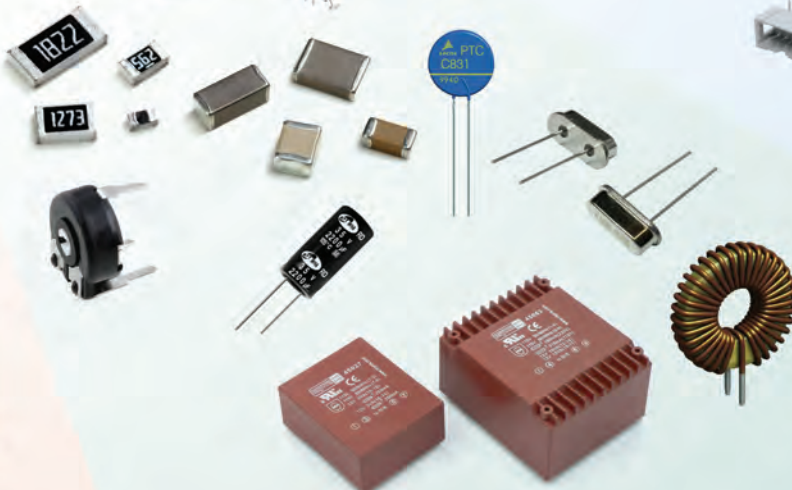
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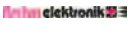


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Keywords

## Communication Modules & Identification

### Communication Modules

#### ZigBee, LAN, USB, WiFi, RS232/485, RFID, 433 MHz, Bluetooth

Communication modules enable data communication in various formats. In general, all communication modules can transfer the same data, however the difference is in the way, how it is proceeded - protocol, hardware requirements and the difference is also in a maximum speed of data transfer.

**Komunikační moduly** umožňují datovou komunikaci v různých formátech. Obecně, všechny komunikační moduly dokáží přenést stejná data, ale rozdíl je v tom, jakým způsobem se to provádí - protokol, hardwarové požadavky a také v maximální rychlosti přenosu dat.

**Die Kommunikationsmodule** ermöglichen Datenkommunikation in unterschiedlichen Formaten. Im Allgemeinen können alle Kommunikationsmodule die gleichen Daten übertragen, der Unterschied besteht lediglich in der Vorgehensweise (Protokoll, Hardwareanforderungen - und der Unterschied besteht ebenfalls in der maximalen Geschwindigkeit der Datenübertragung.

**A kommunikációs modulok** számos formában teszik lehetővé az adatkommunikációt. Általában minden kommunikációs modul hasonló adatokat továbbít, a különbség köztük a továbbítás módjában van: eltérő protokollok és hardverigények, eltérő vivőfrekvenciák (technológiai) vagy átviteli maximális sebességek.

**Moduly komunikacyjne** umożliwiają transfer w różnych formatach. W zasadzie wszystkie moduly komunikacyjne mogą przesyłać te same dane, jednak różnica jest w sposobie, jakim to się odbywa - protokół, wymagania sprzętowe a różnica jest również w maksymalnej predkosci transferu danych.

**Modulele de comunicare** permit comunicarea de date în diverse formate. În general, toate modulele de comunicare pot transfera aceleași date, totuși diferența constă în modul în care se procedează - protocol, cerințele hardware și de asemenea diferența există și în viteza maximă de transferare a datelor.

**Komunikačné moduly** umožňujú dátovú komunikáciu v rozličných formátoch. Vo všeobecnosti, všetky komunikačné moduly dokážu prenásť rovnaké data, ale rozdiel je v spôsobe ako sa to vykonáva - protokol, hardvérové požiadavky a rozdiel je tiež v maximálnej rýchlosti prenosu dát.

Wired and wireless communications enable widely used communication and data transfer between various devices. They enable remote control and monitoring of production processes, tracking in logistics, data acquisition and archiving and many other everyday used functions. Wireless communications also enable for example remote control and monitoring in various hazardous environments, where direct human presence would be dangerous or impossible. Further, wireless communications enable to avoid necessity of costly cable structure, especially in places distant from each other.

### Classification

Communication systems differ in many aspects like power consumption, max. distance, data transfer speed, immunity to noise and disturbances, safety and other. A choice of a right communication system and components for your application depends on above mentioned factors, as well as for example on development and production costs. Wireless communications in general offer a big advantage of avoiding a cable structure and provide a big flexibility and expansibility. However, it is also advisable to take in mind possibility of interference, caused for example by surrounded machines, as well as limited bandwidth. Wired communications in general offer higher transfer speeds and from some point of view, also a higher data safety.

### Terms:

#### Bluetooth

An open wireless technology standard for exchanging data over short distances (using short wavelength radio transmissions in the ISM band from 2400-2480 MHz) from fixed and mobile devices.

#### LAN

Local Area Network, is a computer network that interconnects computers in a limited area such as a home, school, computer laboratory, or office building. LAN usually features high data-transfer rates. Network topology describes the layout pattern of interconnections between devices and network segments. Switched Ethernet has been for some time the most common Data Link Layer and Physical Layer implementation for local area networks. At the higher layers, the Internet Protocol (TCP/IP) has become the standard. Smaller LANs generally consist of one or more switches linked to each other, often at least one is connected to a router, cable modem, or ADSL modem for Internet access.

#### WiFi

A trademark of the Wi-Fi Alliance and the brand name for products using the IEEE 802.11 family of standards, allowing electronic devices to exchange data wirelessly over a computer network. Wi-Fi uses 2.4GHz band and allows cheaper deployment of local area networks (LANs).

#### RFID

Radio-Frequency Identification is the use of a wireless non-contact radio system to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Most of tags require no battery and are powered by the radio waves generated by an RFID reader device. The tag contains an antenna (made of an inductor) and a chip with a stored information. Tag can be read from up to several meters away. RF ID tags are used in many industries, for example an RFID tag attached to a product can be used to track its progress through the assembly line.

#### ZigBee

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on an IEEE 802 standard for personal area networks (PANs). ZigBee technology is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. ZigBee has is best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. ZigBee operates at frequencies 868 MHz and 2.4 GHz.

#### USB

Universal Serial Bus (USB) is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication and power supply between computers and electronic devices. USB was designed to standardize the connection of computer peripherals, both to communicate and to supply electric power. USB has effectively replaced a variety of earlier interfaces, such as serial and parallel ports, as well as separate power chargers for portable devices.

#### RS485

also known as TIA/EIA-485, is a standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems. Digital communications networks implementing the RS-485 standard can be used effectively over long distances and in electrically noisy environments. Multiple receivers may be connected to such a network in a linear, multi-drop configuration. These characteristics make such networks useful in industrial environments and similar applications.

#### 434/868 MHz RF

is a license free frequency band, used by low power devices. 433 MHz communication modules are short range communication devices authorized for use in many parts of the world. They operate in the UHF band from 433.075 MHz to 434.775 MHz. Modules working on this frequency are very often used for remote control of doors and locks.

#### RS232

is the traditional name for a series of standards for serial binary single-ended data and control signals connecting. An RS-232 port was a standard feature of a personal computer, but the limited transmission speed, relatively large voltage swing, and large standard connectors motivated development of the USB which has displaced RS-232 from most of its peripheral interface roles. Many modern personal computers have no RS-232 ports and must use an external converter to connect to older peripherals. RS232 devices are still found especially in industrial machines or scientific instruments. Because the voltage levels are higher than logic levels typically used by integrated circuits, special intervening driver circuits are required to translate logic levels.

GSM / GPRS / GPRS / Antennas



Producer brand

Link to brand microsite



## Communication Modules & Identification

### Communication Modules

[www.soselectronic.com/digi](http://www.soselectronic.com/digi)

DIGI INTERNATIONAL is the leader in commercial grade device networking and is an innovator of wireless machine-to-machine (M2M) device networking products. Digi International embedded and non-embedded products are marketed under the Digi® Rabbit® and Maxstream® brands.



QR code for immediate access to website using your mobile device

**DIGI INTERNATIONAL** je lídrem v oblasti komerční třídy síťových zařízení a inovátor v oblasti bezdrátových machine-to-machine (M2M) síťových zařízení. Embedded a non-embedded produkty jsou prodávány pod značkami Digi® a Rabbit®.

**DIGI INTERNATIONAL** ist ein führendes Unternehmen im Bereich kommerzielle Klasse der Netzwerkgeräte und ein Innovator im Bereich der drahtlosen Machine-to-Machine (M2M) Netzwerkgeräte. Embedded- und Non-embedded-Produkte werden unter den Handelsnamen Digi® und Rabbit®.

A DIGI INTERNATIONAL vezető a kereskedelmi hálózati berendezések és a machine-to-machine (M2M) hálózati termékek fejlesztésének területén. A Digi International beágyazott és nem beágyazott termékei Digi® és Rabbit®.

**DIGI INTERNATIONAL** to lider w komercyjnych urządzeniach sieciowych oraz innowator bezprzewodowych produktów sieciowych machine-to-machine (M2M). Embedded i samodzielne urządzenia Digi International sprzedawane są pod markami Digi® oraz Rabbit®.

**DIGI INTERNATIONAL** este lider în conectarea în rețea a dispozitivelor de uz comercial și un inovator în produsele de rețelistică a dispozitivelor M2M wireless. Produsele Digi International incorporate și neincorporate sunt comercializate sub mărcile Digi® și Rabbit®.

**DIGI INTERNATIONAL** je lídrom v oblasti komerčnej triedy sieťových zariadení a inovátor v oblasti bezdrôtových machine-to-machine (M2M) sieťových zariadení. Embedded a non-embedded produkty sú predávané pod značkami Digi® a Rabbit®.

Multilingual brand introduction

Benefits of brand / why to use

### Why DIGI?

- company specialised on networking
- high performance, flexible and reliable wireless embedded module

More information about brand

Digi International develops reliable products and technologies to connect and securely manage local or remote electronic devices over the network or via the web, and offers the highest levels of performance, flexibility and quality. Digi International's embedded products include modules, microprocessors, single-board computers, satellite communications products, development kits, software, and design services through our subsidiary Spectrum Design Solutions. Non-embedded products include cellular routers, gateways, wireless communication adapters (ZigBee, Wi-Fi, proprietary RF), serial servers, intelligent console servers, USB connected products, remote display products, cameras, sensors and the #1 selling serial card line in the world.

### Did You Know?

The ZigBee Alliance is an association of companies working together to enable reliable, cost effective, low-power, wirelessly networked, monitoring and control products based on an open global standard. The ZigBee Alliance membership comprises technology providers and original equipment manufacturers worldwide. Membership is open to all.

Interesting facts about brand

### ZigBee Modules

#### XBee Series



The XBee and XBee-PRO OEM RF Modules were engineered to meet IEEE 802.15.4 standards and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between devices. The modules operate within the ISM 2.4 GHz frequency band and are pin-to-pin compatible with each other.

Technical Parameters	XBee	XBee PRO
Supply Voltage	2,8 - 3,4 V	
Range Indoor/Outdoor	30 m/100m	100/1500m
Transmit Power	0dBm (1mW)	18dBm (60mW)
Transmit Current	45 mA (at 3,3V)	137 mA to 215mA (at 3,3V)
Idle / Receive Current	50 mA (at 3,3V)	55 mA (pri 3,3V)
Power-down Current	<10uA	<10uA
Receiver Sensitivity	-92 dBm	-100 dBm
RF Data Rate	250 000bps	
Serial Interface Data Rate	1200-115,2 kbps	
Dimensions	2,43 x 2,76 cm	
Operating Temperature	-40°C to 85°C	

#### XBee DigiMesh Series



XBee & XBee-PRO DigiMesh 2.4 embedded RF modules utilize the peer-to-peer DigiMesh protocol in 2.4 GHz for global deployments. This innovative mesh protocol offers users added network stability through self-healing, self discovery, and dense network operation. With support for sleeping routers, DigiMesh is ideal for power sensitive applications relying upon batteries or power harvesting technology for power.

Technical Parameters	XBee DigiMesh	XBee PRO DigiMesh
Supply Voltage	2,8 - 3,4 V	
Range Indoor/Outdoor	30 m/90m	90/1600m
Transmit Power	0dBm (1mW)	18dBm (63mW)
Transmit Current	45 mA (at 3,3V)	250mA to 340mA (at 3,3V)
Idle / Receive Current	50 mA (at 3,3V)	55 mA (pri 3,3V)
Power-down Current	<50uA	<50uA
Receiver Sensitivity	-92 dBm	-100 dBm
RF Data Rate	250 000bps	
Serial Interface Data Rate	1200bps-250kbps	
Dimensions	2,43 x 2,76 cm	
Operating Temperature	-40°C to 85°C	

Types group

Series of products

Product images

Product description

maxstream • xbp • xb24 • xbee

[www.soselectronic.com](http://www.soselectronic.com) 57

Product type

Key technical parameters





# Power Management

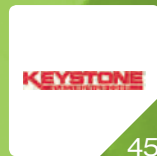
## DC/DC and AC/DC modules 22



## Adapters, Power Supplies and Chargers 31



## Batteries 40



## Alternative Power Supplies and Accessories 46

In principle, these modules are switch-mode power supplies (SMPS). SMPS is an electronic power supply that incorporates a switching regulator in order to be highly efficient in the conversion of electrical power. Another widely used feature is, that they can provide a galvanic isolation between input and output voltage.

**CZ** V principu jsou tyto moduly spínané zdroje (SMPS). SMPS je elektronický zdroj, který obsahuje spínaný regulátor za účelem vysoce účinné přeměny elektrické energie. Další široce využívanou vlastností je, že dokáže poskytnout galvanické oddělení vstupního a výstupního napětí.

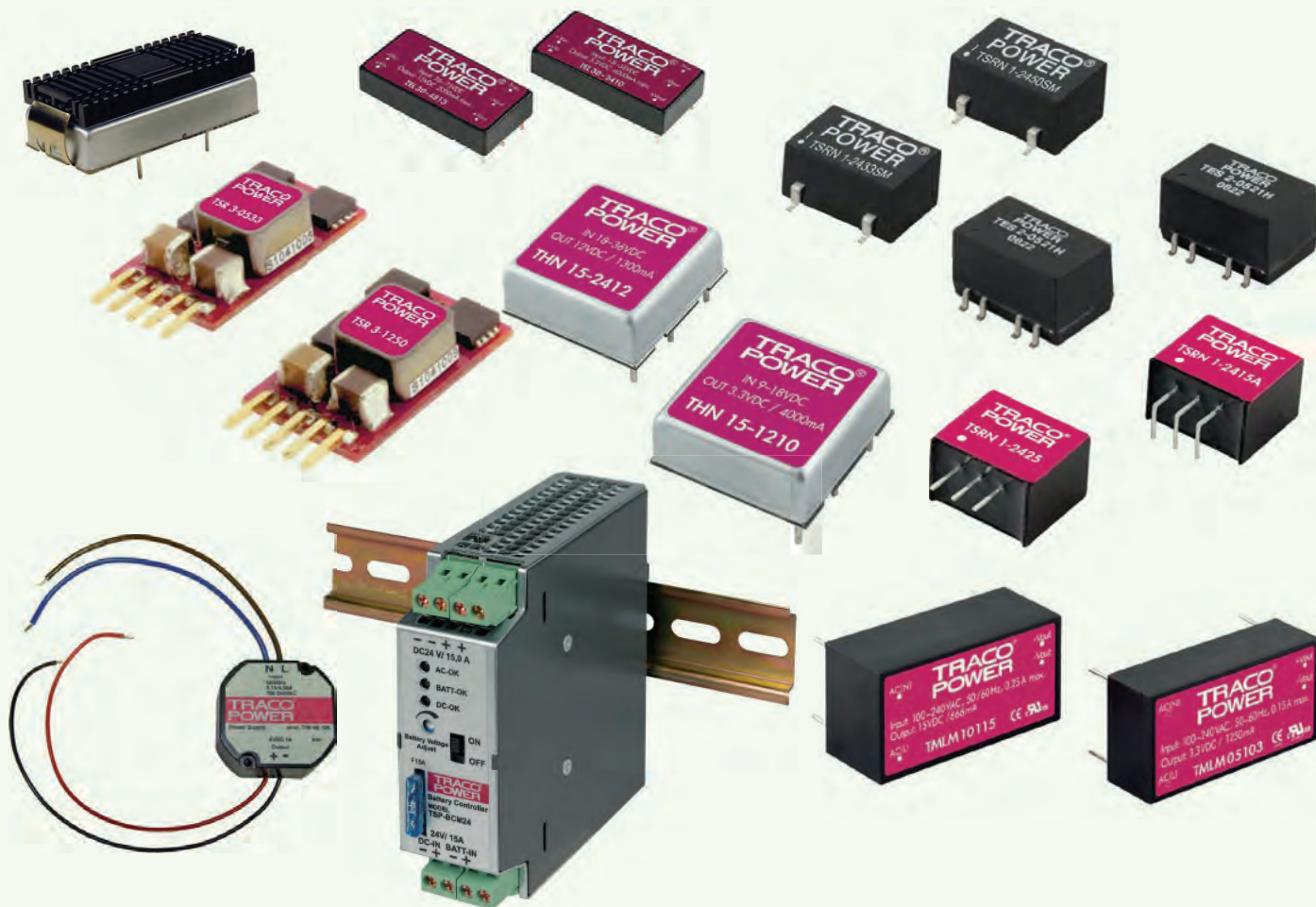
**DE** Im Prinzip sind diese Module Schaltnetzteile. Schaltnetzteile sind elektronische Stromversorgungen, die Schaltregler wegen einer hochwirksamen Umwandlung elektrischer Energie enthalten. Eine andere weit genutzte Eigenschaft ist die Möglichkeit der galvanischen Trennung zwischen Eingangsspannung.

**HU** Ezek a modulok kapcsológézőmű tápegységek (SMPS). Az SMPS egy elektronikus tápforrás, mely egy kapcsológézőmű szabályzót tartalmaz az elektromos energia nagy hatásfokú átalakítására. További széleskörűen alkalmazott jó tulajdonsága, hogy galvanikus elválasztást is biztosít a bemeneti és kimeneti feszültség között.

**PL** Moduły te to w zasadzie zasilacze impulsowe – SMPS (switch-mode power supplies). SMPS to zasilacz elektroniczny, zawierający regulator impulsowy dla uzyskania wysokiej sprawności podczas konwersji energii elektrycznej. Inną szeroko wykorzystywaną cechą jest, że potrafią zapewnić izolację galvaniczną pomiędzy napięciem wejściowym i wyjściowym.

**RO** În principiu, aceste module sunt alimentatoare switch-mode (SMPS). SMPS este o sursă electronică de alimentare care încorporează un regulator de comutare pentru a fi foarte eficient în conversia energiei electrice. O altă caracteristică utilizată pe scară largă este faptul că unele tipuri pot asigura o izolare galvanică între tensiunea de intrare și cea de ieșire.

**SK** V princípe sú tieto moduly spínané zdroje (SMPS). SMPS je elektronický zdroj, ktorý obsahuje spínaný regulátor za účelom vysoce účinnej konverzie elektrickej energie. Ďalšou široko využívanou vlastnosťou je, že dokáže poskytnúť galvanické oddelenie vstupného a výstupného napätia.



An SMPS is usually employed to efficiently provide a regulated output voltage, usually at a level different from the input voltage. Unlike a linear power supply, the pass transistor of a switching mode supply switches very quickly (typically between 50 kHz and 1 MHz) between full-on and full-off states, which minimizes wasted energy. Voltage regulation is provided by varying the ratio of “on” to “off” time. **Switching regulators are used as replacements for linear regulators when higher efficiency, smaller size or lighter weight are required.** In this case, they are mostly called as DC/DC modules. An SMPS can also replace a classic line transformer used to achieve lower Voltage from the 230V mains. In this case, they are called as AC/DC modules.

- The main advantage of this regulation method is a much greater efficiency because the switching transistor acts like a switch, which is only in two states – ON/OFF. Difference in efficiency is most obvious in DC/DC modules at high regulation ratios (high input voltage/ low output voltage).
- In DC/DC modules an energy between on/off cycles is stored in an inductance. In contrast, a linear power supply must dissipate the excess voltage to regulate the output. Higher switching frequency allows to minimize component sizes but it can cause higher switching

losses and EMI radiation. That’s why a choice of the frequency used is always a compromise between switching losses and components size. Very often a slightly higher switching losses are sacrificed for the convenience of a smaller components size, resulting in smaller overall size and price.

- Other advantages in comparison to linear supplies include capacitive (not inductive) character of the input of AC/DC modules, smaller size and lighter weight (from the elimination of low frequency transformers which have a high weight) and lower heat generation due to higher efficiency. Moreover, many DC/DC modules enable to adjust output voltage in some range.
- Disadvantages include greater complexity, the generation of high-amplitude, high-frequency energy that the low-pass filter must block to avoid electromagnetic interference (EMI), and a ripple voltage at the switching frequency and the harmonic frequencies thereof. Very low cost AC/DC modules may couple electrical switching noise back onto the mains power line, causing interference with A/V equipment connected to the same phase. However, a well designed SMPS can fully replace linear stabilizers even at sensitive RF applications.



**TRACO  
POWER**

# DC/DC Converters

SMD-Package 1 to 15 Watt

SIP-Package 1 to 6 Watt

DIP-Package 2 to 60 Watt

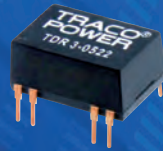
Medical Safety 1 to 10 Watt

High Power Modules 75 to 240 Watt

Non Isolated Switching Regulators 1 – 30 A

High Voltage Converters 180 – 2000 VDC

Industrial Converters up to 22 kW



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For more details contact your authorised distributor SOS electronic europe.



**TRACO  
POWER**

# AC/DC Power Supplies

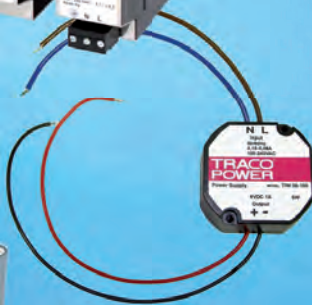
Encapsulated Modules 4 to 60 Watt

Open Frame Design 10 to 300 Watt

Enclosed Metal Case 15 to 1000 Watt

Field Power Supplies 120 Watt

Industrial DIN-rail 15 to 960 Watt



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For more details contact your authorised distributor SOS electronic europe.





TRACO ELECTRONIC AG is a Swiss company with headquarter based in Zurich, Switzerland. As a leading power supply specialist with more than 30 years of experience it is dedicated to the design and manufacturing of high quality DC/DC and AC/DC power conversion products. TRACO ELECTRONIC AG is marketing their products worldwide under the registered trademark TRACOPOWER.

**TRACO ELECTRONIC AG** je švýcarská společnost s centrálou v Curychu. Jako přední specialista na napájecí zdroje s více než třicetiletými zkušenostmi se specializuje na návrh a výrobu vysoce kvalitních DC/DC a AC/DC modulů. Traco Electronic AG prodává své výrobky celosvětově pod značkou TRACOPOWER.

**TRACO ELECTRONIC AG** ist ein Schweizer Unternehmen mit Sitz in Zürich. Als führender Spezialist für Netzteile mit über 30 Jahren Erfahrungen spezialisiert es sich auf die Entwicklung und Produktion qualitativ hochwertiger DC/DC- und AC/DC-Module. Seine Produkte vermarktet Traco Electronic AG weltweit unter der Marke TRACOPOWER.

A svájci **TRACO ELECTRONIC AG** zürichi központtal rendelkezik. Mint a tápforrások vezető gyártója több mint 30 éves tapasztalattal rendelkezik a jó minőségű DC/DC és AC/DC modulok fejlesztése és gyártása terén. A Traco Electronic AG termékeit az egész világon TRACOPOWER néven értékesíti.

**TRACO ELECTRONIC AG** to szwajcarska spółka z siedzibą w Zurychu. Jako wiodący specjalista w dziedzinie źródeł zasilania, z ponad 30-letnimi doświadczeniami, specjalizuje się w projektowaniu i produkcji wysokiej jakości modułów DC/DC oraz AC/DC. Traco Electronic AG sprzedaje swoje wyroby na całym świecie pod marką TRACOPOWER.

**TRACO ELECTRONIC AG** este o companie elvețiană cu sediul în Zurich, Elveția și este unul prin principalii specialiști în rețele electrice cu peste 30 de ani experiență în proiectarea și fabricarea de transformatoare de curent continuu și alternativ de înaltă calitate. Traco Electronic AG își comercializează produsele la nivel global sub marca comercială TRACOPOWER.

**TRACO ELECTRONIC AG** je švajčiarska spoločnosť s centrálou v Zurichu. Ako vedúci špecialista na napájacie zdroje, s viac než 30 ročnými skúsenosťami, sa špecializuje na návrh a výrobu vysoko kvalitných DC/DC a AC/DC modulov. Traco Electronic AG predáva svoje výrobky celosvetovo pod značkou TRACOPOWER.

Mission of Traco Electronic AG is to provide customers with an optimal power supply solution in terms of performance, quality and cost for their specific application. Products range from miniature SMD types, through SIP, DIP packages to open frame, encapsulated, enclosed and DIN-rail power supplies.

## Why TRACOPOWER?

- top quality designed in Switzerland
- reliable industrial solutions for power supply
- many types with galvanic isolation available
- wide range of types, incl. DIN-rail types

## DC/DC Converters

### DC/DC Converters SMD Package 1 to 15W

Our range of isolated DC/DC converters in SMD package offers products from 1 to 15W with unregulated or regulated output voltages. All models provide high pin accuracy and are qualified for automated pick-and-place machines.



They can withstand the high temperatures in lead-free reflow solder processes and comply with IPC J-STD-020D standard. All products can also be supplied in tape and reel package.

Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TSRN 1SM	1A (up to 15W)	3.0 up to 42	1.2-15.5 / -(1.5- 15.5)	non-isolated step down voltage regulator
TES 1	1W	5, 12, 24 (±10%)	3.3, 5, 9, 12, 15, ±5, ±12, ±15	unregulated
TES 1V	1W	5, 12, 24 (±10%)	3.3, 5, 12, 15, ±5, ±12, ±15	3000 VDC I/O-Isolation unregulated
TDR 2SM	2W	4.5-9, 9-18, 18-36, 36-75	5, 12, 15, ±12, ±15	regulated 2:1 Input
TDR 2WISM	2W	4.5-18, 9-36, 18-75	5, 12, 15, ±12, ±15	regulated 4:1 Input
TES 2H	2W	5, 12, 24 (±10%)	3.3, 5, 12, ±5, ±12, ±15	unregulated
TES 2M	2W	5, 12, 24 (±10%)	5, 12, 15, ±12, ±15	unregulated 4000 VACrms I/O-Isolation

Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TES 2N	2W	4.5-9, 9-18, 18-36, 36-75	3.3, 5, 12, 15, ±5, ±12, ±15	regulated 2:1 Input
TDR 3SM	3W	4.5-9, 9-18, 18-36, 36-75	5, 12, 15, ±12, ±15	regulated 2:1 Input
TDR 3WISM	3W	4.5-18, 9-36, 18-75	5, 12, 15, ±12, ±15	regulated 4:1 Input
TES 3	3W	9-18, 18-36, 36-75	3.3, 5, 12, ±12, ±15	regulated 2:1 Input
TES 3WI	3W	9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	regulated 4:1 Input
THL 3WISM	3W	9-36, 18-75	3.3, 5, 12, 15, 24 ±5, ±12, ±15	regulated 4:1 Input
TES 5	5W	9-18, 18-36, 36-75	3.3, 5, 12, 15, ±5, ±12, ±15	regulated 2:1 Input
TES 5WI	5W	9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	regulated 4:1 Input
THL 6WISM	6W	9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	regulated 4:1 Input
TON 15	15W	18-36, 36-75	3.3, 5, 12, 15	1" x 1.1" x 0.33" Open Frame Package 2:1 Input
TON 15WI	15W	9-36, 18-75	3.3, 5, 12, 15	1" x 1.1" x 0.33" Open Frame Package 4:1 Input

### DC/DC Converters

#### DC / DC Converters SIP-Package 1 to 3W

We offer a complete range of ultra compact, isolated DC/DC converters in SIP-package with unregulated or also with regulated output voltages. Our new TMR 3WI Series are the smallest 3W converters in the market with ultra wide input range and regulated outputs.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TMA	1W	5, 12, 15, 24 (±10%)	5, 12, 15, ±5, ±12, ±15	SIP-6, unregulated
TRA 1	1W	5, 12, 24 (±10%)	5, 9, 12, 15, ±5, ±12, ±15	SIP-6, semi-regulated
TME	1W	3.3, 5, 12, 24 (±10%)	3.3, 5, 9, 12, 15	SIP-4, unregulated
TMV	1W	5, 12, 24 (±10%)	5, 12, 15, ±5, ±12, ±15	SIP-7, high I/O-Isolation 3000 VDC, unregulated
TMV-EN	1W	5, 12 (±10%)	5, 12, 15, ±5, ±12, ±15	SIP-7, high I/O-Isolation 3000 VAC, unregulated
TRV 1	1W	5, 12, 24 (±10%)	5, 9, 12, 15	SIP-7, semi-regulated, I/O-Isolation 3000 VDC
TMH	2W	5, 12, 24 (±10%)	5, 12, 15, ±5, ±12, ±15	SIP-6, unregulated
TMR 2E	2W	4.5-9, 9-18, 18-36, 36-75	3.3, 5, 12	SIP-8, 2:1 Input Range, regulated
TMR 2	2W	4.5-9, 9-18, 18-36, 36-75	3.3, 5, 12, ±5, ±12, ±15	3.3, 5, 12, ±5, ±12, ±15
TMR 2WI	2W	9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	SIP-9, 4:1 Input Range, regulated
TMR 3	3W	4.5-9, 9-18, 18-36, 36-75	3.3, 5, 12, 15, ±5, ±12, ±15	SIP-8, 2:1 Input Range, regulated
TMR 3WI	3W	4.5-18, 9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	SIP-8, 4:1 Input Range, regulated

#### DC / DC Converters General Purpose 2 to 30W

Our TEL series contains DC/DC converters modules with industry standard packages and pin-outs, available in the power range of 2W to 30W. Proven circuit topologies, full SMT construction and highly automated assembly lines makes these series the most cost-effective solution for many applications.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TEL 2	2W	4.5-9, 9-18, 18-36, 36-75	3.3, 5, 12, 15, ±5, ±12, ±15	DIP-16, 2:1 Input Range, Plastic Case
TEL 3	3W	4.5-9, 9-18, 10-30, 18-36, 36-75	5, 12, 15, ±12, ±15	DIP-24, 2:1 Input Range, Plastic Case

Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
THL 3WI	3W	9-36, 18-75	3.3, 5, 12, 15, 24, ±5, ±12, ±15	DIP-16, 4:1 Input Range, Plastic Case
TEL 5	5W	9-18, 18-36	3.3, 5, 12, ±12, ±15	DIP-24, 2:1 Input Range, Plastic Case
THL 10WI	10W	9-36, 18-75	3.3, 5.1, 12, 15, 24, ±5, ±12, ±15	1" x 1", 4:1 Input Range, Metal Case
TEL 15	15W	9-18, 18-36, 36-75	3.3, 5.1, 12, 15, ±5, ±12, ±15	1" x 2", 2:1 Input Range, Metal Case
THL 20WI	20W	9-36, 18-75	3.3, 5.1, 12, 15, ±12, ±15	1" x 1", 4:1 Input Range, Metal Case
TEL 30	30W	18-36, 36-75	2.5, 3.3, 5.1, 12, 15	1" x 2", 2:1 Input Range, Metal Case

#### DC / DC Converter Modules High Performance 3 to 15W

The TEN series is an extensive range of high performance DC/DC converters offering excellent specifications and very high power density in shielded metal packages.

All models are available with wide 2:1 or ultra-wide 4:1 input ranges.

The TEN series models offer an extended operating temperature range of -40 to +85°C and provide an internal EMI-filter to meet EN/UL 55022, class A.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TDR 2	2W	4.5-9, 9-18, 18-36, 36-75	5, 12, 15, ±12, ±15	DIP-14, 2:1 Input Range
TDR 2WI	2W	4.5-18, 9-36, 18-75	5, 12, 15, ±12, ±15	DIP-14, 4:1 Input Range
TDR 3	3W	4.5-9, 9-18, 18-36, 36-75	5, 12, 15, ±12, ±15	DIP-14, 2:1 Input Range
TDR 3WI	3W	4.5-18, 9-36, 18-75	5, 12, 15, ±12, ±15	DIP-14, 4:1 Input Range
TEN 3	3W	4.5-9, 9-18, 18-36, 36-72	3.3, 5, 12, 15, ±5, ±12, ±15	DIP-24, 2:1 Input Range, Plastic Case
TEN 3WI	3W	9-36, 18-75	3.3, 5, 12, 15, ±12, ±15	DIP-24, 2:1 Input Range, Plastic Casing
TEN 5	6W	4.5-7, 9-18, 18-36, 36-75	3.3, 5, 12, 15, ±5, ±12, ±15	DIP-24, 2:1 Input Range
TEN 5WI	6W	9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	DIP-24, 4:1 Input Range
TEN 6N	6W		3.3, 5, 12, 15, 24, ±5, ±12, ±15	DIP-24, 2:1 Input Range, Plastic Casing
TEN 6WIN	6W	9-36, 18-75	3.3, 5, 12, 15, 24, ±5, ±12, ±15	DIP-24, 2:1 Input Range, Plastic Casing
TEN 8	8W	9-18, 18-36, 36-75	3.3, 5, 12, 15, ±5, ±12, ±15	DIP-24, 2:1 Input Range



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TEN 8WI	8W	9-36, 18-75, 43-160	3.3, 5, 12, 15, ±5, ±12, ±15	DIP-24, 4:1 Input Range, Excellent EMC
THD 10	10W	9-18, 18-36, 36-75	2.5, 3.3, 5.1, 12, ±12, ±15	DIP-24, 2:1 Input Range
TEN 10	10W	9-18, 18-36, 36-75	3.3, 5, 12, 15, 24, ±5, ±12, ±15	1" x 2", 2:1 Input Range
THD 12	12W	9-18, 18-36, 36-75	2.5, 3.3, 5.1, 12, ±12, ±15	DIP-24, 2:1 Input Range
THD 12WI	12W	9-36, 36-75	3.3, 5.1, 12, 15, ±5, ±12, ±15	DIP-24, 4:1 Input Range
TEN 12WI	12W	9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	1" x 2" 4:1 Input Range
TON 15	15W	18-36, 36-75	3.3, 5, 12, 15	1" x 1.1" x 0.33" Open Frame Package 2:1 Input
TON 15WI	15W	9-36, 18-75	3.3, 5, 12, 15	1" x 1.1" x 0.33" Open Frame Package 4:1 Input
THD 15	15W	18-36, 36-75	3.3, 5.1, 12, 15, ±12, ±15	1" x 1", 2:1 Input Range
THD 15N	15W	9-18, 18-36, 36-75	3.3, 5.1, 12, 15, ±5, ±12, ±15	DIP-24, 2:1 Input Range
THD 15WIN	15W	9-36, 18-75	3.3, 5.1, 12, 15, ±5, ±12, ±15	DIP-24, 4:1 Input Range
THN 15	15W	9-18, 18-36, 36-75	3.3, 5.0, 12, 15, ±5, ±12, ±15	1" x 1", 2:1 Input Range
THN 15WI	15W	9-36, 18-75	3.3, 5.0, 12, 15, ±5, ±12, ±15	1" x 1", 4:1 Input Range
TEN 15	15W	9-18, 18-36, 36-75	3.3, 5, 12, 15, ±5, ±12, ±15	1" x 2", 2:1 Input Range
TEN 15WI	15W	9-36, 18-75	3.3, 5.1, 12, ±12, ±15	1" x 2", 4:1 Input Range

**DC / DC Converter Modules**  
High Performance 20 to 60W

The TEN series is an extensive range of high performance DC/DC converters offering excellent specifications and very high power density in shielded metal packages.

All models are available with wide 2:1 or ultra-wide 4:1 input ranges .

The TEN series models offer an extended operating temperature range of -40 to +85°C and provide an internal EMI-filter to meet EN/UL 55022, class A.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
THN 20	20W	9-18, 18-36, 36-75	3.3, 5, 12, 15, ±12, ±15	1" x 1", 2:1 Input Range
THN 20WI	20W	9-36, 18-75	3.3, 5, 12, 15, ±12, ±15	1" x 1", 4:1 Input Range

Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TEN 20	20W	9-18, 18-36, 36-75	3.3, 5, 12, 15, ±12, ±15	1" x 2", 2:1 Input Range
TEN 20WIN	20W	9-36, 18-75	3.3, 5, 12, 15, ±5, ±12, ±15	1" x 2", 4:1 Input Range
TEN 20WIR	20W	9-36, 18-75, 43-160	3.3, 5, 12, 15, ±12, ±15	1" x 2", 4:1 Input Range, Excellent EMC
TEN 25	5W/30W	9-18, 18-36, 36-75	3.3, 5, 12, 15, ±12, ±15	1.6" x 2", 2:1 Input Range
TEN 25WI	5W/30W	10-40, 18-75	3.3, 5, 12, 15, ±12, ±15	1.6" x 2", 4:1 Input Range
TEN 30	30W	9-18, 18-36, 36-75	1.5, 2.5, 3.3, 5.1, 12, 15, ±5, ±12, ±15	1" x 2", 2:1 Input Range
TEN 30WI	30W	10-40, 18-75	1.8, 2.5, 3.3, 5, 12, 15, ±12, ±15	1.6" x 2" 4:1 Input Range
TEN 30WIN	30W	9-36, 18-75	1.8, 2.5, 3.3, 5, 12, 15, ±12, ±15	1" x 2", 4:1 Input Range
TEN 40N	40 W	9-18, 18-36, 36-75	3.3, 5, 12, 15, ±12, ±15	2" x 1" 2:1 Input Range
TEN 40	40W	9-18, 18-36, 36-75	3.3, 5, 12, 15, 3.3/±12, ±15, 3.3/±12, 3.3/±15, 5/±12, 5/±15	2" x 2", 2:1 Input Range
TEN 40WI	40W	9-36, 18-75	3.3, 5, 12, 15, ±12, ±15	2" x 2", 4:1 Input Range
TEN 60	60W	18-36, 36-75	3.3, 5, 12, 15	2" x 2", 2:1 Input Range

**DC / DC Converters**  
High Power Modules 75 to 240W

The new TEP series are a range of ultra-compact high power DC/DC converter modules with 75 up to 240W output power. Particularly suitable for industrial applications the modules can also be chassis mounted with screw terminal connection. Aluminium baseplate and attachable heat sinks allow operation with convection cooling. They feature wide 2:1 or 4:1 input voltage range.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TEP 75WI	75W	9-36, 18-75	5.0, 12, 15, 24, 28, 48	2.4" x 2.3", 4:1 Input Range
TEP 100	100W	9-18, 18-36, 36-75	3.3, 5.0, 12, 15, 24, 28, 48	2.4" x 2.3", 2:1 Input Range
TEP 150WI	150W	9-36, 18-75	12, 15, 24, 28, 48	3.9" x 2.1", 4:1 Input Range
TEP 160	150W	9-22, 18-36, 34-75	3.3, 5.0, 12, 15, 24, 28, 48	2.4" x 2.3", 2:1 Input Range
TEP 160WIR	142-182	8.5-36, 16.5-75, 43-160	12, 15, 24, 28, 48	2.4" x 2.3", 4:1 Input Range
TEP 200WIR	180-240	8.5-36, 16.5-75, 43-160	12, 15, 24, 28, 48	2.4" x 2.3", 4:1 Input Range

### DC / DC Converters Reinforced Insulation up to 6000V, 2 to 6W

The new TEP series are a range of ultra-compact high power DC/DC converter modules with 75 up to 240W output power. Particularly suitable for industrial applications the modules can also be chassis mounted with screw terminal connection. Aluminium baseplate and attachable heat sinks allow operation with convection cooling. They feature wide 2:1 or 4:1 input voltage range.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TMV-EN	1W	5, 12 (±10%)	5, 12, 15, ±5, ±12, ±15	SIP-7, I/O-Isolation 3000 VAC
THI 2	2W	5, 12, 24 (±10%)	5, 12, 15, ±5, ±12, ±15	DIP-24, I/O-Isolation 2500 VAC
THI 2M	2W	5, 12, 24 (±10%)	5, 12, 15, ±12, ±15	DIP-16, I/O-Isolation 4000 VAC
THB 3	3W	4.5-9, 9-18, 18-36, 36-75	5, 12, 24, ±12, ±15	DIP-24, I/O-Isolation 4000 VAC
THP 3	3W	9-40, 18-80, 36-160	5, 12, ±12, ±15	DIP-24, I/O-Isolation 4000 VAC
THB 6	6W	9-18, 18-36, 36-75	5, 12, ±12, ±15	DIP-24, I/O-Isolation 4000 VAC

### DC / DC Converters Switching Regulators - POL Converters

The new TSR-1 Series are step-down 1A switching regulators, pin compatible to TO-220 style linear regulators. Very high efficiency allows operation without any heatsink.

The TSR-3 Series are step-down 3A switching regulators with very high efficiency with ultra compact SIP open frame construction.

The TOS series are a range of POL (point-of-load) converters compliant to DOSA standard. There are models in SIP or SMD format available with 6 to 30A maximal output current.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TSRN 1	1A	4.6-42	1.5-15 / -(1.5-15)	SIP-3, straight or angled pins
TSRN 1SM	1A	3.0 up to 42	1.2-15.5 / -(1.5- 15.5)	SMD
TSR 1	1A	4.75-32	1.5, 1.8, 2.5, 3.3, 5.0, 6.5, 9.0, 12, 15	SIP-3
TSR 3	3 A	2.5-5.5, 4.5-14, 10-30	0.6-6, 5-15	SIP, open frame
TOS	6A, 10A, 16A, 30A	2.4-5.5, 8.3-14.0	0.75-3.3, 0.75-5.0	SIP, SMD

### DC / DC Converters High Voltage Output 180 to 2000VDC

High Voltage power supplies (2 and 5W) are compact shielded metal package. Full SMT-construction with ceramic capacitors for highest reliability. Excellent output stability and low temperature drift.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
THV	2W	12 (±10%)	180-2000	80/100 x 12 x 20mm Metal Case
PHV	5W	12 (±10%)	350-2000	60 x 40 x 20mm Metal Case

### DC / DC Converters High Power Industrial 60 to 22'000W

We offer a low cost range of boxed DC/DC converters with a power range of 60 to 300W and also an extensive range of high performance converters offering models up to 22'000W output power with an unique flexibility of input/output voltage configurations and options. Standard models with output voltages from 5 to 250VDC and up to 200A are available in this program.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TZL	60-300W	18-36, 36-72	12, 24	Enclosed Metal Case
TSC	150-5000W	10, ..., 800	5, ..., 800	Modules for 19"-Subracks, DIN-rail or wall mounting
TSC 19"	5kW-22kW	10, ..., 800	5, ..., 800	19"-Subrack

DC/DC and AC/DC modules, Adapters, Power Supplies and Chargers, Batteries, Alternative Power Supplies and Accessories

Possibility to order a printed catalogue TracoPower, ord. no 4460.

[www.tracopower.com](http://www.tracopower.com)

**AC/DC Power Supplies**

**AC / DC Power Supplies Encapsulated Modules**

TRACOPOWER offers a large range of fully encapsulated power modules with more than 200 standard models. They are available for PCB mount, chassis mount with screw terminal block or Faston tabs or for installation into standard flush boxes



For some models there is a DIN-rail mount Adapter available TMP, TPM and TMT series are safety class II products.

The TMT series has UL 508 listed models and is also approved to medical safety standard EN/UL 60601-1.

Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TMS	6,....,25W	5-264VAC, 50/60Hz 110-375VDC	5, 12, 15, 24, ±12, ±15	PCB- or Chassis-Mount, Models with FASTON-Tabs
TMLM	4,....,20W	90-264VAC, 47-440Hz	3.3, 5, 9, 12, 15, 24, +5/+3.3, +12/+5	PCB-Mount, Ultra compact
TML	20 & 40W	90-264VAC, 47-440Hz	3.3, 5, 12, 15, 24, ±5, ±12, ±15, 5/12, 5/24 5/±12, 5/±15	PCB- or Chassis-Mount
TPM	5,....,30W	85-264VAC, 47-440Hz 110-375VDC	5, 12, 15, 24, ±12, ±15, 5/±12, 5/±15	PCB- or Chassis Mount, Safety Class II
TMP & TMPM	4,....,60W	85-264VAC, 47-440Hz 120-370VDC	3.3, 5, 12, 15, 24, ±12, ±15, 5/±12, 5/±15, 3.3/5/12	PCB-/Chassis-/Din-Rail Mount, Safety Class II
TMT	0,....,50W	85-264VAC, 50/60Hz, 85-370VDC	5, 12, 15, 24, 48, ±12, ±15, +5/+12, +5/±12, +5/±15, +3.3/+5/+12, +5/+3.3/+12	PCB-/Chassis-/DIN-Rail-Mount, Safety Class II, UL508 listed, Medical Safety Approval
TIW	6 & 12W	90-264VAC, 50/60Hz	3.3, 5, 6, 12, 15, 24	Flush Box Mount

**AC / DC Power Supplies Open Frame Construction**

TRACOPOWER offers a wide range of open frame power supplies with 10 to 300W output power. The new TOP-100 series in the popular 4 x 2" format supplies fully 100W with convection cooling up to 50°C.



The TOF series features a very high reliability with its conservative thermal design. This series is also available with screw terminal block and case kit for industrial applications.

**DIN-Rail Mount Power Supplies Low Profile Metal Case 50 to 600W**

The popular TIS series is a range of DIN-rail power supplies in rugged metal case with a very low depth (57 mm for 50 to 150 W models resp. 83 mm for 300 to 600 W models).



For system applications the basic models can be expanded with built-in function modules for true N+1 redundancy operation or to a battery controller to configure a DC back-up system.

Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TIS	50,...., 600W	93-132VAC/ 187-264VAC User selectable	12, 24, 48, 72	Low Profile Metal Case, optional built-in Function Modules.

**DC / AC Inverters**

**DC / AC Inverters Sine Wave Outputs**

With the TSD series we offer a range of high performance sine wave inverters with regulated 115/230VAC single phase or 400/500VAC three phase output. Output frequencies of 50/60 or 400Hz available. Models with standard Input voltage from 24VDC to 600VDC. Robust design in 19"- subrack for Industrial Environments.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TSD	20VA to 30kVA	24,....,600VDC	115 /230AC single phase 400 /500VAC three phase	19"-subrack

**DIN-Rail mount General Purpose Power Supplies 15 to 480W**

The TBL series comes in low profile plastic cases which fit into wall mounted control panels used in building and factory automation. This product has safety approval to the UL 1310 class II, required for commercial and residential applications.

The popular TCL series in compact plastic cases offer also models with DC-input voltage. They are available with detachable screw terminal block or with spring clamp terminals. All series come with a worldwide safety approval package.



Product Series	Output Power	Input Voltage Range [VDC]	Output Voltage [VDC]	Package Style / Features
TBL	15, 30, 60, 90, 150W	85-264VAC	5, 12, 24	Low Profile Plastic Case, Safety Class II
TBL-BC	60W	93-132 VAC / 187-264 VAC (auto select)	24	Uninterruptible Power Supply Low Profile Plastic Case, Safety Class II
TCL	24, 60, 120, 240W	85-264VAC, 85-375VDC	5.1, 12, 24, 48	Compact Plastic Case, Safety Class I
TCL-DC	24, 60W	9.5-18VDC, 18-75VDC	5, 12, 24	Compact Plastic Case
TSPC	80, 120, 240, 480	85-132 VAC / 187-264 VAC (selection switch)	24	Ruggedized construction for harsh industrial environment

Do you want to evaluate TracoPower modules in your application? Let us know at [info@soselectronic.com](mailto:info@soselectronic.com).





MEAN WELL is one of the leading switching power supply manufacturers in Taiwan, with a 30-year experience. Product lines include AC/DC switching power supplies, DC/DC converters, DC/AC inverters and battery chargers.

**CZ** MEAN WELL je přední výrobce spínaných zdrojů v Taiwane, s třicetiletými zkušenostmi. Linie produktů zahrnuje AC / DC spínané zdroje, DC / DC moduly, DC / AC invertory a nabíječky.

**DE** MEAN WELL ist führender Produzent von Schaltnetzteilen in Taiwan mit 30 Jahren Erfahrungen. Die Produktlinie umfasst AC/DC-Schaltnetzteile, DC/DC-Module, DC/AC-Wechselrichter und Ladegeräte.

**HU** A MEAN WELL egyike a vezető tajvani kapcsolóüzemű tápegység gyártóknak, mely már 30 éves tapasztalattal rendelkezik. Termék kínálatába AC/DC kapcsolóüzemű tápok, DC/DC modulok, DC/AC inverterek és töltők találhatók.

**PL** MEAN WELL to lider w produkcji źródeł impulsowych z Tajwanu, z 30-letnimi doświadczeniami. Szereg produktów obejmuje zasilacze impulsowe AC/DC, moduły DC/DC, przetwornice DC/AC oraz ładowarki.

**RO** MEAN WELL este unul din principalii producători de rețele de alimentare cu comutare din Taiwan, cu o experiență de 30 de ani. Linia de producție include rețele de alimentare cu comutare cu curent continuu și alternativ, convertitoare de curent continuu/alternativ, invertore curent continuu/alternativ și încărcătoare de baterii.

**SK** MEAN WELL je vedúci výrobca spínaných zdrojov v Taiwane, s 30 ročnými skúsenosťami. Línia produktov zahŕňa AC/DC spínané zdroje, DC/DC moduly, DC/AC invertory a nabíjačky.

Mean Well has over 4000 standard models widely used in automation, communication, LED lighting, medical, moving sign, and office automation fields. Mean Well has earned a good reputation based on the quality, competitive prices and reliable deliveries. From a wide portfolio we offer you AC/DC switch-mode power supplies.

### Why MEAN WELL?

- competitive prices
- very good quality

### Did You Know?

In 2010, MEAN WELL was awarded the "Taiwan Superior Brands 2010" title by the Taiwan Bureau of Foreign Trade (BOFT).

### Single Output Switching Power Supplies

#### S Series



- Low cost, high reliability .compact size, light weight
- 105°C output capacitor .100% full load burn-in test
- International ac input range .built in emi filter, low ripple noise
- High efficiency, low working temperature
- Soft-start circuit, limiting ac surge current
- Short circuit, overload, over voltage protected

**Output Power:** 60W, 150 W  
**Output Voltage:** 5V, 12V, 24V

#### AD Series



AD Series is a single output AC/DC power supply with battery charger (UPS) Function that meets UL, TUV, CB & CE requirements. AD Series also has standard features such as short circuit, over load and over load protections as well as optional battery low protections and alarm signals. Suitable applications include control panels, back-up systems

**Output Power:** 55W, 150 W  
**Output Voltage:** 13.8V, 27.6V,

#### RS Series



- Universal AC input / Full range
- Protections: Short circuit / Overload / Over voltage
- Miniature size, non-PFC
- 100% full load burn-in test
- 300VAC input surge, all using 105°C capacitors
- High operating temperature up to 70°C
- Withstand 5G vibration test
- Suitable for critical applications
- No load power consumption<0.5

**Output Power:** 15W, 25W, 35W, 50W, 75W, 100W, 150W  
**Output Voltage:** 3.3V, 5V, 12V, 15V, 24V, 48V

### Single Output Switching Power Supplies with SLA charger

#### SCP Series



- Universal AC input/Full range
- Protections: Short circuit / Overload / Over voltage
- 100% full load burn-in test
- Battery polarity protections
- Built-in temperature compensation function
- Suitable for security industry or battery backup systems
- No load power consumption <0.75W

**Output Power:** 35W, 50W, 75W  
**Output Voltage:** 5V, 12V, 24V

### Single Output Industrial DIN RAIL Power Supplies

#### DR Series



- AC input range selectable by switch
- Protections: Short circuit/Over load/Over voltage/Over temperature
- Cooling by free air convection
- Can be installed on DIN rail TS-35/7.5 or 15
- UL 508(industrial control equipment)approved
- LED indicator for power on
- 100% full load burn-in test
- Isolation class II
- Suitable for building automation and control of household appliance

**Output Power:** 60W, 75W, 120W, 240W, 480W  
**Output Voltage:** 12V, 24V, 48V


#### MDR Series





- Universal AC input/Full range
- Protections: Short circuit / Overload / Over voltage
- Cooling by free air convection
- Can be installed on DIN rail TS-35/7.5 or 15
- NEC class 2 / LPS compliant
- LED indicator for power on
- 100% full load burn-in test
- Built in DC OK active signal


**Output Power:** 20W, 40W, 60W  
**Output Voltage:** 12V, 24V


In general, these devices serve to convert a line supply voltage (usually 230V AC) to a desired voltage and current level.


 Obecně tato zařízení slouží pro přeměnu síťového napětí (obvykle 230V AC) na požadovanou napětíovou a proudovou úroveň.

 Im Allgemeinen dienen diese Geräte zur Umwandlung von Netzspannung (normalerweise 230V AC) auf den gewünschten Spannungs- und Strompegel.

 Általánosságban ezek a berendezések alakítják át a hálózati feszültséget (általában 230V váltófeszültség) a kívánt feszültségre és áramerősségre.

 Urządzenia te służą do przemiany napięcia sieciowego (zwykle 230V AC) na wymagany poziom napięcia i prądu.

 In general, aceste dispozitive servesc la convertirea unei tensiuni de alimentare de linie (de obicei 230V AC) la o tensiune dorită și nivel de curent.

 Vo všeobecnosti tieto zariadenia slúžia na konverziu sieťového napätia (obvyčajne 230V AC) na želanú napätíovú a prúdovú úroveň.

They all have a transformer or a switch mode power supply to convert line AC voltage to a (usually) lower voltage. Then follows a simple or a more sophisticated electronic circuitry for stabilization of voltage, current limitation, shortcut protection, output voltage selection and

other desired properties. Chargers are specific in the way, that they are designed to meet requirements for safe and quick charging of various types of batteries, according to their chemical principle. All these devices should also meet requirements for power-efficiency (ErP).

### Classification:



#### Adapters

– a form of a power supply usually referred to plug-in or desktop power supplies, with a power of single Watts to few tens of Watts, used for supplying of all kinds of electronic devices. The most widely used are the types with a stabilized output voltage, limited output current and with one or more types of output connectors (DC jacks). Output voltage is often selectable via a voltage selector (1.5, 3, 6, 9, 12V etc.).



#### Power supplies

– usually referred to a wide variety of industrial power supplies with a power of single watts to hundreds of Watts, with various output voltages (often multiple) and of various mechanical constructions – closed case, open frame, DIN-rail mounted, etc.



#### Laboratory power supplies

– power supplies specifically designed for laboratory purposes, evaluation and testing, for example at development of new electronic devices. They usually have adjustable output voltage (often symmetrical or double) as well as adjustable current limitation, what prevents a damage to a tested device in case of a shortcut or other problem in a tested device.



#### Voltage converters

– usually referred to devices converting line voltage of one norm to other, for example 230V AC to 110V AC. They enable to supply a device designed for other voltage from a domestic line voltage.



#### Inverters

– electronic devices converting a DC voltage to an AC voltage, for example 12V DC to 230V AC. In principle, they are switch mode power supplies. construction from single ones ensuring only a stabilized charging current to fully intelligent chargers, controlling all charging parameters as well as temperature of cells during charging.



#### Chargers

– a special case of a power supply, with electrical characteristics conformed to a proper charging of a given type of rechargeable batteries. They are always marked for which kind of batteries they are intended, for example NiCd, NiMH, Li-ion, Li-pol, Li-Fe, RAM, Pb and other. They are of a various construction from single ones ensuring only a stabilized charging current to fully intelligent chargers, controlling all charging parameters as well as temperature of cells during charging.

# Wall Power



## FRIWO's new in-wall power supplies

- Fits into all standard in-wall junction boxes
- Compact design with high efficiency
- NEW: Also available with dual USB ports

*A leading manufacturer of power supplies and chargers - worldwide*

FRIWO is a world-wide leading manufacturer of power supplies and chargers.

In addition to a wide range of standard products, we develop and manufacture customer-specific power supplies.

**FRIWO**<sup>®</sup>

**FRIWO Gerätebau GmbH**

Von-Liebig-Strasse 11 | 48346 Ostbevern (Germany) | Tel. + 49 (0) 25 32/81-0 | Fax + 49 (0) 25 32/81-112

sales@friwo.de | www.friwo.de

For more details contact your authorised distributor SOS electronic europe.





The FRIWO brand stands worldwide for high-quality power-supply and charging equipment. Friwo, located in Ostbevern/ Germany, develops and produces innovative and efficient power-supply and charging devices that are designed to meet the very wide range of technical and country-specific requirements.

**Značka FRIWO** znamená vysoce kvalitní vybavení pro napájení a nabíjení. Friwo, nacházející se v Ostbevern/ Německo, vyvíjí a vyrábí inovativní a efektivní napájecí a nabíjecí zařízení, která jsou navržena tak, aby vyhovovala velmi širokému rozsahu technických a jiných místních specifických požadavků.

**Die Marke FRIWO** steht für hochwertige Stromversorgung und Ladetechnik. Friwo mit Sitz in Ostbevern/ Deutschland entwickelt und produziert innovative und effiziente Netzteile und Ladegeräte, die so entworfen sind, um einem breiten Spektrum technischer sowie anderer lokalspezifischer Anforderungen gerecht zu werden.

**A FRIWO** egyet jelent a jó minőségű tápforrásokkal és töltőkkel. A németországi Ostbevern-ben székel. Innovatív és hatékony tápforrásokat és töltőberendezéseket fejleszt és gyárt, melyek úgy vannak megtervezve, hogy a legszélesebb körű műszaki és a speciális helyi igényeknek is megfeleljenek.

**Marka FRIWO** to wysokiej jakości wyposażenie do zasilania i ładowania. Friwo, mające siedzibę w Ostbevern/ Niemcy, projektuje i produkuje innowacyjne i wydajne urządzenia zasilające oraz ładowające, które zaprojektowano tak, aby odpowiadały bardzo szerokiemu zakresowi technicznych i innych specyficznych lokalnie wymogów.

**Marca FRIWO** este cunoscută la nivel global pentru echipamentele de alimentare și încărcare de o înaltă calitate. Friwo, cu sediul în Ostbevern/Germania, dezvoltă și produce dispozitive de alimentare și eficiente proiectate pentru a înfruni o gamă largă de cerințe tehnice, în funcție de specificul național.

**Značka FRIWO** znamená vysoké kvalitné vybavenie pre napájanie a nabíjanie. Friwo, nachádzajúce sa v Ostbevern/ Nemecko, vyvíja a vyrába inovatívne a efektívne napájacie a nabíjacie zariadenia, ktoré sú navrhnuté aby vyhovovali veľmi širokému rozsahu technických a iných miestnych špecifických požiadaviek.

Many products are certified for medical use. The most of Friwo products are designed for a wide input voltage range 100 - 240V AC, making them universally usable all over the world. Most of plug-in power supplies have exchangeable primary adapters and most of plug-in and desktop power supplies have exchangeable secondary adapters.

Friwo products include plug-in and desktop power supplies (incl. medical), USB, flush mounting and open frame power supplies, as well as chargers. Newly Friwo produces also power sources for LED lighting. As a globally active technology company, Friwo is represented on all important markets. Many world leading OEM manufacturers relies on Friwo products, such as Bosch, Whirlpool and many others.

## Why FRIWO?

- high performance, energy efficient products that meet the most stringent demands (EuP2 and other), also for medical use
- universal use thanks to a wide input voltage range, usually from 100 to 240V AC
- the most of Friwo products can be customized - laser adjusted at production to a desired output voltage and current.
- medical versions available from many types

## Switchmode Power Supplies

### LT Series – LED drivers

Constant current and/or constant voltage power supplies, 7 to 60 Watts. Dimmable with optionally connectable Dimmbox controlled via DALI, analog 1-10V and by a pushbutton. Custom specific setup by laser trimming. Low-profile, slim - narrow design even at high power types.



### DT Series

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Low standby power
- ≤ 0.3 Watts (DT 12) resp.
- ≤ 0.5 Watts (DT 60, DT 100, DT 150)
- Continuously short circuit proof
- High efficiency
- All products conform to IEC 61558



**Output Power:** 12W, 60W, 100W, 150W  
**Output Voltage:** 5V, 5.9V, 7.5V, 9V, 12V, 15V, 18V, 24V, 48V

### PP/ MPP Series

- PP3, PP6, PP8, MPP15, MPP30
- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Exchangeable primary adapters
- Low standby power ≤ 0.3 Watts
- Continuously short circuit proof
- High efficiency
- All products conform to IEC 61558



**Output Power:** 3W, 6W, 8W, 15W, 30W  
**Output Voltage:** 5V, 6V, 7.5V, 9V, 12V, 15V, 18V, 24V

## Switchmode Chargers

- NiCd/NiMH, 1Ah-35Ah
- Pb, 1.5Ah-30Ah
- Li-Ion, 0.8Ah-20Ah
- LiFePO4, 20Ah



### GPP Series

- GPP 6, GPP 10, GPP 18, GPP36
- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Exchangeable primary connectors
- Low leakage current ≤ 10 μA
- Low standby power ≤ 0.3 Watts
- Continuously short circuit proof
- All products conform to IEC 60950



**Output Power:** 6W, 10W, 18W, 30W  
**Output Voltage:** 5V, 5.9V, 7.5V, 9V, 12V, 15V, 18V, 24V

### UP, UP-USB Series

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Low standby power
- ≤ 0.3 Watts
- High output power
- Continuously short circuit proof
- Compact design
- IP 64 protection class
- also available universal types UP6, UP12 and UP18



**Output Power:** 7W  
**Output Voltage:** 5V

## Accessories

- Primary adapters
- Secondary adapters





MINWA ELECTRONICS Co. Ltd, one of the leading manufacturing companies of electronics devices and accessories, was established in 1977. The Company was formed specifically to act as an ODM, OEM partner. Minwa Electronics produces a wide range of devices, especially adapters, chargers, car accessories and cables.

**CZ** MINWA ELECTRONICS, jeden z předních výrobců elektronických zařízení a příslušenství, byla založena v r. 1977. Společnost se zformovala specificky jako ODM, OEM partner. Minwa Electronics vyrábí široké portfolio výrobků, zejména adaptéry, nabíječky, autopříslušenství a kabely.

**DE** MINWA ELECTRONICS, einer der führenden Hersteller von elektronischen Geräten und Zubehör, wurde 1977 gegründet. Das Unternehmen wurde spezifisch geformt als ODM, OEM-Partner. Minwa Electronics produziert ein breites Produktportfolio, insbesondere Netzadapter, Ladegeräte, Autozubehör und Kabel.

**HU** A MINWA ELECTRONICS egyike a vezető elektronikai berendezések és tartozékaik gyártóinak. 1977-ben alapították és ODM, OEM partnerként formálódott. Széles termékínálattal rendelkezik. Főként adaptereket, töltőket, autó felszerelést és kábeleket gyárt.

**PL** MINWA ELECTRONICS, jeden z wiodących producentów urządzeń elektronicznych oraz akcesoriów, została założona w r. 1977. Spółka stornowała się jako partner ODM, OEM. Minwa Electronics produkuje szeroką gamę produktów, zwłaszcza adaptery, ładowarki, akcesoria samochodowe i kable.

**RO** MINWA ELECTRONICS Co. Ltd este una din principalele companii de producție a dispozitivelor și accesoriilor electronice, înființată în 1977. Societatea s-a înființat în principal pentru a acționa ca partener ODM, OEM. Minwa Electronics Co. Ltd produce o gamă vastă de dispozitive, în special adaptoare, încărcătoare, accesorii de mașină și cabluri.

**SK** MINWA ELECTRONICS, jeden z vedúcich výrobcov elektronických zariadení a príslušenstva, bola založená v r. 1977. Spoločnosť sa sformovala špecificky ako ODM, OEM partner. Minwa Electronics vyrába široké portfolio výrobkov, najmä adaptéry, nabíjačky, autopríslušenstvo a káble.

Nowadays, a variety of electronics products have been penetrated into more than 75 countries and regions as well as 40 million households throughout these years. Minwa Electronics Co. Ltd. has always maintained the philosophy of designing a quality product with quality components for durability and long life. Minwa products have gained their popularity due to their excellent price/ performance ratio.

### Switching Adapters with adjustable output

- High efficiency
- Very low no-load power consumption
- Low weight
- Output 3-12V DC / 0,3-5A
- MW3A03, MW3IP25, MW3K10, MW3R15, MWA2102 and many other...



### Switching Adapters with Fixed Output

- High efficiency
- Very low no-load power consumption
- Low weight
- Output 5-24V DC / 0,3-5A
- MW3MU10, NA120P030, MI050P225, MK05P150, NN120P060, MW240P300 and many other



### Why MINWA?

- excellent price/performance ratio
- wide range of products

### 230VAC/115VAC Voltage Converters

- Input voltage 230V/AC
- Output voltage 115V/AC
- Available 100W - 1000W
- MW2P045, MW2P100, MW2P200, MW2P300



### Switching Adapters with 12-24V Input

- Suitable to power laptops and USB devices (phones, MP3 players, etc.)
- Output available 1.5-12V/1-2A, 15-24V/3.5A
- MWU2872, MW2172, MW210, MW292





SHANGHAI YIHUA V&A INSTRUMENT CO., LTD, known as Mastech Shanghai, is one of the major test instrument manufacturers in China specialized in professional test and measurement Instruments as well as power supplies.

**Společnost V&A INSTRUMENT**, známá i jako **MASTECH Shanghai**, je jeden z hlavních výrobců měřících přístrojů v Číně, specializující se na profesionální testovací a měřící přístroje a laboratorní zdroje.

**Das Unternehmen V&A INSTRUMENT**, bekannt auch als **Mastech Shanghai**, ist einer der wichtigsten Hersteller von Messinstrumenten in China, der sich auf professionelle Prüf- und Messgeräte sowie Laborstromversorgungen spezialisiert.

**V&A INSTRUMENT**, ismertebb néven **Mastech Shanghai**, az egyike a legfőbb mérőműszer gyártóknak, melyek professzionális tesztelő és mérőműszerekre valamint laboratóriumi tápok gyártására specializálódott.

**Spółka V&A INSTRUMENT**, znana również jako **Mastech Shanghai**, jest jednym z głównych producentów instrumentów pomiarowych w Chinach. Specjalizuje się w produkcji profesjonalnych instrumentów testowych i pomiarowych, jak również zasilaczy laboratoryjnych.

**V&A INSTRUMENT CO.,LTD**, cunoscută sub denumirea de **Mastech Shanghai**, este unul din principalii producători de instrumente de testare din China, specializată în instrumente profesionale de testare și măsurare cât și în rețele electrice.

**Spoločnosť V&A INSTRUMENT**, známa aj ako **Mastech Shanghai**, je jeden z hlavných výrobcov meračích prístrojov v Číne, špecializujúci sa na profesionálne testovacie a meracie prístroje, ako aj laboratórne zdroje.

V&A product line covers different industries such as electronic tools, electrical power, food and chemical, atmosphere monitoring, education and consumer electronics, laboratory equipment and other. V&A products feature very good electrical as well as mechanical quality.

### Why V&A INSTRUMENT?

- excellent price/performance ratio

## Laboratory Power Supplies

### HY1503D

Precise laboratory DC power supply which can operate in two modes: as voltage supply or as current supply. Two LCD displays indicate voltage and current outputs.

- Input Voltage:** 230 V/50 Hz
- Output Voltage:** 0-15 V continuously adjustable
- Output Current:** 0-3 A continuously adjustable
- Dimension:** 206x153x110 mm



### HY 3003 D

Precise laboratory DC power supply which can operate in two modes: as voltage supply or as current supply. Two LCD displays indicate voltage and current outputs.

- Input Voltage:** 230 V / 50 Hz
- Output Voltage:** 0-30V, continuously adjustable
- Output Current:** 0-3A, continuously adjustable
- Dimension:** 291x158x136mm



### HY 3003 D-3

Precise double laboratory DC power supply which can operate in two modes: as a power supply or a current supply. 4 LCD displays indicate voltage and current outputs.

- Input Voltage:** 230 V / 50 Hz
- Output Voltage:** 2x 0-30V, continuously adjustable
- Output Current:** 2x 0-3A, continuously adjustable
- Fixed output:** +5V / 3A (± 3%)
- Dimension:** 310x165x265mm



### HY 3005

Precise laboratory DC power supply for power demanding applications. HY 3005 can operate in two modes: as voltage supply or as current supply. 2 LED displays indicate voltage and current outputs, characters are readable in darkness.

- Input Voltage:** 230 V / 50 Hz
- Output Voltage:** 0-30V, continuously adjustable
- Output Current:** 0-5A, continuously adjustable
- Dimension:** 291x158x136mm



### HY 3003-3 HY 3005-3

Precise double laboratory DC power supply which can operate in two modes: as a power supply or as a current supply. 2 LED displays indicate voltage and current outputs, readable in darkness.

- Input Voltage:** 230 V / 50 Hz
- Output Voltage:** 2x 0-30V, continuously adjustable
- Output Current:** 2x 0-3A (5A), continuously adjustable
- Fixed output:** +5V / 3A (± 3%)
- Dimension:** 310x165x265mm



### HY 3010 HY 3020

Precise laboratory DC power supplies for power demanding applications. They can operate in two modes: as voltage supplies or as current supplies. 2 LED displays indicate voltage and current outputs.

- Input Voltage:** 230 V / 50 Hz
- Output Voltage:** 0-30V, continuously adjustable
- Output Current:** 0-10A (20A), continuously adjustable
- Dimension:** 365x265x164mm



This is a selection of available products. Full range of types can be found on our web site.





The company DIAMETRAL, established in 1991/ Czech Republic, specialises on the production of laboratory technique, laboratory tables, laboratory power supplies, micro-soldering stands, disjunctive transformers, panel foil keyboards and transport signalisation.

**Společnost DIAMETRAL**, založena v r. 1991 / Česká republika, se specializuje na výrobu laboratorní techniky, laboratorních stolů a napájecích zdrojů, mikropáječek, oddělovacích transformátorů, panelových membránových klávesnic a dopravní signalizace.

**Das Unternehmen DIAMETRAL**, gegründet 1991 / Tschechische Republik, spezialisiert sich auf die Herstellung von Labortechnik, Labortischen und -stromversorgungen, Mikro-Lötstationen, Sicherheitstransformatoren, Membrantastaturen für die Steuertafel und Verkehrssignalanlagen.

**A DIAMTERAL** 1991-ben alapították a Cseh Köztársaságban. Laboratóriumai felszerelések, laboratóriumiasztalok és tápegységek, mikro-forrasztó-állomások, leválasztó transzformátorok, membrán billentyűzetek és közlekedési jelzések gyártására szakosodott.

**Spółka DIAMETRAL**, założona w r. 1991 / Republika Czeska, specjalizuje się w produkcji techniki laboratoryjnej, laboratoryjnych stołów i źródeł zasilania, stacji mikrolutowniczych, transformatorów separacyjnych, panelowych klawiatur membranowych oraz sygnalizacji ruchu.

**Societatea DIAMETRAL**, înființată în 1991 / Republica Ceha specializată în producția de tehnică de laborator, mese de laborator, rețele electrice de laborator, suporturi pentru micro-sudură, transformatori disjunctivi, tastaturi în folie pentru panouri și semnalizare de transport.

**Spoločnosť DIAMETRAL**, založená v r. 1991 / Česká Republika, sa špecializuje na výrobu laboratórnej techniky, laboratórných stolov a napájacích zdrojov, mikros pájkovacích staníc, oddelovacích transformátorov, panelových membránových klávesnic a dopravnej signalizácie.

Advanced laboratory tables system VarioLab+ offers big variability. Thanks to this modular system of laboratory furniture the company is now able to offer to their customers a complete solution for establishing and furnishing of laboratories, technical classrooms and operational rooms.

### Why DIAMETRAL?

- quality of EU made products
- high reliability – products designed for everyday use

### DC Laboratory Power Supplies



P130R51D



P130R51D  
L140R51D



P230R51D  
L240R51D



V130R50D  
V140R50D



Q130R50D



M130R50D

Technical Parameters	R124R50E	P130R51D	P230R51D	L140R51D	L240R51D	V130R50D	V140R50D	Q130R50D	M130R50D
Supply Voltage	230V/50Hz	230V/50Hz	230V/50Hz	230 V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz
Output Voltage	1x 0,9 ÷ 24V	1x 0 ÷ 30V	2x 0 ÷ 30V	1x 0 ÷ 40V	2x 0 ÷ 40V	1x 0 ÷ 30V	1x 0 ÷ 40V	1x 0 ÷ 30V	1x 0 ÷ 30V
Output Current	1x 0 ÷ 2A	1x 0 ÷ 4A	2x 0 ÷ 4A	1x 0 ÷ 3A	2x 0 ÷ 3A	1x 0 ÷ 10A	1x 0 ÷ 10A	1x 0 ÷ 20A	1x 0,2 ÷ 40A
Constant Voltage	-	1x 5V	1x 5V	1x 5V	1x 5V	-	-	-	-
Constant Current	-	1x 3A	1x 3A	1x 3A	1x 3A	-	-	-	-

### AC Power Supplies, Isolation Transformers



AC250KxD Series



OT230.0xx Series



OT230 Series

Technical Parameters	OT230.012	OT230.021	OT230.030	OT230.050	OT230.100
Supply Voltage	230V/50Hz	230V/5 Hz	230V/50 Hz	230V/50 Hz	230V/50 Hz
Output Voltage	230V	230V	230V	230V	230V
Max. Output Current	1,2A	2,1A	3,0A	5,0A	10,0A

### Autotransformers



RA1F250.031



RA1F250.200



RA1F250.100



RZ3F400.060

Technical Parameters	RA1F250.031	RA1F250.100	RA1F250.200
Supply Voltage	230V / 50Hz	230V / 50Hz	3x400V / 50Hz
Output Voltage	< 5 ÷ 230V	< 5 ÷ 230V	< 5 ÷ 450V
Output Current	3,1A	10A	6A

## Laboratory Furniture



Superstructures with devices are made in various widths and single or double performance



Legible display of all values and devices control under 10° angle



VARIOLAB+

### VarioLab+ Grows with You

Measuring, laboratory and working table VarioLab+ is intended for school classrooms, electro-technical workshops and research, production and repair workplaces. The modular design of tables makes it possible to equip it according to the user's specific requirements. Thanks to the interlocking structure of the supporting part, the individual tables can be combined into self-contained groups and each table can be completed with further shelves, holders, etc. Therefore it is possible to place the individual parts, including the working desk, at valuable height level according to the specific needs of each user by 1 mm and individual tables can be simply concatenated in continuous straight or corner working centres.

Supporting part of the table is made from metal square tubes with size 40 x 40 mm and height up to 2000 mm. Therefore it is possible to place the individual parts, including the work desk, at valuable height according to the specific needs of each user. The surface of metal frame is made from baked-on coating Comaxit (available in different colours according to the customer's choice). The most recommended colours is grey RAL 7032. The working desk of the table is made from first-rate high-pressure laminate of 25 mm thickness with increased resistance against an abrasion and singe of the top layer. Desk's edges are made from plastic 4 x ABS of 2 mm thickness. Laboratory table working desk's dimensions are specified according to each particular set. Upon request, the working desk can be supplied with antistatic surface modification. The superstructure with instruments is made from laminate of 18 mm thickness with the same features as the main working desk of the table. Internal frame of the superstructure is made from metal square tubes. Instruments placed in the superstructure are inclined by an angle of 10% for easier legibility. The materials used are included in category E1 of formaldehyde evaporation and in category C2 as for the flammability parameter.

Instruments placed in the superstructure are arranged in a modular manner with following dimensions: width - 60 mm, height - 200 mm. Width of individual modules is available in multiples of basic width, i.e. 120 mm, 180 mm etc. Front panel of the modules is made from Fe plate of 2 mm thickness. Each module's surface is made from baked-on coating Comaxit



in grey colour RAL 7035.

Instrumental equipment of the superstructure is implemented according to specific requirements of each customer. Models of inbuilt instruments are in most cases modified from serial instruments manufactured by the company Diametral Ltd. Most of the modules are supplied with its own main switch and control light, but the individual modules can be used only if the superior module M08, whose utilities are circuit break, protector and main

switch TOTAL STOP, is switched off. Different customer-made modules can be manufactured according to the customer's requirements, but first is necessary to discuss the design and all particular technical specifications with manufacturer.

System VARIOLAB is dynamically growing day by day and still some new modules are enlarging the offer. For actual list of available modules please contact our office.





### Modules for Superstructures

The Variolab+ devices are the main part of the integrated system Variolab+. Collection of electro-modules and pneumatic modules is optimally designed for establishment of a sophisticated working place according to the individual needs of each user.

Collection of modules contains various types of devices including the laboratory power supplies, counters, function generators, different types of outgoing circuits, measuring instruments, terminals, circuit breakers and last but not least, pneumatic modules.

All devices are manufactured in a modular system that can be easily combined or changed without any complication. The height of modules is 200 mm and the width of each module is made in a multiple of the base width 60 mm. Eventual change can be provided by unscrewing only 4 screws and unplugging the socket plug of the device from the mains inside the superstructure.

All active modules are equipped with their own switch-off. Furthermore, all these modules are controlled by the central module with a circuit breaker, protector and switch button TOTAL STOP. Thanks to this protection, the safety of the whole workplace is fully guaranteed. This central safety module contains also a switch for shut ON/OFF the light, if needed.

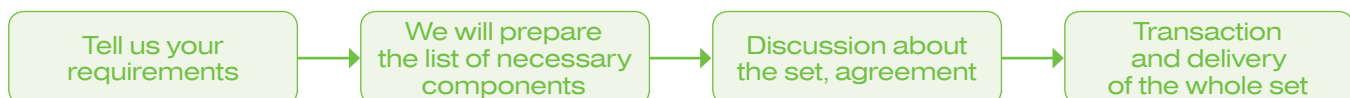
Different customer-made modules can be manufactured according to the customer's requirements. System VARIOLAB is dynamically growing day by day and still some new modules are enlarging the offer.



### Selection from available Modules

Type	Description
M00	Cover 60 mm (M01 - 120 mm)
M02	Two Single Sockets 230V, 50 Hz, 6 A
M03	Connection Terminals
M04	DC Power Supply $\pm 15V/1A$
M05	DC Laboratory Adjustable Power Supply $1x0 \pm 30V/4A; 5V/3A$
M06	Interface RS-232 (COM1 and COM2)
M07	Terminals 3x24V with 3F Circuit Breaker
M08	1-Phase Central Switch, Circuit Breaker, Protector, Switch Button TOTAL STOP
M09	AC Stabilized Power Supply 0 V - 255 V/1A
M10	Counter and Function Generator
M11	Basic Measurement of DC Voltmeter and Ammeter
M12	Micro Soldering Stand
M13	DC Power Supply 9V / 1A
M14	DC Double Laboratory Adjustable Power Supply $2x 0 \div 30V / 4 A; 5 V / 3 A$
M15	Isolating Transformer 230 V / 230 V / 1,2A
M16	DC Laboratory Adjustable Power Supply $1 x 0 \div 30 V / 10A$
M17	3-phase Pointer-type Ammeter $3 x 20A/40A$
M18	3-Phase Circuit Breaker and Protector
M19	Safety Terminals 3-Phase 400 V
M20	3-Phase Socket 16A + Switch Button ON/OFF
M21	Two Single Sockets 230V, 50 Hz, 6 A + own circuit breaker
M22	Cover 30 mm
M23	Short Circuit Tester
M24	Power Supply AC 24V/2A 1-Phase Socket + Control Light + Switch ON/OFF
M25	3-Phase Socket, Switch Button ON/OFF, Circuit Breaker 3 x 10A, Control Lights
M26	Precise Multi-meter APPA 106
M27	Power Supply DC $\pm 15V/1A; + 5V/3A$

Type	Description
M28	Interface RS-232, LPT, USB
M29	Isolating Transformer 230 V / 230 V / 2,1A
M30	3-Phase Circuit Breaker
M31	Isolating Transformer 230 V / 230 V / 3A
M32	3-Phase Central Switch, Circuit Breaker, Protector and Switch Button TOTAL STOP
M33	DC Laboratory Adjustable Power Supply $1 x 0 \div 30 V / 20A$
M34	Input Pointer-type UI AC Measuring Unit
M35	One Single Sockets 230V + 1 PC socket 230, 50 Hz, 6 A
M36	Connection Terminals - 6 lines
M37	Module 3 x 400V with safety jacks, Circuit Breaker 10A, Switch Button TOTAL STOP
M38	Interface RS-232, LPT, USB, LAN-RJ45
M39	Module with LAN switch 10/100 MB, 5 ports
M40	Module with Replicator USB to 4 connection points
M41	DC Double Laboratory Adjustable Power Supply $2x 0 \div 40V / 3A; 5V / 3A$
M42	DC Laboratory Adjustable Power Supply $1 x 0 \div 40V/3A; 5V/3A$
M43	Stabilized Power Supply DC $\pm 24/1A$
M44	AC Stabilized Power Supply 0 V - 255 V/2A
M45	Isolating Transformer 230 V / 230 V / 10A (M46 - 5A)
M47	Non-Stabilized Unfiltered Power Supply DC $\pm 24/4,5A$
M48	DC Laboratory Adjustable Power Supply $1 x 0 \div 40V/10A$
M49	Pressured-Air Module with Precise Reduction Valve 2,5 bar (M50 - 10 bar)
M51	Three-Phase Auto-Transformer 3x230 V / 400 V / 2A
M52	Three-Phase Auto-Transformer 230 V / 2A with possibility of AC/DC change
M53	Non-Stabilized Unfiltered Power Supply DC 6 - 12 - 24 - 48V/2A
M55	Two Single "Schuko" Sockets 230V, 50 Hz, 6 A + Own Circuit-breaker





Founded in 1974 / Germany, ELEKTRO-AUTOMATIK is a company focused on development and production of reliable power supply units and systems. Product portfolio is very wide covering almost all kinds of power supplies, DIN rail-mounted supplies, UPS's, AC sources, chargers, programmable laboratory power supplies, electronic loads, high voltage and high current power supplies and other.

**CZ** ELEKTRO-AUTOMATIK, který byl založen v r. 1974 v Německu je společnost, zaměřená na vývoj a výrobu spolehlivých napájecích zdrojů a systémů. Výrobní portfolio je velmi široké, pokrývající téměř všechny druhy napájecích zdrojů, zdroje na DIN lištu, UPS, AC zdroje, nabíječky, programovatelné laboratorní zdroje, elektronické zátěže atd.

**DE** ELEKTRO-AUTOMATIK, gegründet im Jahr 1974 / Deutschland, ist ein Unternehmen, welches sich auf Entwicklung und Produktion zuverlässiger Netzgeräte und -systeme spezialisiert. Das Produktionsportfolio ist sehr breit gefächert, es deckt nahezu alle Arten von Netzgeräten, Hut-schiennetzgeräten, USV, AC-Stromquellen, Ladegeräten, programmierbaren Labornetzgeräten und elektronischen Lasten ab.

**HU** Az 1974-ben Németországban alapított ELEKTRO-AUTOMATIK cég a megbízható tápellátó berendezések és rendszerek fejlesztésére és gyártására összpontosít. Kínálatuk rendkívül széles skálát ölel fel, egyebek mellett szinte minden típusú tápegység, DIN-sínre szerelhető tápmodulok, szünetmentes tápegységek, AC áramforrások, töltők, programozható labortápok, elektronikus terhelések, nagyfeszültségű és nagy áramú tápegységek fellelhetők benne.

**PL** ELEKTRO-AUTOMATIK, założona w r. 1974/ Niemcy, to spółka zajmująca się rozwojem i produkcją niezawodnych źródeł i systemów zasilania. Portfolio produktów jest bardzo szerokie i zawiera prawie wszystkie rodzaje źródeł zasilania, zasilaczy na listwę DIN, UPS, źródła AC, ładowarki, programowalne źródła laboratoryjne, obciążenia elektroniczne.

**RO** Fondată în 1974 / Germania, ELEKTRO-AUTOMATIK este o companie axată pe proiectarea și producerea de unități și sisteme sigure de alimentare. Portofoliul de produse este foarte larg, acoperind aproape toate tipurile de surse de alimentare, surse DIN montate pe șină, UPS, surse de CA, încărcătoare, surse de alimentare de laborator programabile, sarcini electronice, surse de înaltă tensiune și alimentare cu putere și curent înalte, precum și altele.

**SK** ELEKTRO-AUTOMATIK, založený v r. 1974/ Nemecko, je spoločnosť zameraná na vývoj a výrobu spoľahlivých napájacích zdrojov a systémov. Výrobné portfolio je veľmi široké, pokrývajúce takmer všetky druhy napájacích zdrojov, zdrojov na DIN lištu, UPS, AC zdroje, nabíjače, programovateľné laboratórne zdroje, elektronické zátáže.

Elektro Automatik produces high power DC and AC power supplies suitable for many industry segments. High power enables to supply and/or test various devices, which can't be tested by usual power supplies. As a mid-sized company, Elektro-Automatik is a very flexible company, able to meet even special requirements of customers. With its own development and own production capacities, Elektro-Automatik ensures high quality of their products. Upon request, we are able to deliver you any product from Elektro-Automatik portfolio.

### Why ELEKTRO-AUTOMATIK?

- company specialized on power supplies, with over 35 years experience
- top quality products
- voltage 0...32V up to 1500V DC
- current 0...10A up to 5100A

### Programmable Laboratory Power Supplies

- Power 640W up to 150kW
- Voltage 0...32V up to 1500V DC
- Current 0...10A up to 5100A
- $\mu$ -Processor controlled
- Tower case, Desktop and 19"-rack
- All values displayed simultaneously
- Flexible autoranging output
- User configuration memory
- Integrated function generator
- Resistance control
- Interfaces: Analog, CAN, IEEE, USB, RS232, Ethernet, User software



### Programmable Electronic DC-Load

- Input power 400W up to 100kW
- Voltages 0...80V up to 750V DC
- Current 25A up to 600A
- $\mu$ -Processor controlled
- Operation modes CC+CV+CP+CR
- All values displayed simultaneously
- For automatic test systems
- Air or water cooling
- Dynamic ramping function
- Battery test function
- Interfaces: Analog, CAN, IEEE, USB, RS232, Ethernet, User software



### Industrial Power Supplies and DC-UPS

- Power 640W up to 150kW
- Voltage 0...32V up to 1500V DC
- Current 0...10A up to 5100A
- $\mu$ -Processor controlled
- Tower case, Desktop and 19"-rack
- All values displayed simultaneously
- Flexible autoranging output
- User configuration memory
- Integrated function generator
- Resistance control
- Interfaces: Analog, CAN, IEEE, USB, RS232, Ethernet, User software




### 19" Plug-in Power Supplies Compliant to DIN 41494


- Power 58W up to 240W
- Voltages 3.3V, 5V, 12-15V, 24V
- Single, Double and Triple output
- Current 2.5A up to 30A
- Wide input range 90-264VAC / 90-360VAC
- High efficiency up to 92%
- Active PFC (Power factor correction)
- All outputs separately adjustable
- Remote sensing, Remote ON / OFF
- Over voltage protection (OVP)
- Over temperature protection (OTP)
- Power sharing for parallel operation








Rechargeable batteries and batteries serve as a main or a backup power supply for electronic devices. As an independent power supply, they are very important component of many portable devices, as well as devices requiring with uninterruptible operation.


 Akumulátory a baterie slouží jako hlavní nebo záložní zdroj energie pro elektronická zařízení. Jako nezávislý zdroj napájení jsou velmi důležitým komponentem mnoha přenosných zařízení, jakož i zařízení vyžadujících nepřetržitý provoz.

 Akkus und Batterien dienen als Haupt- oder Notstromversorgung für elektronische Geräte. Als unabhängige Stromversorgungsquelle stellen sie wichtige Komponenten vieler tragbarer Geräte sowie von Geräten, die einen unterbrechungsfreien Betrieb erfordern, dar.

 Az akkumulátorok és elemek fő vagy tartalék energiaforrásként szolgálnak az elektromos berendezésekben. Független energiaforrásként rendkívül fontos szerepük van számos hordozható berendezésben, és az olyan berendezésekben, melyeknél elvárt a szünetmentes működés.

 Akumulatory i baterie służą jako główne, lub zapasowe źródło zasilania urządzeń elektronicznych. Jako niezależne źródło zasilania, stanowią bardzo ważny element wielu urządzeń przenośnych, jak również urządzeń, które muszą działać nieprzerwanie.

 Acumulatorii și bateriile servesc ca alimentare principală sau de rezervă pentru dispozitivele electronice. Ca alimentare independentă, sunt o componentă foarte importantă a multor dispozitive portabile, precum și a dispozitivelor care necesită funcționare neîntreruptă.

 Akumulátory a batérie slúžia ako hlavný alebo záložný zdroj energie pre elektronické zariadenia. Ako nezávislý zdroj napájania, sú veľmi dôležitým komponentom mnohých prenosných zariadení, ako aj zariadení vyžadujúcich nepretržitú prevádzku.

Rechargeable batteries are a variant of batteries, able to be recharged, thus able to be used many times. Properties of batteries, like nominal voltage per cell, charge and discharge characteristics are determined mainly by their chemistry type.

### Classification:

#### Primary Batteries

Also called as primary cell is a form of a battery for one use. i.e. battery can not be recharged. This is the most common group of batteries widely used in commercial and industrial devices. Advantage is usually a lower price, compared to rechargeable batteries, and at some types also a very low self-discharge.

##### Alkaline Battery

- a type of primary batteries with an alkaline electrolyte and electrodes from zinc and manganese dioxide (Zn/MnO<sub>2</sub>). Alkaline batteries feature low self-discharge and they provide 3-5x capacity of zinc-carbon batteries.

##### Lithium Thionyl-Chloride (LiSOCl<sub>2</sub>)

- a special type of a primary battery with nominal voltage 3.6V and extremely low self discharge. Widely used in devices with low consumption located at places without a possibility of other power supply. They are able to supply power to a device for up to 10 years.

##### Lithium Manganese Dioxide (LiMnO<sub>2</sub>)

- the most common type of lithium batteries with nominal voltage of 3V. They feature a high energy-to-weight and energy-to-volume ratio. Often used in commercial electronics.

##### Lithium Iron (Li-FeS<sub>2</sub>)

- thanks to their nominal voltage 1.5V, they are "voltage-compatible" with other standard alkaline batteries. They feature approx. 2.5 x higher lifetime for high current discharge regime than alkaline batteries, very low self-discharge and very long storage time.

#### Rechargeable Batteries

Also called as rechargeable cell is a form of battery usually referred to a wide variety of industrial power supplies with a power of single watts to hundreds of Watts, with various output voltages (often multiple) and of various mechanical constructions - closed case, open frame, DIN-rail mounted, etc.

**Lead-Acid Battery** - probably the most widely used type of rechargeable batteries, invented already in 1859. They feature a low energy-to-weight ratio, but they are able to supply high currents (they have a very low internal resistance). Together with a low cost and good recycling properties, they are still most widely used in motor vehicles and backup power supplies.

**NiCd Battery** - widely used type of rechargeable batteries, able to deliver high currents. Because they contain Cadmium, it is a trend to gradually replace them by ecologically more friendly types like for example NiMH batteries.

**NiMH Battery** - rechargeable battery with a similar principle like NiCd batteries, but they don't contain Cadmium, that's why they are ecologically far more friendly. They are able to deliver mid to high currents. Newly available are types with a very low self-discharge, what make them able to remain 80% of energy after 1 year of storage.

**RAM** - rechargeable alkaline manganese battery, with a nominal voltage of 1.5V. Properties very similar to primary alkaline batteries, but they can be charged up to hundreds of times. Battery is best suited for low-drain devices like remote controls and thanks to their very low self discharge also to many other industrial devices with low drain. For a long lifetime, it is highly recommended to recharge them before they are discharged to 50%.

**Li-ion, Li-Polymer** - rechargeable batteries with a very high energy/volume and energy/weight ratio. Widely used in portable devices like mobile phones, laptops, tablets, etc. They feature low self-discharge, thus very good storage properties. A proper charging and battery management must be observed when using this type of batteries.





XENO ENERGY is the specialized company who over 15 years develops and manufactures 3.6V Lithium Thionyl Chloride (Li-SOCI<sub>2</sub>) Batteries independently. Based on product understanding and production know-how of Li-SOCI<sub>2</sub> batteries, XENO ENERGY provides high performance batteries.

**CZ** XENO ENERGY je specializovaná společnost, která přes 15 let nezávisle vyvíjí a vyrábí 3,6 V lithium thionyl-chloridové baterie (Li-SOCI<sub>2</sub>). Vycházejí z důkladného poznání produktu a výrobního know-how Li-SOCI<sub>2</sub> baterií, poskytují Xeno Energy špičkové baterie.

**DE** XENO ENERGY ist ein spezialisiertes Unternehmen, das seit mehr als 15 Jahren unabhängig 3,6-V-Lithium-Thionylchlorid-Batterien (Li-SOCI<sub>2</sub>) entwickelt und produziert. Ausgehend von gründlicher Produktkenntnis und dem Produktions-Know-how für Li-SOCI<sub>2</sub>-Batterien bietet Xeno Energy Spitzenbatterien an.

**HU** A XENO ENERGY egy cég, mely már több mint 15 éve függetlenül fejleszt és gyártja a 3,6V-os lítium thionil-klorid elemeket (Li-SOCI<sub>2</sub>). A termék alapos megismeréséből és a Li-SOCI<sub>2</sub> elemek gyártási know-how-jából kiindulva a Xeno Energy csúcsmínőségű elemeket készít.

**PL** XENO ENERGY to wyspecjalizowana spółka, która od ponad 15 lat niezależnie projektuje i produkuje 3,6V baterie litowo-chlorkowo-tionylowe (Li-SOCI<sub>2</sub>). W oparciu o dokładną znajomość produktu oraz know-how produkcyjnego baterii Li-SOCI<sub>2</sub>, Xeno Energy oferuje doskonałe baterie.

**RO** XENO ENERGY este o companie specializată care de mai bine de 15 ani dezvoltă și produce în mod independent baterii cu clorură de litiu tionil (Li-SOCI<sub>2</sub>). Bazându-se pe înțelegerea produsului și know-how-ul de producție al bateriilor Li-SOCI<sub>2</sub>, Xeno Energy furnizează baterii de înaltă performanță.

**SK** XENO ENERGY je špecializovaná spoločnosť, ktorá vyše 15 rokov nezávisle vyvíja a vyrába 3,6V lítium thionyl-chloridové batérie (Li-SOCI<sub>2</sub>). Vychádzajúc z dôkladného poznania produktu a výrobného know-how Li-SOCI<sub>2</sub> batérií, poskytuje Xeno Energy špičkové batérie.

Lithium Thionyl Chloride batteries are generally less known but it is important industrial power source as main power or subsidiary power. Also, their demand is continuously growing thanks to the unique and superior voltage behavior, temperature coverage, lowest self discharge, good safety structure and durability comparing with other known batteries. XenoEnergy also offers custom solution to meet customer requirements.

## Why XENO ENERGY?

- ? company focused entirely on development and production of Li-SOCI<sub>2</sub> batteries
- over 15 years experience
- industrial grade non-rechargeable batteries with extremely low self discharge
- very good price/performance ratio

## 3.6V Lithium Batteries



### With pins into PCB

Type	Size	Nominal voltage	Capacity
XL-050F T3	1/2AA	3,6V	1200 mAh
XL-055F T3	2/3AA	3,6V	1650 mAh
XL-060F T3	AA	3,6V	2400 mAh

### With axial terminals

Type	Size	Nominal voltage	Capacity
XL-050F AX	1/2AA	3,6V	1200 mAh
XL-055F AX	2/3AA	3,6V	1650 mAh
XL-060F AX	AA	3,6V	2400 mAh

### General Characteristics of XENO Batteries:

- High Steady Operating Voltage:
  - Nominal Voltage: 3.6V
  - Operating Voltage 3.4V
- Improved Transient Minimum Voltage Effect
- Very Low Self-Discharge Rate (Self-discharge 1 up to 2% per year at room temperature)
- Superior Storage Capability (10 years)
- Pulse Current up to Medium Current
- Highest Reliability and Safety
- Operating Temperature Range: -55°C up to +85°C

### Standard

Type	Size	Nominal voltage	Capacity
XL-050F	1/2AA	3,6V	1200 mAh
XL-055F	2/3AA	3,6V	1650 mAh
XL-060F	AA	3,6V	2400 mAh
XL-140F	C	3,6V	7200 mAh
XL-145F	C	3,6V	8500 mAh
XL-200F	D	3,6V	16500 mAh
XL-205F	D	3,6V	19000 mAh

### With terminal leads

Type	Size	Nominal voltage	Capacity
XL-050F T1	1/2AA	3,6V	1200 mAh
XL-055F T1	2/3AA	3,6V	1650 mAh
XL-060F T1	AA	3,6V	2400 mAh
XL-140F T1	C	3,6V	7200 mAh
XL-145F T1	C	3,6V	8500 mAh
XL-200F T1	D	3,6V	16500 mAh
XL-205F T1	D	3,6V	19000 mAh





TECXUS was one of the first brands to offer high-performance lithium batteries. In TECXUS portfolio you can find all standard batteries, alkaline, lithium, NiMH and many other. Nearly all of TECXUS standard and rechargeable batteries offer the highest capacities (mAh) available in the market.

**CZ** *TECXUS byl jeden z prvních výrobců, který nabídl výkonné lithiové baterie. V portfoliu Tecxus můžete najít všechny standardní baterie - alkalické, lithiové, NiMH a mnohé jiné. Téměř všechny standardní a dobíjecí baterie Tecxus nabízejí nejvyšší dostupné kapacity (mAh) na trhu.*

**DE** *TECXUS war einer der ersten Anbieter von leistungsstarken Lithiumbatterien. Im Tecxus-Portfolio können Sie alle Standardbatterien, Alkali-, Lithium-, NiMH-Batterien und viele andere finden. Nahezu alle Standardbatterien sowie Akkus bieten höchste auf dem Markt verfügbare Kapazitäten (mAh).*

**HU** *A TECXUS az első gyártók között volt, aki nagyteljesítményű lítium elemeket kínált. Kínálatában megtalálható minden általános alkáli vagy lítium elem, NiMH akkumulátor és számos más cella. Közel az összes Tecxus elem és akkumulátor a piacon elérhető legnagyobb kapacitással (mAh) rendelkezik.*

**PL** *TECXUS był jednym z pierwszych producentów, który zaoferował wydajne baterie litowe. W portfolio Tecxus znaleźć można wszystkie standardowe baterie, alkaliczne, litowe, NiMH i wiele innych. Prawie wszystkie baterie standardowe i akumulatory Tecxus oferują najwyższe pojemności (mAh) dostępne na rynku.*

**RO** *TECXUS a reprezentat una din primele branduri care a pus pe piață bateriile cu litiu de mare performanță. In portofoliul Tecxus regăsim toate tipurile de baterii standard, alcaline, cu litiu, NiMH și multe altele. Aproape toate bateriile standard și reîncărcabile de la Tecxus oferă cele mai înalte capacități (mAh) disponibile pe piață.*

**SK** *TECXUS bol jeden z prvých výrobcov, ktorý ponúkol výkonné lítiové batérie. V portfóliu Tecxus môžete nájsť všetky štandardné batérie, alkalické, lítiové, NiMH a mnohé iné. Takmer všetky štandardné a nabíjateľné batérie Tecxus ponúkajú najvyššie dostupné kapacity (mAh) na trhu.*

Tecxus is producing batteries using state of the art technology, manufacturing processes and quality controls. Excellent product quality has been proven in independent test by consumer magazines - outperforming products made by renowned competitors. Tecxus also offers innovative "Ready to Use" NiMH (nickel metal hydride) rechargeable batteries, precharged to be used right out of the package. Main advantage of these cells is a very low self-discharge, what allows them to maintain up to 80% of their capacity after 1 year of storage.

## Why TECXUS?

- very high capacity of batteries
- batteries often outperform other renowned products in independent tests
- excellent price/performance ratio

Type	ANSI	IEC	Diameter x height [mm]	
Lady	N	UM5	R1	12,0 x 30,2
Micro	AAA	UM4	R03	10,5 x 44,5
Mignon	AA	UM3	R6	14,5 x 50,5
Baby	C	UM2	R14	26,2 x 50,0
Mono	D	UM1	R20	34,2 x 61,5
9V Block	PP3	-	6F22	(26,0x17,5) x 49,0

Type	ANSI	Diameter x height [mm]
AAAA		8,3x6,7
Micro	2/3AAA, 5/4AAA, 5/3AAA	10,5x28,5    10,5x50    10,5x67
Mignon	1/3AA, 1/2AA, 2/3AA	14,5x17,5    14,5x23,7    14,5x28,2
	4/5AA, 4/3AA	14,5x43    14,5x65
	A (AF), 2/3A (AF)	17x50    17x28,5
	4/5A (AF), 7/5A (AF)	17x43    17x66
Baby	SC, 1/2SC, 2/3SC	23x43    23x25,5    23x26,8
	4/5SC, 4/3SC	23x34    23x50
Mono	1/2D, 3/2D(F), DD	33x36,5    33x90,5    33x111

## NiMH Rechargeable Batteries



Type	Voltage	Capacity	Type	Package
NIMH 600 AAA TECXUS BP2	1,2V	600mAh	AAA	Blister / 2pcs
NIMH 1100 AAA TECXUS BP2	1,2V	1900mAh	AAA	Blister / 2pcs
NIMH 1500 AA TECXUS BP2	1,2V	1500mAh	AA	Blister / 2pcs
NIMH 2700 AA TECXUS BP2	1,2V	2700mAh	AA	Blister / 2pcs
NIMH 4500 C TECXUS BP	1,2V	4500mAh	C	Blister / 1pc
NIMH 10000 D TECXUS BP	1,2V	10 000mAh	D	Blister / 1pc
NIMH 160-9V TECXUS BP	8,4V	160mAh	9V	Blister / 1pc
NIMH 280-9V TECXUS BP	8,4V	280mAh	9V	Blister / 1pc



FLAT TOP WITH SOLDER TAG

Type	Voltage	Capacity	Type	Package
NIMH 950 AAA-1Z TECXUS SP4	1,2V	950mAh	AAA	1 unit/4pcs
NIMH 2500 AA-1Z TECXUS SP4	1,2V	2500mAh	AA	1 unit/4pcs
NIMH 4300 C-1Z TECXUS SP2	1,2V	4300mAh	C	1 unit/2pcs
NIMH 9000 D-1Z TECXUS SP2	1,2V	9000mAh	D	1 unit/2pcs

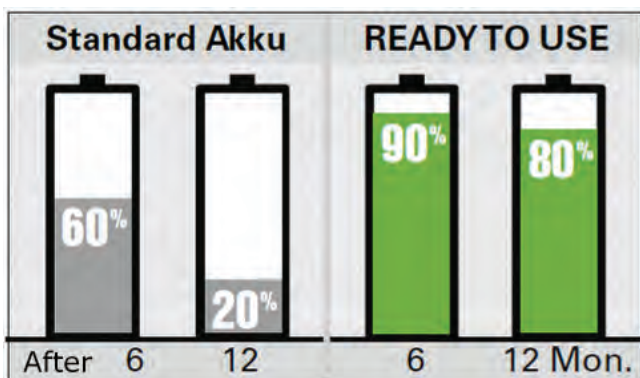
## NiMH Rechargeable "READY TO USE" Batteries

The new NiMH technology - the rechargeable battery is precharged and can be put to use immediately like a standard alkaline battery.

- self discharge is much lower than with standard NiMH batteries - after 6 month, the battery still retains 90% and after 12 months it still retains 80% of its charged capacity. That means more than 365 days of operational readiness!
- rechargeable up to 1000 times
- lasts up to 4 x longer in digital cameras than standard batteries
- quick-charge capable



Type	Voltage	Capacity	Type	Package
NiMH RTU 800 AAA TECXUS BP2	1,2V	800mAh	AAA	Blister / 2pcs
NiMH RTU 800 AAA-1Z TECXUS	1,2V	800mAh	AAA	1pc
NiMH RTU 2100 AA TECXUS BP2	1,2V	2100mAh	AA	Blister / 2pcs
NiMH RTU 2100 AA-1Z TECXUS	1,2V	2100mAh	AA	1pc

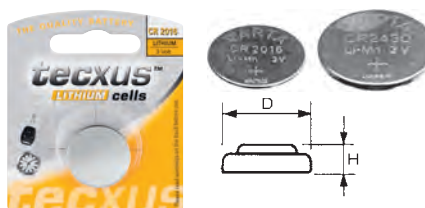


## Lithium Batteries



Type	Voltage	Type	Description	Package
Lithium FR03 TECXUS BP2	1,5V	AAA	1100mAh/Li-FES2	Blister/2pcs
Lithium FR6 TECXUS BP2	1,5V	AAA	2900mAh/Li-FES2	Blister/2pcs
Lithium ER9V TECXUS BP	9V	AA	1200mAh/Li-SOCL2	Blister/1pc

## CR Series (3V)



Type	Voltage	Capacity	Dimensions
CR 1220 TECXUS BP	3V	35mAh	2,5x2mm
CR 1225 TECXUS BP	3V	50mAh	12,5x2,5mm
CR 1616 TECXUS BP	3V	55mAh	16x1,6mm
CR 1620 TECXUS BP	3V	70mAh	16x2mm
CR 2016 TECXUS BP	3V	75mAh	20x1,6mm
CR 2025 TECXUS BP	3V	150mAh	20x2,5mm
CR 2032 TECXUS BP	3V	210mAh	20x3,2mm
CR 2430 TECXUS BP	3V	270mAh	24x3mm
CR 2450 TECXUS BP	3V	500mAh	24x5mm
CR 123 A TECXUS	3V	1300mAh	34,5x17,1mm



To find out appropriate chargers - please visit our website [www.soselectronic.com](http://www.soselectronic.com).





ACCUCCELL - located in Waiblingen/ Germany, specializes on rechargeable alkaline manganese (RAM) batteries already from 1993. The company produces RAM batteries as well as appropriate chargers.

**CZ** ACCUCCELL se nachází ve Waiblingenu v Německu. Společnost se specializuje již od roku 1993 na dobíjecí alkalické manganové baterie (RAM). Firma vyrábí RAM baterie a nabíječky, vhodné pro nabíjení těchto baterií.

**DE** ACCUCCELL befindet sich in Waiblingen in Deutschland. Das Unternehmen spezialisiert sich bereits seit 1993 auf wiederaufladbare Alkali-Mangan-Batterien (RAM). Die Firma produziert RAM-Batterien wie auch geeignete Ladegeräte.

**HU** Az ACCUCCELL székhelye a németországi Waiblingen-ben található. A cég a töltethető alkalikus mangán elemekre (RAM) specializálódott 1993 óta. RAM elemek, és a hozzá tartozó töltőgyártásával foglalkozik.

**PL** ACCUCCELL ma siedzibę w Waiblingen w Niemczech. Spółka już od roku 1993 specjalizuje się w produkcji manganowych akumulatorów ładowanych (RAM). Firma produkuje akumulatory RAM, jak również odpowiednie ładowarki.

**RO** ACCUCCELL - cu sediul în Waiblingen/ Germania, este o societate specializată în producția de baterii reîncărcabile alcaline cu mangan (RAM) încă din anul 1993. Compania produce baterii RAM cât și încărcătoare corespunzătoare.

**SK** ACCUCCELL sa nachádza vo Waiblingen v Nemecku. Spoločnosť sa špecializuje na dobíjacie alkalické manganové batérie (RAM) už od roku 1993. Firma vyrába RAM batérie, rovnako ako vhodné nabíjačky.

1.5V nominal voltage makes RAM batteries widely applicable as a direct replacement of primary batteries. As ecologically friendly and economically very convenient, RAM batteries are very suitable alternative to primary batteries. Thanks to a very low self-discharge and no memory effect, they can be applied to almost any low-drain devices. RAM batteries are available in all 4 main sizes - micro (AAA), mignon (AA), baby (C) as well as mono (D).

### Why ACCUCCELL?

- company focusing on rechargeable alkaline batteries
- ecologically friendly technology
- economically convenient replacement of primary cells with a 1.5V nominal voltage

### Rechargeable 1.5V Alkaline Batteries



Type	Voltage	Capacity	Type	Package
AccuCell AAA	1,5V	750mAh	AAA	Blister / 4pcs
AccuCell AA	1,5V	1800mAh	AA	Blister / 4pcs
AccuCell C	1,5V	3000mAh	C	Blister / 2pcs
AccuCell D	1,5V	6000mAh	D	Blister / 2pcs

### Battery Chargers

Universal rapid chargers for 1-4 RAM (Rechargeable Alkaline Manganese) batteries: AA, AAA, C or D. A microcontroller monitors each bay separately to ensure that each cell is charged effectively, and protected against overcharging and reverse polarity. After charging it changes over automatically to trickle charge. New AccuCell Alpha chargers are able to charge all common rechargeable batteries - RAM, NiCd and NiMH.



AccuCell chargers will recharge your NiMH or NiCd batteries. You can mix different battery types, sizes and charging times. After charging, each cell is stored at the peak of readiness with a gentle trickle charge until you're ready for it. There are four bays that accept AAA, AA, C or D cells, plus two bays that accept 9-volt cells. Charge times will run from 20 minutes to 12 hours depending on type and size. Supplied with both AC and DC charging cords and will run off standard 120V AC, automotive 12 volts, or a 10- to 15-watt solar panel with appropriate plug.





For over 60 years, KEYSTONE ELECTRONICS has been manufacturing precision electronic interconnect components and hardware, supplying quality products at competitive prices to industry, worldwide. All Keystone products are engineered specifically for use by OEM Designers and Engineers.

**CZ** Již více než 60 let KEYSTONE ELECTRONICS vyrábí a dodává do celého světa kvalitní elektronické spojovací komponenty a hardware. Všechny výrobky jsou navrženy zvláště pro OEM designéry a inženýry.

**DE** Seit mehr als 60 Jahren produziert und liefert KEYSTONE ELECTRONICS weltweit hochwertige elektronische Verbindungselemente und Hardware. Sämtliche Produkte sind insbesondere für OEM-Designer und -Ingenieure entworfen.

**HU** A KEYSTONE ELECTRONICS több mint 60 éve gyárt precíziós elektronikai öszszekötő alkatrészeket és eszközöket. Elérhető árú, jó minőségű termékeit kínálja az ipar számára világszerte. A Keystone termékeket főleg az OEM tervezők és mérnökök által való használatra tervezték.

**PL** Już ponad 60 lat, KEYSTONE ELECTRONICS produkuje precyzyjne łączące komponenty oraz sprzęt elektroniczny. Dostarcza wysokiej jakości produktów konkurencyjnych cenach dla przemysłu na całym świecie. Wszystkie produkty Keystone są zaprojektowane specjalnie dla użycia przez OEM projektantów i inżynierów.

**RO** De peste 60 de ani, KEYSTONE ELECTRONICS fabrică componente și hardware de interconectare electronice de mare precizie, furnizând produse de calitate superioară la prețuri competitive la nivel global. Toate produsele Keystone sunt proiectate în mod specific pentru a fi utilizate de proiectanții și inginerii OEM.

**SK** Už viac ako 60 rokov KEYSTONE ELECTRONICS vyrába a dodáva do celého sveta kvalitné elektronické spojovacie komponenty a hardware. Všetky výrobky sú navrhnuté zvlášť pre OEM dizajnérov a inžinierov.

While catalog products meet most standard requirements, modifications as well as custom fabrications can be manufactured to meet customers' special needs. Design and engineering, precision tool and die capabilities, close tolerance Stamping, Machining and Assembly, computer based quality control and responsive customer service are all vital in-house resources of Keystone. From company Keystone we keep in our offer battery holders, battery contacts and carriers, and PCB test terminals.

### Why KEYSTONE?

- quality OEM dedicated products
- possibility of custom modification

### Battery Holders

#### Button Cells Battery Holders



#### Wide range of hardware

- Terminals
- Fuse Clips and Holders
- Spacers
- Standoffs
- Test Points





### Battery Clips








Components enabling to gain electric energy from renewable energy sources become still more popular from many reasons. Solar – photovoltaic panels and wind turbines are the two most common devices in this field.


 *Komponenty, umožňující získat elektrickou energii z obnovitelných zdrojů, se stávají stále populárnějšími z mnoha důvodů. Solární – fotovoltaické panely a větrné turbíny jsou v této oblasti dvě nejběžnější zařízení.*

 *Komponenten, welche die Stromgewinnung aus erneuerbaren Energien ermöglichen, werden aus zahlreichen Gründen immer beliebter. Solar- bzw. Photovoltaik-Module und Windkraftanlagen stellen in diesem Bereich die zwei am häufigsten verwendeten Vorrichtungen dar.*

 *A megújuló forrásokból történő energiatermelést lehetővé tevő komponensek több okból is egyre inkább népszerűvé válnak. Ezen a területen a két legelterjedtebb eszköz a szélenergia és a (fotovoltaikus) napenergia.*

 *Komponenty umożliwiające pozyskanie energii elektrycznej ze źródeł odnawialnych robią się coraz popularniejsze z wielu powodów. Solarne – panele fotowoltaiczne oraz turbiny wiatrowe są w tej chwili dwoma najczęściej używanymi urządzeniami w tej dziedzinie.*

 *Surse alternative de energie Componente care să permită obținerea energiei electrice din surse regenerabile de energie încep să devină din ce în ce mai populare din mai multe motive. Două dintre cele mai comune dispozitive în acest domeniu sunt panourile fotovoltaice și turbinele eoliene.*

 *Komponenty umožňujúce získať elektrickú energiu z obnoviteľných zdrojov sa stávajú stále populárnejšími z mnohých dôvodov. Solárne – fotovoltaické panely a veterné turbíny sú v tejto oblasti dve najbežnejšie zariadenia.*

Alternative power supplies are already for decades the only choice for operation of devices in outlying locations, or any other places without a possibility to connect to a mains power supply. General effort for environmentally friendly behavior is also one of the key reasons to use alternative energy sources. However, like in many fields of our life, the price has also a big influence on the scale of how much these sources will be used. Fortunately, thanks to a mass production and enhanced production processes, prices of alternative power supplies and especially photovoltaic panels drop down significantly. Last but not least – modern low power components enable to produce devices with a very low power consumption, resulting in much lower price for building an alternative power supply for a given device.

### Classification:

There are many possibilities to gain energy from renewable sources. Photovoltaic panels and wind generators are probably the most frequently used devices producing an electric energy.

#### Photovoltaic panels

are mainly produced of monocrystalline- and a polycrystalline silicon. Monocrystalline types generally feature efficiency of 13-17%, but because the raw material is more expensive to produce, the final price per panel is usually higher. Polycrystalline types have somewhat lower efficiency (12-15%), thus the panel with the same power as a monocrystalline one is physically slightly larger. A typical monocrystalline solar cell is a dark black colour, and the corners of cells are usually missing as a result of the production process and the physical nature of monocrystalline silicon. Polycrystalline, on the other hand, is identifiable by its light or dark blue colour, but not uniformly - some patches are lighter than others. The differences in appearance come about as a result of the manufacturing process. It is worth to note, that the power of a given panel is the main parameter, so if we have a monocrystalline- and a polycrystalline panel of the same power rating, there is no other substantial difference between them from the user point of view - the only main difference is somewhat bigger size of a polycrystalline type. When choosing a photovoltaic panel, it is good to use a product from a well-proven company, where the whole construction of the panel guarantees high quality and lifetime.

#### Wind generators

are very efficient especially in windy places, but modern turbines start already at low wind speeds, often as low as 4-6mph (1,79-2,68 m/s). Wind generators are a very convenient complement to photovoltaic panels

### Terms:

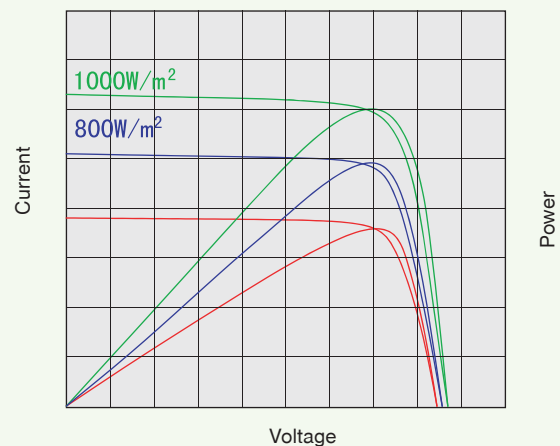
**Maximum Power  $P_{MAX}$**  - maximum power of a given PV panel at standard test conditions, usually at radiation of 1000W/m<sup>2</sup>.

**Open circuit voltage  $U_{OC}$**  - voltage of the PV panel when exposed to radiation at no load condition (open circuit).

**Maximum power point voltage  $U_{MPP}$**  - voltage at which a maximum power is obtainable.

**Maximum power point current  $I_{MPP}$**  - current at which a maximum power is obtainable (while keeping also the  $U_{MPP}$ .)

#### Typical characteristics of solar panel:



### Generators



- Solar Modules
- Wind Generators

### Electronics



- Solar Charge Controllers
- Stand Alone Inverters/Chargers
- Outback Power Systems
- SMA Solar Electronics
- Battery Chargers

### Batteries



- Pb batteries - universal, as well as special batteries for solar applications
- Li-ion batteries
- Li-Pol batteries

### Solar Panels

#### ET x0 Wp Series

##### Efficiency

- Low voltage-temperature coefficient ensures high-temperature operation
- Exceptional low-light performance combined with high sensitivity to light enables excellent energy delivery

##### Materials

- Highest quality, high-transmission tempered glass provides enhanced stiffness and impact resistance
- Advanced EVA encapsulation system with triple-layer back sheet meets the most stringent safety requirements for high-voltage operation
- A sturdy, anodized aluminum frame allows modules to be easily roof-mounted with a variety of standard mounting systems
- Ultra reliable bypass diodes prevent damage through overheating due to shaded or defective cells

##### Benefits

- Manufactured in an ISO 9001:2000 certified plant
- High efficiency, high safety, high reliability
- Output power tolerance of +/-5%
- 25-year limited warranty on power output, 5-year limited warranty on materials and workmanship

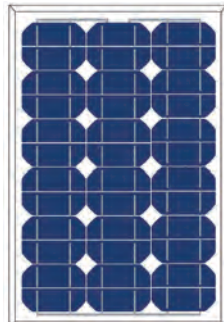
10 W  
ET-M53610



20 W  
ET-M53620



30 W  
ET-M53630



### Loads



- Fluorescent Compact Lamps 12 VDC
- LED Lighting
- Refrigerator and Freezer Boxes
- DC Ceiling Fans
- DC Televisions

### Systems



- Complete Kits
- Solar Street Lights

### Pumps



- Pumps for clear water

### ET x0 Wp Series

#### World Class Quality

SolarWorld produces the best products with the highest quality, manufactured according to German and US quality standards in fully-automated ISO 9001 and 14001 certified factories.

#### Outstanding Products

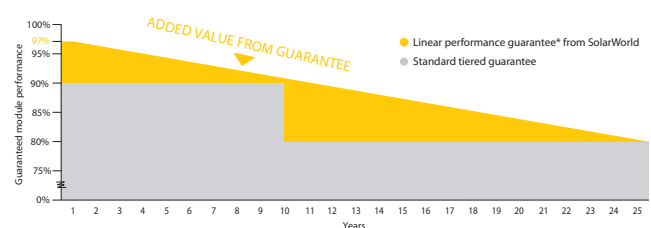
SolarWorld's modules were assessed by the ÖKO-TEST consumer magazine as "excellent".

#### An Experienced Industry Leader

With over 30 years of experience in off-grid solar applications – Solar World delivers top products and technical experience at the highest levels. SolarWorld's modules are installed in over 100,000 Telecom/Industrial systems worldwide.

SolarWorld guarantees that on average annually, the performance of the module cannot deviate from the specified rated power by more than 0.7 percent. For example, SolarWorld guarantees performance at 95.6 percent in the third year – clear added value compared to standard guarantees, which promise only 90 percent and can even drop to 80 percent over time.

Linear performance guarantee



### SW 50, SW 80





### Wind Turbines

#### Air Breeze

The microprocessor based speed control results in increased performance, improved battery charging capability and the reduction of "flutter" noise from the machine. The controller allows for peak-power tracking of the wind by optimizing the alternator's output on all points of the cubic curve and then efficiently delivers the energy to the battery. The turbine's smart controller allows it to actually control blade rotation speed thus eliminating the buzzing noise. Furthermore, a new series of carbon-reinforced blades with a modified pitch angle further increases power production.



Technical Parameters	AIR BREEZE
<b>Rotor Diameter</b>	46 in (1.17 m)
<b>Weight</b>	13 lb (5.9 kg)
<b>Mount</b>	1.5 in schedule 40 1.9 in (48 mm) OD pipe
<b>Start-up wind speed</b>	6 mph (2.68 m/s)
<b>Voltage</b>	12/24VDC
<b>Rated power</b>	200 watts at 28 mph (12.5 m/s)
<b>Monthly Energy Production</b>	38 kWh/mo at 12 mph (5.4 m/s)

### Accessories

#### A-light 360 RS

The ALight is the best price performance ratio lamp in the industry. The A-light uses a Philips 10W fluorescent tube and is equipped with the highest grade electronic components to ensure a long lifetime. The uniquely shaped UV-stabilized reflector takes care of a good diffusion of the light. The A-light displayed here produces 360 Lumens at 10W power consumption.



### Solar Controllers

#### APPLE 20

The unique small PV charger/discharger, specially designed for very low cost applications based on SMD technology. The Apple is extremely power efficient due to its very low voltage drop over both input and output switching Mosfets, and a buzzer to indicate that user is close to LVD (Low Voltage Disconnect). The Apple also has an electronic master-switch or On/Off-switch, and a clear state of charge indicator that also gives you a good indication during charging.



Frequent cycling of the battery at a very low state of charge causes fast deterioration of the battery due to sulfation and stratification. The Apple does not allow the user to frequently operate the battery at low state of charge.

<b>Nominal Voltage:</b>	12/24V
<b>Output Voltage with Load:</b>	12,8/25,6V
<b>Max. Charging Voltage:</b>	14,5/29V
<b>Max. Input Current:</b>	10A, 20A, 40A
<b>Max. Output Current:</b>	10A, 20A, 40A
<b>Dimensions:</b>	80x100x32mm

#### CXN Series

- Multifunctional LCD display
- Programmable Low Voltage Disconnect with new ALVD (Adaptive Low Voltage Disconnect)
- Sophisticated programmable nightlight function
- Complete electronic protection
- Negative Grounding



#### Other chargers available

Steca Solarix MPPT, Steca Solarix PRS, Steca PR xxx, Steca PR xxx IP, Phocos CX, Sundaya Solar charger.

### Sealed Lead Acid Batteries

#### LCR Series



Type	Voltage	Capacity	Dimensions	Weight.
LCR 1,3-6	6V	1300mAh	97x24x50 mm	0,3kg
LCR 3,4-6	6V	3400mAh	134x34x60 mm	0,62kg
LCR 7,2-6	6V	7200mAh	150x34x100mm	1,26kg
LCR 12-6	6V	12000mAh	151x50x94 mm	1,95kg
LCR 1,3-12	12V	1300mAh	97x48 x50 mm	0,59kg
LCR 2,2-12	12V	2200mAh	177x 34x60mm	0,8kg
LCR 3,4-12	12V	3400mAh	134x 67x60mm	1,2kg
LCR 7,2-12	12V	7200mAh	151x 65x94 mm	2,5kg
LCR 12-12	12V	12000mAh	151x 102x94mm	3,9kg

#### LCX Series



Type	Voltage	Capacity	Dimensions
LCX 28-12	12V	2800mAh	165x125x175 mm
LCX 42-12	12V	4200mAh	197x165x175 mm
LCX 65-12	12V	6500mAh	350x166x175mm

### 12(24) VDC/230VAC Voltage Converters

#### SW-x-12, SW-x-24 series



Technical Parameters	SW-150-12	SW-300-12	SW-300-24
<b>Input Voltage</b>	11-15 VDC	11-15 VDC	22-30 VDC
<b>Output Voltage</b>	230 VAC	230 VAC	230 VAC
<b>Rated Power</b>	150W	300 W	300 W
<b>Dimension</b>	120x245x70mm	240x245x70mm	240x245x70mm
<b>Note</b>	sinusoidal output	sinusoidal output	sinusoidal output

Technical Parameters	SW-600-12	SW-1200-12	SW-1200-24
<b>Input Voltage</b>	11-15 VDC	11-15 VDC	22-30 VDC
<b>Output Voltage</b>	230 VAC	230 VAC	230 VAC
<b>Rated Power</b>	600W	1200 W	1200 W
<b>Dimension</b>	340x245x70mm	390x245x70mm	390x245x70mm
<b>Note</b>	sinusoidal output	sinusoidal output	sinusoidal output

Technical Parameters	SW-2000-12	SW-2000-24
<b>Input Voltage</b>	11-15 VDC	22-30 VDC
<b>Output Voltage</b>	230 VAC	230 VAC
<b>Rated Power</b>	2000 W	2000 W
<b>Dimension</b>	455x245x70mm	455x245x70mm
<b>Note</b>	sinusoidal output	sinusoidal output

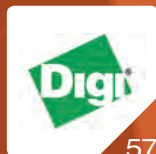
# Communication Modules & Identification

## GSM / GPRS / GPS 50



## Communication Modules 56

ZigBee, LAN, USB, WiFi, RS232/485, RFID, 433 MHz, Bluetooth



## Antennas 71





GSM, GPRS and GPS modules are still more used in many devices. GSM and GPRS modules enable data communication even on places without a possibility to connect to a line voltage, while GPS modules enable to localize moving objects (for example vehicles). Very often these two types of modules are used simultaneously.

**CZ** GSM, GPRS a GPS moduly jsou stále častěji používány v mnoha zařízeních. GSM / GPRS moduly umožňují datovou komunikaci i na místech bez možnosti připojit se k síťovému napětí, zatímco GPS moduly umožňují lokalizovat pohyblivé objekty. Velmi často se tyto typy modulů používají současně.

**DE** GSM-, GPRS- und GPS-Module werden zunehmend in einer Vielzahl von Geräten genutzt. GSM / GPRS-Module ermöglichen eine Datenkommunikation auch an Standorten ohne die Möglichkeit der Anbindung an Netzspannung, während GPS-Module eine Lokalisierung von beweglichen Objekten ermöglichen. Sehr häufig werden beide Typen von Schaltungen parallel genutzt.

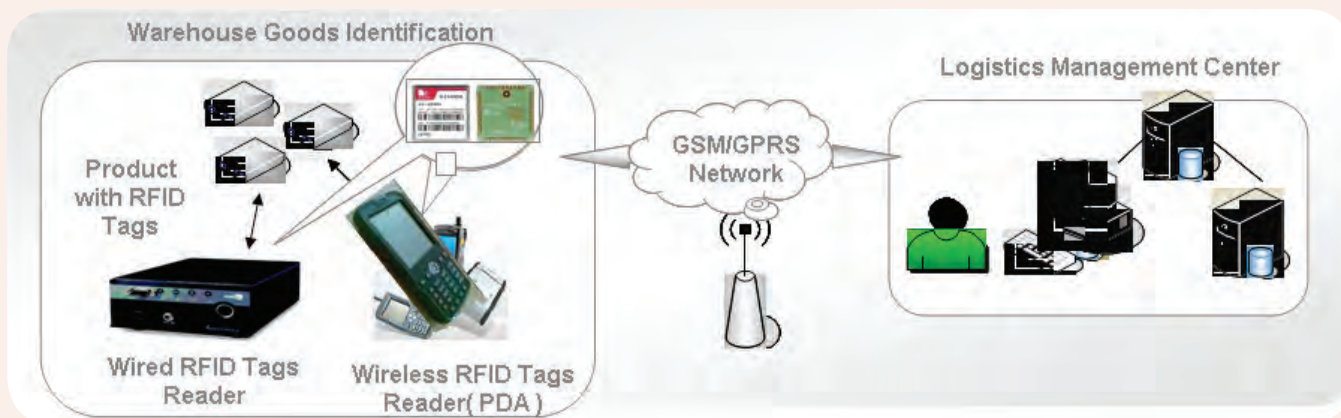
**HU** A GSM, GPRS és GPS modulokat egyre több készülékben használnák. Lehetővé teszik az adatkommunikációt olyan helyeken is ahol nincs lehetőség a vezetékcsatlakozásra, míg a GPS modulok lehetővé teszik a mozgó tárgyak (pl. járművek) lokalizációját. Nagyon gyakran a két modul típust együttesen alkalmazzzák.

**PL** W wielu urządzeniach coraz częściej stosowane są moduły GSM, GPRS oraz GPS. Moduły GSM / GPRS umożliwiają komunikację nawet w miejscach bez możliwości podłączenia do zasilania sieciowego. Moduły GPS umożliwiają lokalizację obiektów poruszających się (np. pojazdów). Bardzo często oba typy modułów stosowane są równocześnie.

**RO** Modulele GSM, GPRS GPS mai sunt încă utilizate în multe dispozitive. Modulele GSM / GPRS permit comunicarea de date chiar și în locuri fără posibilitatea de conectare la o tensiune de linie, în timp ce modulele GPS permit localizarea obiectelor în mișcare (de exemplu vehicule). Foarte des, aceste două tipuri de module sunt utilizate simultan.

**SK** GSM, GPRS a GPS moduly sú stále častejšie používané v mnohých zariadeniach. GSM / GPRS moduly umožňujú dátovú komunikáciu aj na miestach bez možnosti napojiť sa na sieťové napätie, zatiaľ čo GPS moduly umožňujú lokalizovať pohyblivé objekty. Veľmi často sa tieto typy modulov používajú súčasne.

### Classification:



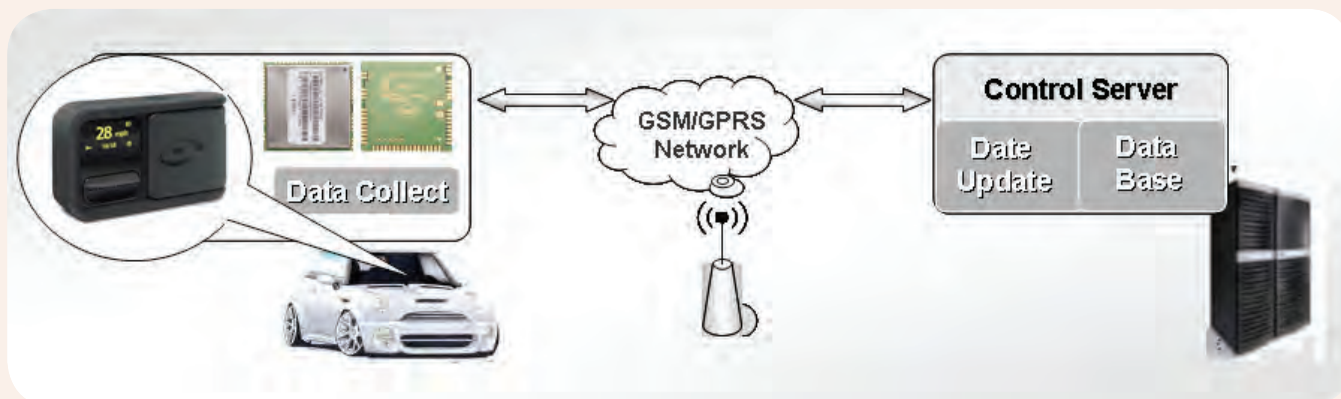
### GSM / GPRS modules

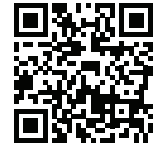
GSM / GPRS modules are being used for example in data acquisition systems (telemetry), security systems and vehicle tracking systems. As this communication is mostly in the form of data transmission from one device to another (for example from an end device to a central system), this communication is commonly called as an M2M (machine to machine) communication. Possibilities of use are very wide, also thanks to still lower prices for data transmission from GSM operators. GSM and GPRS data transmission offers a huge advantage in the fact, that an existing network of GSM stations are used, thus no expensive RF

equipment is necessary to establish a connection even between two very distant places. Disadvantage of such a form of communication is that the reliability of a connection depends on the functionality of an existing GSM network in the place where a device is used (dropouts, signal quality, capacity of the network, free channels).

### GPS modules

GPS modules further enhance possibilities of various devices in the term of possibility to localize the device – whether for online tracking, navigation, or for archive purposes. GPS modules enable to very precisely locate a (mobile) device with a before unthinkable accuracy. Advantage of the GPS system is also, that it is completely free – there are no fees for the “data transmission”. As GPS system is based on receiving a small intensity signals from (moving) GPS satellites, the usability of a GPS module depends on a direct visibility to the sky. Buildings, trees and other subjects significantly decrease the signal quality and the time during which the GPS module can receive signals from satellites.





QUECTEL WIRELESS SOLUTION is the innovative M2M and GPS modules manufacturer. Focusing on the wireless technology, Quetel designs and manufactures variety of reliable modules to fulfill different industrial standards and requirements.

**CZ** **QUECTEL Wireless Solutions** je výrobce inovativních bezdrátových M2M a GPS modulů. Quetel se zaměřuje na bezdrátové technologie a navrhuje a vyrábí řadu spolehlivých bezdrátových modulů, které plní různé průmyslové standardy a požadavky.

**DE** **QUECTEL Wireless Solutions** ist ein Produzent von innovativen drahtlosen M2M- und GPS-Modulen. Quetel spezialisiert sich auf drahtlose Technologien und entwirft und entwickelt eine Reihe zuverlässiger drahtloser Module, die verschiedene Industriestandards und -anforderungen erfüllen.

**HU** **A QUECTEL Wireless Solutions** az innovatív vezeték nélküli M2M és GPS modulok gyártója. A Quetel a vezeték nélküli technológiákra szakosodott és megbízható vezeték nélküli modulok egész sorát tervezi és gyártja az ipari normák és igények kielégítésére.

**PL** **QUECTEL Wireless Solutions** to producent innowacyjnych modułów bezprzewodowych M2M i GPS. Quetel koncentruje się na technologiach bezprzewodowych i rozwija oraz produkuje szereg niezawodnych modułów bezprzewodowych dla sprostania różnym standardom i wymogom przemysłowym.

**RO** **QUECTEL Wireless Solutions** este un producător de module inovatoare M2M wireless și GPS. Concentrându-se pe tehnologia wireless, Quetel proiectează și produce o varietate de module wireless fiabile ce îndeplinesc standardele și cerințele industriale.

**SK** **QUECTEL Wireless Solutions** je výrobca inovatívnych bezdrôtových M2M a GPS modulov. Quetel sa zameriava na bezdrôtové technológie a navrhuje a vyrába širokú škálu spoľahlivých bezdrôtových modulov pre splnenie rôznych priemyselných štandardov a požiadaviek.

Quetel provides wireless communication modules covering standards from 2G, 2.5G and 3G. The Quetel products have been applied in M2M sectors like smart metering, automotive, sales and payment, security, tracking and tracing, remote control and monitoring, mobile computing, etc. Quetel GSM, GPRS and GPS products feature high sensitivity, high level of integration of various functions and interfaces, and a low power consumption.

### Why QUECTEL?

- top featured products
- high sensitivity of modules
- low power consumption
- small dimensions

Quetel provides to all they modules EVB Kits, those are included all necessary components to development, such as GSM and/or GPS antennas, SIM card holder, USB/RS232 converter cable, hands free set, power supply.

#### GSM EVB KIT



#### GPS EVB KIT



Do you need help? Call SOS technician. Please see the contact details at local SOS websites .





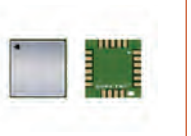
### GSM/GPRS Modules

Product	M10	M12	M72	M75	M80	M95
<b>Appearance</b>						
<b>Picture</b>						
<b>Packaging</b>	64-pin SMD Quad-band module	64-pin SMD Dual-band module	30-pin SMD Dual-band module	30-pin SMD Dual-band module	110-pin SMD Quad-band module	42-pin SMD Quad-band module
<b>General Features</b>						
<b>Radio Bands (MHz)</b>	850/ 900/ 1800/ 1900	900/ 1800	900/ 1800	900/ 1800	850/ 900/ 1800/ 1900	850/ 900/ 1800/ 1900
<b>GPRS Multi-slot Class</b>	Class: 12/10/8	Class: 12/10/8	Class: 12/10/8	No	Class:12/10/8	Class: 12/10/8
<b>Operating Temperature Range</b>	-45 °C to +85 °C	-40 °C to +80 °C	-40 °C to +80 °C	-40 °C to +80 °C	-45 °C to +85 °C	-40 °C to +85 °C
<b>Dimensions</b>	29×29×3.6mm	29×29×3.6mm	27.5x24×3.6mm	27.5x24×3.6mm	23×25× 2.6mm	19.9x23.6x2.65mm
<b>Weight</b>	6 g	6 g	5 g	5 g	3 g	3 g
<b>Certificates</b>						
<b>Certificates</b>	CE/GCF/PTCRB/FCC/TA/NCC/UCRF/ICA-SA CE	CE/TA				
<b>Network Protocols</b>						
<b>PPP</b>	Yes	Yes	Yes	No	Yes	Yes
<b>TCP/UDP</b>	Yes	Yes	Yes	No	Yes	Yes
<b>HTTP</b>	Yes	Yes	Yes	No	Yes	Yes
<b>FTP</b>	Yes	Yes	Yes	No	Yes	Yes
<b>MMS</b>	Yes	Yes	Yes	No	Yes	No
<b>SMTP</b>	Yes	Yes	Yes	No	Yes	No
<b>Specifications for SMS via GSM / GPRS</b>						
<b>SMS Support</b>	Point-to-point MO &MT SMS cell broadcast Text and PDU mode	Point-to-point MO &MT SMS cell broadcast Text and PDU mode	Point-to-point MO &MT SMS cell broadcast Text and PDU mode	Point-to-point MO &MT SMS cell broadcast Text and PDU mode	Point-to-point MO &MT SMS cell broadcast Text and PDU mode	Point-to-point MO &MT SMS cell broadcast Text and PDU mode
<b>Speech Codec Modes</b>	HR,FR, EFR, AMR	HR,FR, EFR, AMR	No	No	HR,FR, EFR, AMR	HR, FR, EFR, AMR
<b>Echo Arithmetic</b>	Echo cancellation Echo suppression Noise reduction	Echo cancellation Echo suppression Noise reduction	No	No	Echo cancellation Echo suppression Noise reduction	Echo cancellation Echo suppression Noise reduction
<b>Specifications for voice Specifications for Fax and Data transmission</b>						
<b>GPRS Class 12</b>	max. 85.6 kbps (uplink & downlink)	max. 85.6 kbps (uplink & downlink)	max. 85.6 kbps (uplink & downlink)	No	max. 85.6 kbps (uplink & downlink)	max. 85.6 kbps (uplink & downlink)
<b>Fax</b>	Group 3, Class 1 & 2	Group 3, Class 1 & 2	No	No	Group 3, Class 1 & 2	Group 3, Class 1 & 2
<b>CSD</b>	Up to 14.4 kbps	Up to 14.4 kbps	Up to 14.4 kbps	Up to 14.4 kbps	Up to 14.4 kbps	Up to 14.4 kbps
<b>Interfaces</b>						
<b>External SIM</b>	3V/ 1.8V	3V/ 1.8V	3V/ 1.8V	3V/ 1.8V	3V/ 1.8V	3V/ 1.8V
<b>Embedded SIM IC</b>	No	No	No	No	No	No
<b>Embedded SIM Card-Holder</b>	No	No	No	No	No	No
<b>Audio Analog Interfaces</b>	Two channels	Two channels	No	No	Two input channels Three output channels	Two channels
<b>Audio Digital PCM Interface</b>	No	No	No	No	Yes	No
<b>RTC Backup</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>I<sup>2</sup>C</b>	No	Yes (in OPEN CPU)	No	No	Yes (in OPEN CPU)	No
<b>Keypad Interface <sup>1</sup></b>	No	Yes (in OPEN CPU)	No	No	Yes (in OPEN CPU)	No
<b>LCD Interface <sup>1</sup></b>	No	Yes (in OPEN CPU)	No	No	Yes (in OPEN CPU)	No
<b>Serial Interface</b>	Three	Three	Two	Two	Three	Two
<b>Antenna Connector</b>	No	No	No	No	No	No
<b>Charging Interface</b>	Optional	No	No	No	Yes	No
<b>GPIOs</b>	Yes	Yes	No	No	Yes	No
<b>SD Card Interface</b>	No	No	No	No	Yes	No
<b>Dual SIM</b>	No	No	No	No	Yes	No
<b>OpenCPU</b>						
<b>OpenCPU Support</b>	Yes	Yes	No	No	Yes	No
<b>Camera</b>						
<b>CMOS Camera Interface</b>	No	No	No	No	Yes	No
<b>Recommended Applications</b>						
<b>Automatic Meter Reading</b>	★	★	★★		★	★
<b>Automotive Sales and Payment</b>	★	★	★		★	★
<b>Security</b>	★	★	★	★	★	★
<b>Tracking and Tracing</b>	★	★	★		★	★
<b>Remote Maintenance and Control</b>	★	★	★	★	★	★

Note: (1) Function is not provided in default firmware.

(2) ★: Recommended application; ★★: Enhanced feature or cost reduction for certain application.

GPS Modules

		L10	L20	L30	L50
<b>Appearance</b>					
Picture					
Packaging		28-pin SMD GPS module	24-pin SMD GPS module	21-pin SMD GPS module	24-pin SMD GPS module
<b>Certificates</b>					
Certificates		CE/FCC	CE	CE	
<b>General Features</b>					
Chip solution		MTK:MT3329	SIRF:GSD4e-9302	SIRF:GSD4e-9302	SIRF:GSD4e-9302
Dimensions		22.4mmx17.0mmx3.0mm	16.0mmx12.2mmx2.4mm	9.0mmx9.0mmx1.6mm	28.0mmx16.0mmx3.0mm
Weight		2 g	1 g	0.6 g	4g
L1 Band Receiver (1575.42MHz)		22 TRK/66 ACQ	48 TRK	48 TRK	48 TRK
	C/A code	Yes	Yes	Yes	Yes
	SBAS	WAAS, EGNOS, MSAS	WAAS, EGNOS	WAAS, EGNOS	WAAS, EGNOS
Reacquisition time		<1s	<1s	<1s	<1s
TTFF (Time To First Fix)	Cold Start	<35s	<35s, Autonomous25s typ. With CGEE	<35s, Autonomous25s typ. With CGEE	<33s, Autonomous25s typ. With CGEE
	Warm Start	<35s	<35s, Autonomous10s typ. With CGEE	<35s, Autonomous10s typ. With CGEE	<33s, Autonomous10s typ. With CGEE
	Hot Start	<1s	<1s	<1s	<1s
Sensitivity	Autonomous Acquisition	-148dBm	-148dBm	-145dBm	-148dBm
	Reacquisition	-160dBm	-160dBm	-159dBm	-160dBm
	Hot Start	-160dBm	-160dBm	-159dBm	-160dBm
	Tracking	-165dBm	-163dBm	-160dBm	-163dBm
Position Accuracy (autonomous)		<1.25m CEP	<2.5m CEP	<2.5m CEP	<2.5m CEP
Velocity Accuracy (without aid)		<0.1m/s	<0.01m/s	<0.01m/s	<0.01m/s
Maximum Acceleration Accuracy (without aid)		0.1 m/s <sup>2</sup>	0.1 m/s <sup>2</sup>	0.1 m/s <sup>2</sup>	0.1 m/s <sup>2</sup>
Timing Accuracy		<100ns	<100ns	<100ns	<100ns
Max Update Rate		5Hz	1Hz	1Hz	1Hz
Dynamic Performance	Maximum Altitude	18000m	18288m	18288m	18288m
	Maximum Acceleration	4G	4G	4G	4G
	Maximum Velocity	514m/s	514m/s	514m/s	514m/s
	Operating	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
	Storage	-45°C to 125°C	-45°C to 125°C	-45°C to 125°C	-45°C to 125°C
<b>Interfaces</b>					
UART		Yes	Yes	Yes	Yes
IIC		No	No	Yes	Yes
SPI		No	No	Yes	No
IIC (For EEPROM)		No	Yes	Yes	Yes
USB		Yes	No	No	No
Reset		Yes	No	Yes	Yes
ON_OFF		No	Yes	Yes	Yes
Wakeup		No	No	Yes	No
Time Pulse		Yes	Yes	Yes	Yes
Interrupt		No	No	No	No
Antenna Detection		Yes	No	No	No
<b>Electrical Data</b>					
Power Suply		3.0V to 4.3V	2.0V to 3.6V	1.71V to 1.89V	1.71V to 1.89V
I/O Voltage		2.7V to 2.9V	2.7V to 2.9V	1.71V to 1.89V	1.71V to 1.89V
Power Consumption	Acquisition	43mA (Passive antenna)	57mA (Passive antenna)	40mA (Passive antenna)	48mA
	Tracking	38mA (passive antenna)	41mA (Passive antenna)	36mA (Passive antenna)	38mA
	Hibernate	2mA	7mA	17uA	20uA
Antenna Type		Active and passive	Active and passive	Active recommended	Embedded patch antenna
Antenna Power		External or internal	External or internal	External	Internal
<b>Protocols</b>					
NMEA		Yes	Yes	Yes	Yes
Other		PMTK	OSP	OSP	OSP
<b>Recommended Applications</b>					
Vehicle tracking and tracing		★	★	★	★
Pet tracking			★	★★	★
Asset tracking		★	★	★	★

Note: ★: Recommended application; ★★: Enhanced feature or cost reduction for certain application.



# QUECTEL

## Wireless Module



### M80

NEW

New Generation GSM/GRPS Module  
 Quad-Band:850/900/1800/1900MHz  
 Dimensions:25\*23\*2.6mm  
 Surface Mounting:LGA  
 Embedded ClassAB Amplifier  
 Temperature Range:-45°C~+85°C  
 Low Power Consumption:1.1mA@DRX=5  
 TCP/IP/UDP/FTP/HTTP/MMS/SMTP  
 Support SD Interface  
 Support CMOS Camera Interface  
 Support Open CPU



### M10

GSM/GPRS Module  
 Global Approvals:  
 GCF PTCRB CE FCC TA NCC UCRF ICASA  
 Quad-Band:850/900/1800/1900MHz  
 Surface Mounting:LCC  
 Dimensions:29\*29\*3.6mm  
 TCP/IP/UDP/FTP/HTTP/MMS/SMTP  
 Temperature Range:-45°C~+85°C



### M95

NEW

The Smallest GSM/GPRS Module  
 New Generation  
 Surface Mounting:LCC  
 Dimensions:19.9\*23.6\*2.65mm  
 Quad-Band:850/900/1800/1900MHz  
 Low Power Consumption:0.9mA@DRX=5  
 Embedded ClassAB Amplifier  
 Temperature Range:-40°C~+85°C  
 TCP/IP/UDP/FTP/HTTP



### M12

GSM/GPRS Module  
 Dual-Band:900/1800MHz  
 Surface Mounting:LCC  
 Dimensions:29\*29\*3.6mm  
 TCP/IP/UDP/FTP/HTTP/MMS/SMTP  
 Temperature Range:-40°C~+80°C  
 Support Open CPU



### U10

NEW

WCDMA/HSPA Module  
 Uplink/Downlink:7.2M/5.76M  
 Multiple Bands:  
 WCDMA:850/1900/2100MHz  
 GSM:850/900/1800/1900MHz  
 100Pin BTB  
 Support 8M Digital Camera  
 Support High Speed USB  
 Support 32G SD card



### M72

GSM/GPRS Module  
 Dual-Band:900/1800MHz  
 Data Only  
 Surface Mounting:LCC  
 Dimensions:27.5\*24\*3.6mm  
 Temperature Range:-40°C~+80°C  
 TCP/IP/FTP/HTTP



**Quectel Wireless Solutions - Dedicated M2M Wireless Module Manufacturer**

Quectel Wireless Solutions Co.,Ltd. Website: [www.quectel.com](http://www.quectel.com)

Room 501, Building 13, No. 99 Tianzhou Road, Xuhui District, Shanghai, China 200233

For more details contact your authorised distributor [SOS electronic europe](http://SOS electronic europe).



**SIMCOM WIRELESS SOLUTIONS**, a subsidiary of SIM Technology Group Ltd., is one of leading companies providing high quality wireless modules for different technology platforms in GSM/GPRS/EDGE, WCDMA/HSPA, TD-SCDMA, EVDO and GPS.

**CZ** **SIMCOM WIRELESS SOLUTIONS** je dceriná spoločnosť SIM Technology Group Ltd., A je jednou z předních společností, které poskytují vysoce kvalitní bezdrátové moduly pro různé technologické platformy v GSM / GPRS / EDGE, WCDMA / HSPA, TD-SCDMA a EVDO a GPS.

**DE** **SIMCOM WIRELESS SOLUTIONS** ist eine Tochtergesellschaft von SIM Technology Group Ltd. und eines der führenden Unternehmen, welche hochqualitative drahtlose Module für verschiedene Technologieplattformen in GSM / GPRS / EDGE, WCDMA / HSPA, TD-SCDMA und EVDO sowie GPS anbieten.

**HU** **A SIMCOM WIRELESS SOLUTIONS** a SIM Technology Group Ltd. leányvállalata, egyike a jó minőségű különböző technológiai platformokra (GSM/ GPRS/EDGE, WCDMA/ HSPA, TD-SCDMA, EVDO és GPS) szánt vezeték nélküli modulok vezető gyártóinak.

**PL** **SIMCOM WIRELESS SOLUTIONS**, spółka-córka SIM Technology Group Ltd., to jedna z wiodących spółek oferująca jakościowe moduły bezprzewodowe dla różnych platform technologicznych w GSM/ GPRS/EDGE, WCDMA/ HSPA, TD-SCDMA, EVDO i GPS.

**RO** **SIMCOM WIRELESS SOLUTIONS**, o filială a SIM Technology Group Ltd., este una din principalele companii ce furnizează module wireless de înaltă calitate pentru diverse platforme de tehnologie în GSM/GPRS/ EDGE, WCDMA/HSPA, TD-SCDMA, EVDO și GPS.

**SK** **SIMCOM WIRELESS SOLUTIONS** je dcérska spoločnosť SIM Technology Group Ltd., a je jednou z popredných spoločností, ktoré poskytujú vysooko kvalitné bezdrôtové moduly pre rôzne technologické platformy v GSM / GPRS / EDGE, WCDMA / HSPA, TD-SCDMA a EVDO a GPS.

Simcom Wireless Solutions supplies 2.5G, 3G, 3.5G technology-based wireless communication modules and related application solutions. SIMCom Wireless Solutions is ranked the number 2 based on worldwide shipment based on the ABI recent research report. In March 2008, SIM Technology Group was awarded as "Top 50 global emerging-market enterprises" by Boston which is the world's leading consulting firm. As one of the 15 Chinese selected enterprises, SIM Technology Group is considered as the outstanding representative of the national enterprises takes the lead in the local market through its innovative business mode and leading technology.

### Why SIMCOM?

- experienced company, rich-featured products
- very good price/performance ratio

## GSM/GPRS Modules

### SIM900, SIM900D

The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design.

- SIM900 is designed with a very powerful single-chip processor integrating AMR926EJ-S core
- Quad - band GSM/GPRS module
- SMT type suit for customer application
- An embedded Powerful TCP/IP protocol stack
- Based upon mature and field-proven platform, backed up by our support service, from definition to design and production



#### SIM900

**Dimensions:**  
24mmx24mmx3mm



#### SIM900D

**Dimensions:**  
33mmx33mmx3mm  
Compatible with SIM300

### SIM900R

SIM900R is the low-cost version of SIM900 with the same foot print. SIM900R is suitable for price-sensitive applications.

- Dual-Band 900/ 1800 MHz SIM900R
- GPRS multi-slot class 10/8
- GPRS mobile station class B
- Compliant to GSM phase 2/2+
- SAIC (Single Antenna Interference Cancellation)

#### SIM900R

**Dimensions:**  
24mm x 24mm x 3mm



### SIM08

SIM08 is a high-performance host-based GPS module. It cooperates with SIM900 module.

- Serial interfaces UART or slave SPI (to SIM900)
- NMEA0183, ST Ericsson API air interface
- 42-channel
- High-performance STE engine
- Sensitivity- Tracking: -160 dBm, Cold starts : -146 dBm
- Operation temperature: -40°C to +85 °C

#### SIM900R


**Dimensions:**  
9,5mm x 12mm x 2,3mm








### ZigBee, LAN, USB, WiFi, RS232/485, RFID, 433 MHz, Bluetooth


Communication modules enable data communication in various formats. In general, all communication modules can transfer the same data, however the difference is in the way, how it is proceeded – protocol, hardware requirements and the difference is also in a maximum speed of data transfer.


 Komunikační moduly umožňují datovou komunikaci v různých formátech. Obecně, všechny komunikační moduly dokáží přenášet stejná data, ale rozdíl je v tom, jakým způsobem se to provádí - protokol, hardwarové požadavky a také v maximální rychlosti přenosu dat.

 Die Kommunikationsmodule ermöglichen Datenkommunikation in unterschiedlichen Formaten. Im Allgemeinen können alle Kommunikationsmodule gleiche Daten übertragen, der Unterschied besteht lediglich in der Vorgehensweise. Protokoll, Hardwareanforderungen - und der Unterschied besteht ebenfalls in der maximalen Geschwindigkeit der Datenübertragung.

 A kommunikációs modulok számos formában teszik lehetővé az adatkommunikációt. Általánosságban minden kommunikációs modul hasonló adatokat továbbít, a különbség köztük a továbbítás módjában van: eltérő protokollok és hardverigények, eltérő vivőfrekvenciák (technológiák) vagy átviteli maximális sebességek.

 Moduły komunikacyjne umożliwiają transfer w różnych formatach. W zasadzie wszystkie moduły komunikacyjne mogą przesłać te same dane, jednak różnica jest w sposobie, jakim to się odbywa - protokół, wymagania sprzętowe a różnica jest również w maksymalnej prędkości transferu danych.

 Modulele de comunicare permit comunicarea de date în diverse formate. În general, toate modulele de comunicare pot transfera aceleași date, totuși diferența constă în modul în care se procedează - protocol, cerințe hardware și de asemenea diferența există și în viteza maximă de transferare a datelor.

 Komunikačné moduly umožňujú dátovú komunikáciu v rozličných formátoch. Vo všeobecnosti, všetky komunikačné moduly dokážu prenášať rovnaké data, ale rozdiel je v spôsobe ako sa to vykonáva - protokol, hardvérové požiadavky a rozdiel je tiež v maximálnej rýchlosti prenosu dát.


Wired and wireless communications enable widely used communication and data transfer between various devices. They enable remote control and monitoring of production processes, tracking in logistics, data acquisition and archiving and many other everyday used functions. Wireless communications also enable for example remote control and monitoring in various hazardous environments, where direct human presence would be dangerous or impossible. Further, wireless communications enable to avoid necessity of costly cable structure, especially in places distant from each other.

### Classification

Communication systems differ in many aspects like power consumption, max. distance, data transfer speed, immunity to noise and disturbances, safety and other. A choice of a right communication system and components for your application depends on above mentioned factors, as well as for example on development and production costs. Wireless communications in general offer a big advantage of avoiding a cable structure and provide a big flexibility and expansibility. However, it is also advisable to take in mind possibility of interference, caused for example by surrounded machines, as well as limited bandwidth. Wired communications in general offer higher transfer speeds and from some point of view, also a higher data safety.

### Terms:


#### Bluetooth

 An open wireless technology standard for exchanging data over short distances (using short wavelength radio transmissions in the ISM band from 2400-2480 MHz) from fixed and mobile devices.


#### LAN

Local Area Network, is a computer network that interconnects computers in a limited area such as a home, school, computer laboratory, or office building. LAN usually features high data-transfer rates. Network topology describes the layout pattern of interconnections between devices and network segments. Switched Ethernet has been for some time the most common Data Link Layer and Physical Layer implementation for local area networks. At the higher layers, the Internet Protocol (TCP/IP) has become the standard. Smaller LANs generally consist of one or more switches linked to each other, often at least one is connected to a router, cable modem, or ADSL modem for Internet access.


#### WiFi

 A trademark of the Wi-Fi Alliance and the brand name for products using the IEEE 802.11 family of standards, allowing electronic devices to exchange data wirelessly over a computer network. Wi-Fi uses 2.4GHz band and allows cheaper deployment of local area networks (LANs).


#### RFID

 Radio-Frequency Identification is the use of a wireless non-contact radio system to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Most of tags require no battery and are powered by the radio waves generated by an RFID reader device. The tag contains an antenna (made of an inductor) and a chip with a stored information. Tag can be read from up to several meters away. RF ID tags are used in many industries, for example an RFID tag attached to a product can be used to track its progress through the assembly line.

#### ZigBee

 ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on an IEEE 802 standard for personal area networks (PANs). ZigBee technology is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. ZigBee has is best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. ZigBee operates at frequencies 868 MHz and 2.4 GHz.

#### USB

 Universal Serial Bus (USB) is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication and power supply between computers and electronic devices. USB was designed to standardize the connection of computer peripherals, both to communicate and to supply electric power. USB has effectively replaced a variety of earlier interfaces, such as serial and parallel ports, as well as separate power chargers for portable devices.

#### RS485

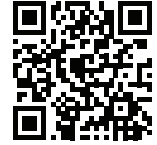
also known as TIA/EIA-485, is a standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems. Digital communications networks implementing the RS-485 standard can be used effectively over long distances and in electrically noisy environments. Multiple receivers may be connected to such a network in a linear, multi-drop configuration. These characteristics make such networks useful in industrial environments and similar applications.

#### 434/868 MHz RF

is a license free frequency band, used by low power devices. 433 MHz communication modules are short range communication devices authorized for use in many parts of the world. They operate in the UHF band from 433.075 MHz to 434.775 MHz. Modules working on this frequency are very often used for remote control of doors and locks.

#### RS232

is the traditional name for a series of standards for serial binary single-ended data and control signals connecting. An RS-232 port was a standard feature of a personal computer, but the limited transmission speed, relatively large voltage swing, and large standard connectors motivated development of the USB which has displaced RS-232 from most of its peripheral interface roles. Many modern personal computers have no RS-232 ports and must use an external converter to connect to older peripherals. RS232 devices are still found especially in industrial machines or scientific instruments. Because the voltage levels are higher than logic levels typically used by integrated circuits, special intervening driver circuits are required to translate logic levels.



DIGI INTERNATIONAL is the leader in commercial grade device networking and is an innovator of wireless machine-to-machine (M2M) device networking products. Digi International embedded and non-embedded products are marketed under the Digi®, Rabbit® and Maxstream® brands.

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**RO** DIGI INTERNATIONAL este lider în conectarea în rețea a dispozitivelor de uz comercial și un inovator în produsele de rețelistică a dispozitivelor M2M wireless. Produsele Digi International încorporează și neîncorporează sunt comercializate sub mărcile Digi® și Rabbit®.

**SK** DIGI INTERNATIONAL je lídrom v oblasti komerčnej triedy sieťových zariadení a inovátor v oblasti bezdrôtových machine-to-machine (M2M) sieťových zariadení. Embedded a non-embedded produkty sú predávané pod značkami Digi® a Rabbit®.

Digi International develops reliable products and technologies to connect and securely manage local or remote electronic devices over the network or via the web, and offers the highest levels of performance, flexibility and quality. Digi International's embedded products include modules, microprocessors, single-board computers, satellite communications products, development kits, software, and design services through our subsidiary Spectrum Design Solutions. Non-embedded products include cellular routers, gateways, wireless communication adapters (ZigBee, Wi-Fi, proprietary RF), serial servers, intelligent console servers, USB connected products, remote display products, cameras, sensors and the #1 selling serial card line in the world.

### Why DIGI?

- company specialised on networking
- high performance, flexible and reliable wireless embedded module

### Did You Know?

The ZigBee Alliance is an association of companies working together to enable reliable, cost effective, low-power, wirelessly networked, monitoring and control products based on an open global standard. The ZigBee Alliance membership comprises technology providers and original equipment manufacturers worldwide. Membership is open to all.

## ZigBee Modules

### XBee Series



The XBee and XBee-PRO OEM RF Modules were engineered to meet IEEE 802.15.4 standards and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between devices. The modules operate within the ISM 2.4 GHz frequency band and are pin-to-pin compatible with each other.

Technical Parameters	XBee	XBee PRO
Supply Voltage	2,8 - 3,4 V	
Range Indoor/Outdoor	30 m/100m	100/1500m
Transmit Power	0dBm (1mW)	18dBm (60mW)
Transmit Current	45 mA (at 3,3V)	137 mA to 215mA (at3,3V)
Idle / Receive Current	50 mA (at 3,3V)	55 mA (pri 3,3V)
Power-down Current	<10uA	<10uA
Receiver Sensitivity	-92 dBm	-100 dBm
RF Data Rate	250 000bps	
Serial Interface Data Rate	1200-115.2 kbps	
Dimensions	2,43 x 2,76 cm	
Operating Temperature	-40°C to 85°C	

### XBee DigiMesh Series



XBee & XBee-PRO DigiMesh 2.4 embedded RF modules utilize the peer-to-peer DigiMesh protocol in 2.4 GHz for global deployments. This innovative mesh protocol offers users added network stability through self-healing, self discovery, and dense network operation. With support for sleeping routers, DigiMesh is ideal for power sensitive applications relying upon batteries or power harvesting technology for power.

Technical Parameters	XBee DigiMesh	XBee PRO DigiMesh
Supply Voltage	2,8 - 3,4 V	
Range Indoor/Outdoor	30 m/90m	90/1600m
Transmit Power	0dBm (1mW)	18dBm (63mW)
Transmit Current	45 mA (at 3,3V)	250 mA to 340mA (at3,3V)
Idle / Receive Current	50 mA (at 3,3V)	55 mA (pri 3,3V)
Power-down Current	<50uA	<50uA
Receiver Sensitivity	-92 dBm	-100 dBm
RF Data Rate	250 000bps	
Serial Interface Data Rate	1200bps-250kbps	
Dimensions	2,43 x 2,76 cm	
Operating Temperature	-40°C to 85°C	



### ZigBee Modules

#### XBee ZB Series



XBee and XBee-PRO ZB embedded SMT RF modules provide cost-effective wireless connectivity to end-point devices in ZigBee mesh networks. They are interoperable with other ZigBee PRO feature set devices, including devices from other vendors\*. They require no configuration or additional development; users can have their network up and running in a matter of minutes. Programmable versions of the SMT module make customizing ZigBee application easy, even without wireless design expertise.

Technical Parameters	XBee® ZB SMT	XBee-PRO® ZB SMT
Supply Voltage	2.1 to 3.6V	2.7 to 3.6V
Range Indoor/Outdoor	60 m/1200m	90/3200m
Transmit Power	6.3 mW(+8 dBm)	63 mW (+18 dBm)
Transmit Current	45 mA (at 3,3V)	100 mA (at3,3V)
Idle / Receive Current	31 mA (at 3,3V)	31 mA (pri 3,3V)
Power-down Current	< 1 uA	< 1 uA
Receiver Sensitivity	-102 dBm	-102 dBm
RF Data Rate	250 kbps	
Serial Interface Data Rate	1200bps-250kbps	
Dimensions	2.20 cm x 3.40 cm x 0.30 cm	
Operating Temperature	-40°C to 85°C	

### Serial Server

#### ME 9210



The Digi Connect ME 9210 is an ultra-compact embedded system-on-module (SoM) with 10/100 Ethernet support based on Digi's new and powerful 32-bit NS9210 processor (ARM9). The module allows customers to implement the next generation of leading network-enabled products and maintains full form factor and pin-compatibility with the existing Digi Connect ME family. Digi's own NET+ARM processor technology also delivers the true long-term availability that is a key requirement for embedded applications.

Technical Parameters	ME 9210
Processor	32-bit Digi NS9210, Core ARM926EJ-S, 75 MHz
Memory	2/4 MB NOR flash, 8 MB SDRAM 4k I/D Cache
Interfaces	TTL Serial, GPIO, SPI, I2C, Ethernet 10Base-T or 100Base-TX (Auto-Sensing)
Management	Users Linux applications
Input Voltage	3.3 VDC
Dimensions	36.7 x 19.05 x 18.67mm



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Together we find the most effective solution for designing of your application.



AK-NORD GmbH, Itzehoe/ Germany produces various server and interface modules to connect devices to networks. Production portfolio contains device servers (WLAN, USB, ISDN), print servers, embedded LAN modules, industrial DIN-rail servers and other.

**CZ** AK-NORD GmbH sídlí v Itzehoe v Německu a vyrábí různé servery a moduly rozhraní pro připojení zařízení do sítě. Portfolio obsahuje servery WLAN, USB, ISDN, tiskové servery, vložené LAN moduly, průmyslové servery na DIN-lištu a další.

**DE** AK-NORD GmbH hat ihren Sitz in Itzehoe in Deutschland und produziert verschiedene Server und Schnittstellenmodule für die Netzwerkanbindung von Geräten. Das Portfolio umfasst WLAN-, USB-, ISDN-Server, Druckerserver, Embedded-LAN-Module, Industriemodulserver für DIN-Schiene und weitere.

**HU** Az AK-NORD GmbH a németországi Itzehoe-ban található, különböző szervereket és interfészmodulokat gyárt a berendezések hálózatra kapcsolásához. Portfóliójuk többek között WLAN, USB, ISDN és nyomtatószervereket, beilleszthető LAN modulokat, DIN sínre szerelhető ipari szervereket tartalmaz.

**PL** AK-NORD GmbH, z siedzibą w Itzehoe w Niemczech, produkuje różne servery i moduly złączny dla podłączenia urządzeń do sieci. Portfolio zawiera servery WLAN, USB, ISDN, servery druku, embedded moduly, przemysłowe servery na listwę DIN i inne.

**RO** AK-NORD GmbH, Itzehoe/Germania produce diverse module de server și interfață pentru conectarea dispozitivelor la rețea. Portofoliul de produse cuprinde serwere pentru dispozitive (WLAN, USB, ISDN), serwere pentru imprimante, module LAN incorporate, serwere industriale pe șina DIN și altele.

**SK** AK-NORD GmbH sídlí v Itzehoe v Německu a vyrába rôzne servery a moduly rozhrania pre pripojenie zariadenia do siete. Portfolio obsahuje servery WLAN, USB, ISDN), tlačové servery, vložené LAN moduly, priemyselné servery na DIN-lištu a ďalšie.

In our offer from AK-NORD you can find mainly device servers interfacing TCP/IP protocol to RS232, I2C, SPI or USB.

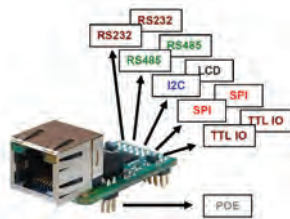
## Why AK-NORD?

- universally usable modules
- easy implementation into a target device
- small dimensions

## LAN Modules

### XT NANO-XXL

Thanks to its extremely little dimensions of only 20 x 34 mm, the new XT-NANO-XXL module is very well appropriate to be integrated also to very small terminals. A total of two bus systems are made available of each four or five switchable interfaces such as RS232, RS485, I2C, SPI as well as TTL-IO. Even a POE (Power over Ethernet) supply is available since all necessary connections are executed. Lots of functions, e.g. a 4-bit or SPI LCD display as well as the direct connection of the SD card may be directly selected.

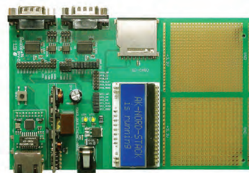


#### Main features:

- Power supply: 3.3V/170mA, POE Power-Over-Ethernet
- Management: Telnet, Browser, Serial interface
- Supported Protocols: IP, TCP, UDP, FTP, TFTP, ICMP, ARP, SNMP, LPR, DHCP, BOOTP, DNS, TELNET, HTML, http, DYN DNS, SMTP, POP3, SYSLOG, SSL (in preparation)
- Ethernet (MDIX)
- Interfaces (TTL) RS232, RS485, I2C, SPI, TTL/IO
- Dimensions: (WxD) 20 x 32 mm

### XT NANO Evaluation kit

The EVA-KIT for the XT-NANO offers all functions as well as hardware options in order to completely try out the XT-NANO / XT-NANO-XXL. Two RS232/RS485 interfaces as well as an SPI display and an SD card holder are available. Also a POE (PowerOverEthernet) module is included in the EVA-KIT. Two additional WIRE-WRAP fields of the contact spacing 2.54 and 2mm. Using the jumpers, it is possible to individually separate or connect each bus of the XT-NANO module. An XT-NANO and the connection plan are also included in the functional scope.



## ConLine Series

### CONLINE-USB

The ConLine-USB is a small and compact print server and is easy to use. The ConLine USB is a small cable solution and integrates every printer with a usb interface into a network.



- Power supply: 5Volt / ca. 300 mA
- Connection: Ethernet 10/100Mbit RJ45 USB-B Plug or USB-A Jack
- Protocols: IP,TCP,UDP, SNMP, ICMP, DHCP,
- DNS, DDNS, ARP, BOOTP,HTML,HTTP,TELNET,LPR,IPP
- Functions: Printer USB1.1 and USB 2.0 compatible , IEEE1284-4,bidirectional

### CONLINE-V24

The ConLine-V24 is a small and compact device server and is easy to use. The ConLine-V24 is a small cable solution and integrates every hardware with a serial interface like Rs232 into a network.



- Power supply: 5Volt / ca. 300 mA
- Connection: Ethernet 10/100Mbit RJ45 9pol Sub-D JACK or Plug
- Protocols: TCP/IP, UDP, FTP, SNMP, Telnet, ICMP, DHCP, DNS, DDNS, ARP, BOOTP, HTTP, IPP, LPR, DynDNS
- Software Emulations: Modem - Emulation, PAD - Emulation, ConnectOnData, AutoConnect, UDP-KeepAlive, DynDNS
- Serial Interface: Speed: 300Baud -115200Baud Parity: Odd,Even,Mark,Space,None Databits:7-8Bit Signals: TXD, RXD, RTS, CTS, DSR, DTR, DCD, GND

## Industrial Device Server

Serial to LAN or WLAN interfaces, known also as device servers are widely spread and favourite because of their ability to easily implement a device with serial port into a LAN or WLAN. New LAN and WLAN industrial DIN rail device servers AK-DinRail-XXL and AKDinRail-XXR provide this functions for devices with RS232 or RS485 interface and support all modern communication protocols and security functions.

- RS232/485 to LAN and WLAN device servers
- DIN rail mounting
- 10/100 Mbit ethernet
- supports IEEE802.11b,g,n WLAN protocols
- for 2 devices with serial interface RS232 or RS485
- highest safety standard
- SD card slot







WIZNET is a company fully focused on internet communication. Main Product is an internet processor - iMCU™, based on a unique patented Fully Hardwired TCP/IP. Based on these processors, company produces various communication and interface modules.

**CZ** WIZNET je společnost, plně zaměřená na internetovou komunikaci. Hlavním produktem je internetový procesor - iMCU™, založený na jedinečné patentované technologii Fully Hardwired TCP / IP. Na základě těchto procesorů firma vyrábí různá komunikační rozhraní a moduly.

**DE** WIZNET ist ein Unternehmen, das sich vollständig auf die Internetkommunikation spezialisiert. Das Hauptprodukt ist der Internetprozessor iMCU™, basierend auf der einzigartigen patentierten Technologie Fully Hardwired TCP / IP. Auf Grundlage dieser Prozessoren fertigt das Unternehmen verschiedene Kommunikationsschnittstellen und Module.

**HU** A WIZNET teljes mértékben az internetes kommunikációra szakosodott. Fő terméke az internetproceszor - iMCU™, mely a Fully Hardwired TCP/IP egyedülálló szabadalmaztatott technológián alapul. Erre a proceszorra alapozva a cég különféle kommunikációs interfészeket és modulokat gyárt.

**PL** WIZNET to spółka całkowicie poświęcona komunikacji internetowej. Jej główny produkt to procesor internetowy - iMCU™ oparty na wyjątkowej opatentowanej technologii Fully Hardwired TCP / IP. Na podstawie tych właśnie procesorów firma produkuje różne złącza oraz moduły komunikacyjne

**RO** WIZNET este o societate axată pe comunicația pe internet. Principalul produs este procesorul de internet - iMCU™, bazat pe un TCP/IP unic brevetat și complet cablat. Cu ajutor acestor procesoare, compania produce diverse module de comunicații și de interfață.

**SK** WIZNET je spoločnosť plne zameraná na internetovú komunikáciu. Hlavným produktom je internetový procesor - iMCU™, založený na jedinečnej patentovanej technológii Fully Hardwired TCP / IP. Na základe týchto procesorov vyrába firma rôzne komunikačné rozhrania a moduly.

WIZnet core technology, 'TCP/IP Offload Platform' is ASSP and silicon-proven IP for custom ASIC, which best fits OS-less device and is compatible with any Embedded OS. Also, its fully hardwired TCP/IP algorithm guarantees line speed by on-the-fly processing architecture, that is independent of main processor. Moreover, it eliminates main processor's overhead by offloading TCP/IP processing and hence enhances overall system performance especially in multimedia streaming applications.

WIZnet hardwired TCP/IP chip has been adopted worldwide both in OS-less devices (esp. DVR, Remote Control) and OS-based (esp. STB, DTV). It provides high performance and stability.

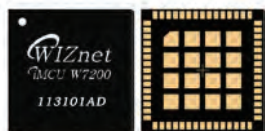
### Why WIZNET?

- provides reliable high-speed TCP/IP communication without overloading of a main processor
- various serial to TCP/IP interfaces available

### Ethernet Controllers

#### W7200

iMCU W7200 - ARM32bit Cortex M3 with hardwired TCP/IP, MAC & PHY.



- ARM 32-bit Cortex-M3
- 72MHz maximum frequency (1.25 DMIPS/MHz)
- 20KBytes Data Memory (RAM)
- 128KBytes Code Memory
- CRC calculation unit, 96-bit unique ID
- GPIO, SPI, USART and USB Interfaces
- 10BaseT/100BaseTX Ethernet PHY embedded
- Hardwired TCP/IP Protocols: TCP, UDP, ICMP, IPv4 ARP, IGMP,
- Auto Negotiation (Full-duplex and half duplex), Auto MDI/MDIX
- ADSL connection with PPPoE Protocol with PAP/CHAP
- 8 independent sockets which are running simultaneously
- 32Kbytes Data buffer for the Network

#### W7100A

iMCU W7100A - Single Chip Microcontroller with TCP/IP and 10/100 Fast Ethernet MAC/PHY



- Fully software compatible with industrial standard 8051
- Pipelined architecture 4~5 times faster than a standard 8051
- 2 data Pointers for fast memory block processing
- Fully Hardwired TCP/IP Protocols
- 8 independent hardware socket and hybrid software stack
- Internal 32K Bytes memory for TCP/IP data communication
- 10BaseT/100Base TX Ethernet MAC/PHY Embedded
- Auto negotiation (Full / Half Duplex)
- Auto MDI/MDIX
- 3.3V operation with 5V I/O signal tolerance

#### W5100

WIZnet Hardwired TCP/IP Embedded Ethernet Controller



- Line Speed Data transmission up to 25Mbps
- Easy TCP/IP implementation without OS
- MAC & PHY embedded
- Support Hardwired TCP/IP Protocols TCP, UDP, ICMP, IPv4 ARP, IGMP, PPPoE, Ethernet
- 10BaseT/100BaseTX Ethernet PHY embedded
- Support Auto Negotiation (Full-duplex and half duplex)
- Support Auto MDI/MDIX
- Support ADSL connection (with support PPPoE Protocol with PAP/CHAP Authentication mode)
- Supports 4 independent sockets simultaneously
- Supports Serial Peripheral Interface(SPI MODE 0, 3)Multi-function LED outputs (TX, RX, Full/Half duplex, Collision, Link, Speed)

#### WIZ 81x Series



- Plug-in Module
- Usable without H/W design for W5100, transformer and RJ-45
- Available of fast evaluation of W5100 and MCU in the target board
- Supports MCU BUS and SPI Interface
- Supports Auto MDI/MDIX (auto detection of crossover)
- Supports network status indicator LEDs - FDX, TX, RX, LINK, Collision

#### WIZ 830 MJ



- Plug-in Network Module having W5300 & Mag Jack
- Available of fast evaluation of W5300 and MCU in the target board
- Supports 8 Independent connections simultaneously
- Supports MCU BUS Interface
- Supports 16/8 bit data bus width
- Support Memory to Memory DMA

### WIZ107SR

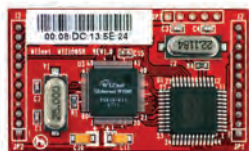


Compact Serial-to-ethernet module

- Connect with the Serial Device directly
- High System Stability and Reliability by using W7100 Hardware Chip
- Supports Serial Configuration &dash with Simple and Easy command
- Supports Password for the Security
- Easy & Powerful Configuration Tool Program
- 10/100 Ethernet Interface and max 230Kbps Serial Interface

Technical Parameters	WIZ107SR
TCP / IP	W7100
PHY	Included in W7100 Auto negotiation, Auto MDI / MDIX
I/O Interface	RS-232C
Dimension (WxDxH)	30mm X 45mm (PCB width x length)
Connector Type	2.54mm Pitch 12 pins
Input Voltage	DC 3.3V

### WIZ 100 SR



- Plug & Play Type Serial to Ethernet Gateway Module
- High stability & reliability by using W5100 WIZnet Chip, a fully-hardwired TCP/IP stack
- 10/100Mbps Ethernet Interface, Max 230Kbps Serial Interface
- Compact Size : 50mm X 30mm X 12mm
- Easy & Powerful Configuration program

Technical Parameters	WIZ 100 SR
TCP / IP	W5100
PHY	Included in W5100
MCU	GC89L591A0-MQ44I(fact 80C52 compatible) - 62K Bytes in-system programmable (ISP) Flash
Memory	GC89L591A0-MQ44I Internal SRAM 16K Bytes GC89L591A0-MQ44I Internal EEPROM 2K Bytes
Mag Jack	RDA-125BAG1A
Interface	10/100 Base-T Ethernet (Auto Detection)
Protocol	TCP, UDP, IP, ARP, ICMP, MAC, DHCP, PPPoE
Network Interface	MII, Wireless 802.11b, 802.11g
Connector Type	2 X 12 2mm Pin header array
Input Voltage	3.3V Internal Operation, 5V Tolerant I/Os
Power Consumption	150mA

### WIZ 110 SR



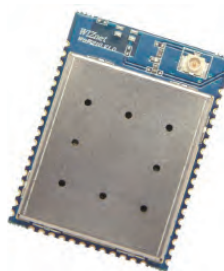
- All-made Serial to Ethernet module
- > Simple and quick network implementation
- > Available of firmware customization for various serial devices
- High stability & reliability by using W5100 WIZnet Chip, a fully-hardwired TCP/IP stack
- Easy & Powerful Configuration program
- 10/100Mbps Ethernet Interface, Max 230Kbps Serial Interface
- Dimensions: 75x45mm

Technical Parameters	WIZ 110 SR
TCP / IP	W5100
PHY	Included in W5100
MCU	GC89L591A0-MQ44I(fact 80C52 compatible) - 62K Bytes in-system programmable (ISP) Flash
Network Interface	10/100 Mbps auto sensing RJ-45 Connector
Protocol	TCP, UDP, IP, ARP, ICMP, MAC, PPPoE
Serial: Signals	TXD, RXD, RTS, CTS, GND Parity : None, Even, Odd
Parameters	Data bits : 7,8 Flow Control : RTS/CTS, XON/XOFF
Speed	Up to 230Kbps
Input Voltage	5V Adaptor
Power Consumption	DC 5V, Under 180mA

## WiFi Modules



### WIZ Fi210



Ultra Low Power "Serial to WiFi" Module

- Bring WiFi connectivity via Serial Host Interface
- Quick Booting Time : under 20msec
- Ultra Low Power through Dynamic Power Management (34µA at the Standby mode)
- Operates with standard 802.11b/g/n access point at speed up to 11Mbps (802.11b)
- Security Protocol : WEP, WPA/WPA2-PSK, Enterprise, EAP-FAST, EAP-TLS, EAP-TTLS, PEAP
- Compact Size : 32 x 23.5 x 2.9 (mm)

Technical Parameters	WIZ Fi210
Wireless Standards	IEEE 802.11b/g/n Compatible
Frequency Range	2.4 - 2.497 GHz
Output Power	8dBm ± 1dBm
I/O Interface	UART, SPI, I2C, WAKE, ALARM, GPIOs
Networking Protocols	UDP, TCP/IP (IPv4), DHCP, ARP, DNS, HTTP/HTTPS Client and Server(**)

### WizFi210-EVB



Technical Parameters	Description
Radio Protocol	IEEE 802.11b/g/n Compatible
Supported Data Rates	11, 5.5, 2, 1 Mbps (IEEE 802.11b)
Modulation	DSSS and CCK
RF Operating Frequency	2.4 - 2.497 GHz
Antenna Options	Chip antenna and U.FL connector for ext. antenna
Networking Protocols	UDP, TCP/IP (IPv4), DHCP, ARP, DNS, HTTP/HTTPS Client and Server(**)
RF Output Power (Typical)	8dBm ± 1dBm
Security Protocols	WEP, WPA/WPA2-PSK, Enterprise (EAP-FAST, EAP-TLS, EAP-TTLS, PEAP(**))
I/O Interface	UART, SPI(**), I2C(*), WAKE, ALARM, GPIOs
Dimensions	32 x 23.5 x 3 mm

### WIZ 610 wi



Stand-alone typed 802.11b/g wireless LAN module

- Ethernet to Wireless Bridging : Enable wired network device to have wireless communication interface
- Supports Serial Interface for "Serial to Wireless" application
- Supports AP/Station/Gateway mode
- 54Mbps data rate and Max.20Mbps Effective Data Transmission
- Built-in Web server for configuration via standard web browser

Technical Parameters	WIZ 610 wi
Wireless Standards	IEEE 802.11b; 802.11g
Frequency Range	2.412GHz ~ 2.472GHz
Output Power	14dBm
Receive Sensitivity	802.11b -65dBm@11Mbps 802.11g -76dBm@54Mbps
Range	Up to 200m/2dBi antenna gain
Modulation Techniques	11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 11b: DSSS (CCK, DQPSK, DBPSK)
Serial Interface	UART, CMOS (Asynchronous) 3.3V-level signals, rate is software selectable
Protocols Supported	ARP, UDP, TCP, Telnet, ICMP, DHCP, PPPoE, BOOTP, HTTP, SMTP, TFTP





LANTRONIX®, Inc. was founded in 1989 and is headquartered in Irvine, California/USA. It is a global leader in secure communication technologies that simplify remote access, management, and control of virtually any electronic device regardless of location. Its products, like Xport - original fully-integrated embedded networking server, have gained an international reputation.

**Společnost LANTRONIX®, Inc.** byla založena v r. 1989, s centrálou v Irvin, Californie / USA. Je světovou jedničkou v oblasti zabezpečených komunikačních technologií, které zjednodušují vzdálený přístup, správu a ovládní prakticky jakéhokoli zařízení. Jejich produkty, jako např. Xport - plně integrovaný embedded síťový server, získaly mezinárodní reputaci.

**Das Unternehmen LANTRONIX® Inc.** wurde 1989 gegründet und hat seinen Sitz in Irvine in Kalifornien, USA. Es ist globaler Spitzenreiter im Bereich Technologien zur gesicherten Kommunikation, welche den Fernzugriff, -verwaltung und -steuerung und -steuerung praktisch jedes beliebigen elektronischen Gerätes unabhängig vom Standort vereinfachen. Die Produkte von Lantronix wie Xport - voll integrierte Embedded-Netzwerkserver - haben sich einen internationalen Namen gemacht.

**A LANTRONIX® Inc.-et** 1989-ben alapították a kaliforniai (USA) Irvine-ben. A világ vezető biztonságos kommunikációs technológiáinak gyártója, melyek egyszerűsítik a távoli hozzáférést, lekérdéztést és vezérlést gyakorlatilag bármilyen elektronikus berendezéshez bárhol is helyezkedjen el. A Lantronix termékei, mint az Xport - eredeti teljesen integrált beágyazott hálózati szerver, nemzetközi elismerést szereztek.

**Spółka LANTRONIX®, Inc.** została założona w r. 1989, z centralą w Irvine, Kalifornia / USA. Jest światowym liderem w zabezpieczonych technologiach komunikacyjnych, które upraszczają dostęp zdalny, zarządzanie i sterowanie praktycznie dowolnego urządzenia. Ich produkty, jak Xport - w pełni zintegrowany embedded serwer sieciowy, uzyskały sobie międzynarodową reputację.

**LANTRONIX®, Inc** s-a înființat în 1989 și are sediul principal în Irvine, California/SUA. Este un lider global în tehnologii securizate de comunicații care simplifică accesul la distanță, managementul și controlul tuturor dispozitivelor electronice, indiferent de locația acestora. Produsele sale, cum ar fi Xport - un server de conectare în rețea incorporat și complet integrat, au câștigat o reputație internațională.

**Spoločnosť LANTRONIX® Inc.,** bola založená v roku 1989 a sídli v Irvine v Kalifornii, USA. Je svetová jednotka v oblasti zabezpečených komunikačných technológií, ktoré zjednodušujú vzdialený prístup, správu a kontrolu prakticky akéhokoli zariadenia bez ohľadu na umiestnenie. Produkty Lantronix ako Xport - plne integrované embedded sieťové servery si získali medzinárodné renomé.

Lantronix innovative solutions enable businesses to make better decisions based on real-time information and are utilized in almost every vertical market including: security, building and industrial automation, medical/healthcare, IT/data center, government, transportation, retail, power and utilities, and many others.

### Why LANTRONIX?

- one of the world leaders in networking
- products for fast and easy network-enabling of your device
- top features, small dimensions
- above-standard customer support

### Did You Know?

All over the world, more than 2 millions of Lantronix XPort® was sold.

### XPort®

#### Embedded Ethernet Device Server

- Minimal engineering effort required to web-enable virtually any electronic device
- Remote command and control of edge devices
- Real-time edge device status via e-mail alerts
- 256-bit AES encryption for secure communications
- EMC/EMI-compliant; RoHS-compliant
- Everything you need – all in a single RJ45 package



Technical Parameters	XP1001000-04R
Serial Interface	CMOS (Asynchronous, 5V Tolerant)
Data Rates	300 bps to 921,600 bps
Interface	Ethernet 10Base-T or 100Base-TX (Auto-Sensing)
Connector	RJ45
Protocols	TCP/IP, UDP/IP, ARP, ICMP, SNMP, TFTP, Telnet, DHCP, BOOTP, HTTP, and AutoIP
Management	SNMP, Telnet, serial, internal web server, and Microsoft Windows®-based utility for configuration
Security	Password protection
CPU	Based on the DSTni-EX enhanced 16-bit, 48MHz or 88MHz, x86 architecture
Memory	256KB SRAM and 512KB flash
Input Voltage	3.3 VDC
Dimensions	33.9 x 16.25 x 13.5mm

### XPort® Pro

#### World's Smallest Linux Networking Server

- Enable M2M edge computing and effortlessly handle demanding applications with the power of an advanced architecture 32-bit processor
- Run Linux (XPP1003000-02R) or Lantronix Evolution OS (XPP1002000-02R) for the ultimate in-application development flexibility
- Production-ready hardware and software solution provides simple device set-up, configuration and monitoring, with powerful, industry-standard management tools
- Footprint compatible with the popular XPort
- VIP Access technology can seamlessly integrate with a remote services enablement platform



Technical Parameters	XPP1002000-02R, XPP1003000-02R
Serial Interface	Flow Control: XON/XOFF (software), CTS/RTS (hardware), Programmable IO: 3 PIO pins
Data Rates	300 bps to 921,600 bps
Interface	Ethernet 10Base-T or 100Base-TX (Auto-Sensing)
Connector	RJ45
Protocols	TCP/IP, UDP/IP, ARP, ICMP, SNMPv2, TFTP, FTP, Telnet, DHCP, BOOTP, HTTP, SMTP, SSHv2, SSLv3, PPP, AutoIP, RSS, and SYSLOG
Management	Internal Web Manager (SSL Option for secure login) CLI (over Serial Ports, Telnet or SSH) XML Configuration Records via CLI or FTP
Security	SSLv3 and SSHv2 Client & Server, Selectable, 128/256/512/1024 Bit certificates, Encryption: AES, 3DES and RC4, Authentication: SHA-1, MD5, Base-64
CPU	High performance 32-bit processor
Memory	8MB SDRAM/16MB Flash or 16MB SDRAM/16MB Flash
Input Voltage	3.3 VDC
Dimensions	33.9 x 16.25 x 13.5mm

Micro

Embedded Device Server

- Easily network-enable virtually any serial device
- Flexible, well-developed IP protocol stack
- Ethernet RJ45 (10BASE-T) connector on the board
- TTL serial interface
- Two serial ports
- Accepts 5VDC regulated input power
- HTTP, Serial, Telnet and SNMP management
- Flash ROM for easy software upgrades
- Custom protocol support available



MSSLite

Embedded Device Server

- Upload data directly to one or more selected hosts.
- Provide management information to network requestors even while data transfers are in progress.



UDS1100-B

Embedded Device Server

- Quick way to embed network connectivity to access, monitor and control equipment over Ethernet
- RS-232, RS422 or RS-485 serial support
- RJ45 10Base-T/100Base-TX Ethernet Interface
- Configurable via internal web server, Telnet on serial
- 2 MB Flash ROM
- Environmentally-friendly RoHS and WEEE compliant
- Compact design allows for easy integration



WiPort® NR

Embedded Serial to Ethernet Device Server

- Serial to Ethernet networking in the same form factor and pinout as our 802.11 b/g wireless WiPort offering ability to implement wired or wireless solution with the same board design
- Build Ethernet or IP networking into your products - quickly and easily
- Provide a smooth transition to 802.11b/g wireless networking without any board redesign (using WiPort)
- Proven operating system, embedded web server complete network protocol stack
- 256-bit AES encryption for secure communications
- EMC/EMI-compliant; RoHS-compliant



PremierWave

Embedded Linux Wireless Device Server

- Small form factor measuring 55mm x 30mm
- 802.11 a/b/g/n solution with Selectable Dual Band Radio (2.4GHz or 5GHz)
- Linux Operating System with IP v6 Support
- Adds Wi-Fi to devices with the highest enterprise-grade security and authentication protocols
- Lantronix SmartRoam™ technology\* provides seamless mobile connectivity and improved reliability
- Includes full TCP/IP stack and web server
- Robust set of interfaces that include Ethernet, Serial, USB, I2C, and SPI
- Low power consumption modes
- Powerful applications customization platform with 32-bit AR M9 Processor
- Virtual IP (VIP) Access to gain remote connectivity behind firewalls
- Ethernet-to-Wireless LAN bridging provides seamless connectivity for wired Ethernet devices
- Advanced Applications Suite including:
  - Tunnelling, secure tunnelling, Configuration Manager, Web-based Configuration Manager



xPico

Embedded Device Server

- Chip-sized Footprint: 24mm x 16.5mm
- Complete Device Server Application with Full IP Stack and Web Server
- Storage Capacity: 384KB for Web Pages
- CPU: Based on the DSTni-EX Enhanced 16-bit x86 Architecture
- Memory: 256KB SRAM, 512KB Flash
- Serial Data Rate of up to 921 Kbps
- 256-bit AES Encryption
- Interface: CMOS (Asynchronous) 3.3V-level signals (5V tolerant)
- Extended Temperature: -40° to +85° C



EDS-MD™

The Next Generation of Multi-Port Medical Device Servers

- UL and IEC-60601 compliance provides galvanic port isolation to protect connected medical devices
- Securely connect any medical device with a serial interface to the network using enterprise-level SSL and SSH
- Simple set up and configuration with industry-standard management tools including Web, CLI and XML
- Gigabit Ethernet offers increased bandwidth for higher performance
- Available with 4, 8 or 16 port



EDS8PS and EDS16PS

Hybrid Ethernet Terminal and Multiport Device Servers

- Quickly connect any device with a serial port to the network using robust SSH or SSL enterprise-level security
- Easily customize and enhance the EDS for your unique application with Evolution OS®
- Simple device set-up, configuration and monitoring with powerful, industry-standard management tools (Web, CLI, XML, SNMP)
- Sleek design (with desktop or wall-mount capability) appropriate for installation in medical or other high visibility applications



XPress-DR

Industrial Device Server

- Cascade multiple devices from a single network Connect enterprise (ERP, MES) systems to factory floor devices without disturbing existing control networks
- Allow remote firmware upgrades, saving money and time from manual upgrades
- IAP version supplies many industrial communication protocols
- Configurable serial interface supports RS-232, RS-422, or RS-485
- 10Base-T/100Base-TX Ethernet (RJ45)
- Isolated serial and Ethernet ports
- FM-approved for hazardous locations Class I, Div. 2
- RoHS Compliant



EDS1100 / EDS2100

Hybrid Ethernet Terminal and Multiport Device Servers

- Quickly connect any device with a serial port to the network using robust SSH or SSL enterprise-level security
- Run Linux or Lantronix Evolution OS for the ultimate in application development flexibility
- Easily customize and enhance the EDS for your unique application with Evolution OS
- Simple device set-up, configuration and monitoring with powerful, industry-standard management tools (Web, CLI, XML, SNMP)
- VIP Access technology can seamlessly integrate with a remote services enablement platform







YITRAN COMMUNICATIONS Ltd. is a leading provider of cutting edge Powerline Communication technology (PLC) for command and control applications. Yitran designs, develops and markets communication integrated circuits and modules that utilize existing power lines and eliminate the need for a costly communication infrastructure.

**CZ** YITRAN COMMUNICATIONS Ltd je předním poskytovatelem špičkových Powerline komunikačních technologií (PLC) pro řízení a kontrolu aplikací. Yitran navrhuje, vyvíjí a prodává komunikační integrované obvody a moduly, které využívají existující elektrické vedení a odstraňují potřebu nákladné komunikační infrastruktury.

**DE** YITRAN COMMUNICATIONS Ltd. ist ein führender Anbieter von spitzentechnologischen Powerline Kommunikationstechnologien (PLC) zur Steuerung und Kontrolle von Anwendungen. Yitran entwirft, entwickelt und vertreibt integrierte Kommunikationsschaltungen und -module, welche bestehende Stromleitungen nutzen und eine kostenaufwendige Kommunikationsinfrastruktur überflüssig machen.

**HU** A YITRAN COMMUNICATIONS elsősorban a kiváló Powerline kommunikációs technológiák (PLC) szolgáltatója az alkalmazások szabályozására és vezérlésére. A Yitran tervezi, fejleszti és értékesíti azokat az integrált kommunikációs áramköröket és modulokat, melyek a meglévő elektromos vezetékeket használják, így feleslegessé teszik a költséges kommunikációs infrastruktúra kiépítését.

**PL** YITRAN COMMUNICATIONS Ltd to wiodący dostawca najwyższej klasy technologii komunikacyjnych Powerline (PLC) dla kontroli i sterowania aplikacjami. Yitran projektuje, rozwija i sprzedaje komunikacyjne układy scalone oraz moduły, które wykorzystują istniejące linie elektryczne i eliminują konieczność kosztownej infrastruktury komunikacyjnej.

**RO** YITRAN COMMUNICATIONS Ltd. este un important furnizor de sisteme de comunicații PLC (Power line Communication) și aplicații de comandă și control. Yitran proiectează, dezvoltă și comercializează circuite și module integrate de comunicații care utilizează liniile electrice existente și elimină nevoia unei infrastructuri costisitoare de comunicație.

**SK** YITRAN COMMUNICATIONS Ltd je popredným poskytovateľom špičkových Powerline komunikačných technológií (PLC) pre riadenie a kontrolu aplikácií. Yitran navrhuje, vyvíja a predáva komunikačné integrované obvody a moduly, ktoré využívajú existujúce elektrické vedenie a odstraňujú potrebu nákladnej komunikačnej infraštruktúry.

Yitran's narrowband PLC modem chips feature PHY (Physical), MAC, Network and Profiling Layers on a SoC (System on a Chip) device. Yitran provides low cost, innovative technology for superior performance and robustness. This is due in large part to Yitran's DCSK (Differential Code Shift Keying) modulation technique, which provides extremely high communication reliability (US patent No. 6,064,695) and Adaptive back-off algorithm (patent pending) based on IEEE802.11, optimized for the power line medium.

Applications of PLCs include Energy Management, Demand Response, Automated Meter Reading/Management (AMM/AMR), Home/Building Automation, Switching and Lighting, Appliances, HVAC control and more.

### Why YITRAN?

- superior performance and robustness of Yitran's technology
- low cost, easy to use products

#### IT900

- Low-cost Powerline Communication (PLC) modem and application solution in a single chip
- Data rates up to 500 Kbps FCC and ARIB, 150 Kbps in CENELEC-A band and 50 Kbps in CENELEC-B
- Transparent interface for IPv6, IPv4, 6lowpan and support for SE 2.0 (future release)
- Implements DCSK and DCSK Turbo Modulation - Natural extension to DCSK based technology
- HomePlug® Command and Control ready - Fully backward compatible with IT700 and IT800 Series
- Incorporates Yitran's high performance Data Link Layer (DLL), Network Protocol (Y-Net) and extremely robust Physical Layer (PHY)
- High in-phase & cross-phase connectivity. Full coverage even under adverse line conditions.
- Embedded AFE (external Amplifier is not required!)

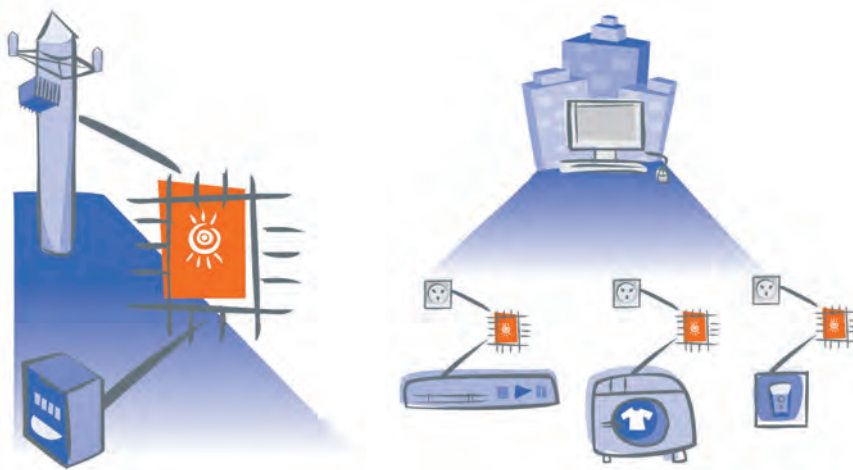


#### IT700

- Full, low cost PLC modem and applications solution in a single chip.
- Incorporates YITRAN'S high performance DLL (Data Link Layer), Y-NET protocol and extremely robust PHY (Physical layer).
- Includes 8051 Micro for protocol stack and application.
- High in-phase and cross-phase reliability.
- Complies with worldwide regulation requirements (FCC, ARIB, CENELEC).
- Ideal for a "No New Wires" applications utilizing existing electrical wiring and grids such as Energy Management and Demand Response, AMR (Automated Meter Reading/Management)/AMM/AMI, home/building automation, security access and more.
- Fully compatible with IT800 series



Also available:  
Evaluation kits





With more than 20 years of experience research, development and production of various RFID products, SUNBEST provides reliable products and solutions. Guaranteed quality, competitive prices and innovative design are the reasons why Sunbest products are attractive to system integrators.

**CZ** SUNBEST díky svým více než dvacetiletým zkušenostem v oblasti výzkumu, vývoje a výroby různých produktů RFID poskytuje spolehlivé produkty a řešení. Zaručená kvalita, konkurence schopné ceny a inovativní design jsou důvody, proč se produkty Sunbest staly atraktivní pro systémové integrátory.

**DE** Dank seinen mehr als 20-jährigen Erfahrungen im Bereich Forschung, Entwicklung und Herstellung diverser RFID-Produkte bietet SUNBEST zuverlässige Produkte und Lösungen. Garantierte Qualität, Konkurrenzpreise und innovatives Design sind Gründe, warum Sunbest Produkte für System-Integratoren an Attraktivität gewonnen haben.

**HU** A SUNBEST a több mint 20 éves tapasztalatának köszönhetően a különböző RFID termékek kutatásában, fejlesztésében és gyártásában megbízható termékeket és megoldásokat kínál. A garantált minőség, a versenyképes árak és az innovatív dizájn magyarázza, miért választják szívesen a Sunbest termékeit a rendszerintegrátorok.

**PL** SUNBEST dzięki swoim ponad 20-letnim doświadczeniom w dziedzinie badań, rozwoju i produkcji różnych produktów RFID, oferuje niezawodne produkty i rozwiązania. Gwarantowana jakość, konkurencyjne ceny oraz innowacyjny design to powody, dla czego produkty Sunbest są dla integratorów systemowych tak atrakcyjne.

**RO** Cu peste 20 de ani de experiență în cercetarea, dezvoltarea și producția diverselor produse RFID, Sunbest furnizează produse și soluții fiabile. Calitatea garantată, prețurile competitive și design-ul inovator sunt factorii determinanți ai atractivității produselor Sunbest pentru integrații de sistem.

**SK** SUNBEST vďaka svojim viac ako 20-ročným skúsenostiam v oblasti výskumu, vývoja a výroby rôznych produktov RFID, poskytuje spoľahlivé produkty a riešenia. Zaručená kvalita, konkurenčné ceny a inovatívny dizajn sú dôvody, prečo sa Sunbest produkty stali atraktívne pre systémové integrátorov.

In Sunbest portfolio we can find a variety of RFID products, mainly contactless cards, RFID tags (LF, HF and UHF), RFID key fobs, special cards, metal mount tags and HF RFID labels, readers and writers. Sunbest products are widely used all over the world in telecommunications, logistics, food industry, financial services, admittance systems of buildings and other areas where RFID technology is useful.

### Why SUNBEST?

- reliable, proven RFID products
- RFID tags available for LF, HF and UHF range
- excellent price/performance ratio
- Available directly from our stock

### RFID Readers



**EM80**  
Long range proximity reader.

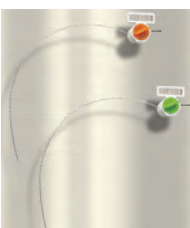


**ID2, ID12, ID20**  
125kHz RFID proximity module with external antenna and internal antenna.

### RFID Tags



**HB8830X, HB8831BABY**  
Water and dust proof disposable wristband.



**SL215**  
Sealertag, management and tracking of precision machinery



**PT100**  
Plant tag



**SR816X, 817X**  
Plant tag



**MT8836, 37, 38, 39**  
Cabletie tag, using ul approved nylon-66 anti-aging and water-proof



**NA2380, NA2381**  
Nail tag, tree identification, pallet tracking and timber tracking.



**SMAR TLABEL**  
Anti-Counterfeit 13.56MHz chip  
ISO 14443 A/15693,  
up to 50 tags(reader/antenna dependent)





**LM8100,8200**  
On-metal tag, fix spot labeling management, water proof  
125 kHz EM4100  
Temic E5557, HITAG1/2



**LD201,25,22,20,16**  
Laundry tag, water and dust proof, IP68  
125 kHz EM4100, Temic E5557, HITAG1/2  
13,56 MHz Mifare



**TAG17,13,18,25,30, PH35,40,50, TAG301X,302,401X,501X**  
RFID tag in various size.  
125 kHz EM4100, Temic E5557, HITAG1/2  
13,56 MHz Mifare  
13,56 MHz I-code



**GT601200,Q5, CT6008,6300,6230**  
Cylindrical transponder  
125 kHz EM4100, Temic E5557, HITAG1/2  
13,56 MHz Mifare  
13,56 MHz I-code



**BR00X,BU00X**  
RFID pigeon ring, for bird or poultry identification  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**FLAPA,B,C,D,E, EAR203**  
Animal tag in various shape and colours  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**TU208**  
RFID tube tag of various colours  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**CLAMSHELL CARD . ISO CARD**  
Thick or thin card of your choice  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**TOKEN20,28,30**  
RFID tokens in various size and colours  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**TOKEN20,28,30**  
RFID tokens in various size and colours  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**WR8866,67,68**  
Wristband Of Various Designs & Colours  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**WR8861,62,63,65**  
Wristband Of Various Designs & Colours  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**WR8860A, WR8860B**  
RFID silicone wristband of various designs & colours.  
WR8860A Dim. 60mm, WR8860B Dim. 56mm  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**WS8875,76**  
RFID hand watch, water proof watch in various colours  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**WS887X**  
RFID watch in various designs  
125 kHz EM4100, Temic E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**DT1801X**  
RFID keyfob in various shapes and sizes  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**EM9981-3X,9987,88X**  
RFID keyfob in various shapes and sizes  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**EM999X**  
Leather keyfob for RFID 25mm pvc tag  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**EM9951-2, 9971-6W/T, 997-9**  
Leather keyfob in various shapes and sizes  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**TK28X**  
Leather keyfob in various shapes and sizes  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**TK19,29,30,EM9969,9970**  
Leather keyfob in various shapes and colours  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**EM9921X,9960-3X**  
Leather keyfob in various shapes and colours  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**SHINING KEY FOB**  
RFID keyfob in various shape and colours  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**RF ID STONE TAG**  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



**NA2380, NA2381**  
Nail tag, tree identification, pallet tracking and timber tracking  
125 kHz EM4100, Temic  
E5557, HITAG1/2, Legic 256  
13,56 MHz Mifare  
13,56 MHz I-code



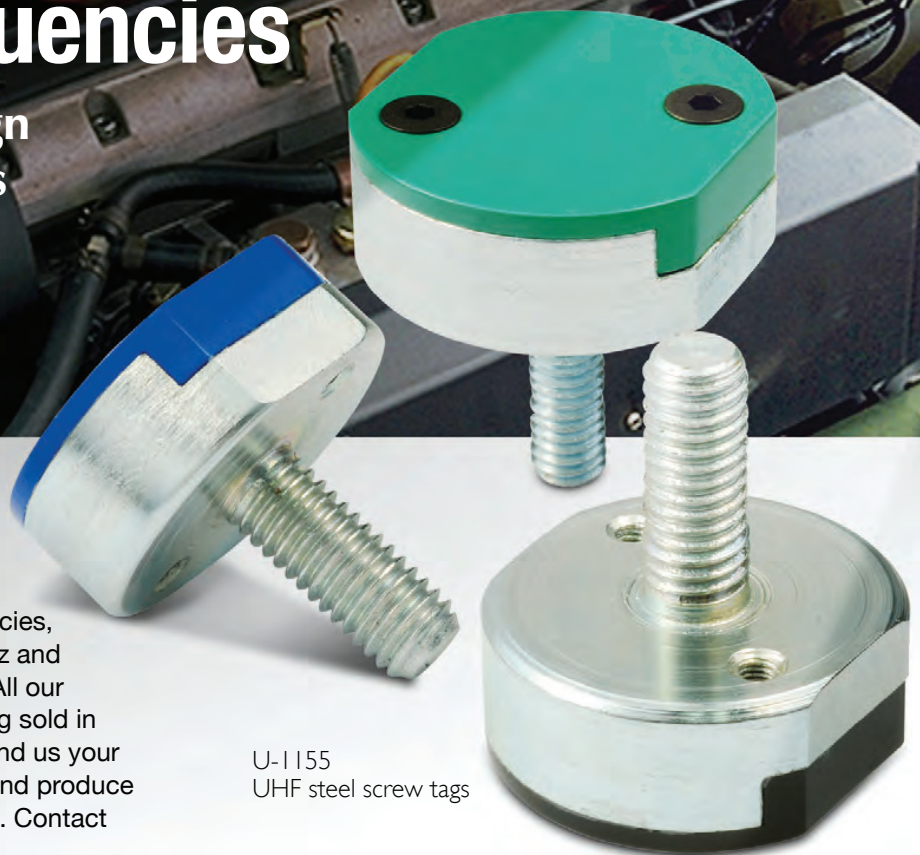
We prepare for our customers and fans a unique newsletter, which is tailor-made. You can choose what you want to read and how often you'll get! Please visit [www.soselectronic.com/newsletter](http://www.soselectronic.com/newsletter)



# Customizable RFID devices for a wide range of LF, HF and UHF frequencies

We can make your design ideas a reality in 30 days

For 12 years, we've been designing and manufacturing RFID devices according to your specifications. Our staff can customize RFID products to work with different frequencies, including 125kHz, 13.56MHz, 860 to 928MHz and 2.45GHz, for a wide variety of applications. All our tags are CE- and TÜV-certified, and are being sold in a growing number of markets worldwide. Send us your OEM/ODM specifications. We can develop and produce prototypes from your designs in just 30 days. Contact us today.



U-1155  
UHF steel screw tags



U-1156  
Reusable RFID car decal for glass



U-1157  
UHF anti-counterfeit label



WR-8857  
UHF CI G2 fashionable wristband



U-1145  
UHF CI G2 wooden tag



U-1084B  
UHF dragonfly seal tag



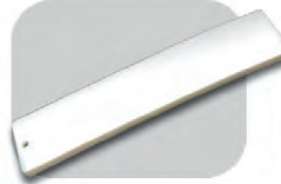
WR-8854  
UHF CI G2 fashionable wristbands



U-36/37/38  
Various LF/HF key fob tags



U-1134  
UHF hot-melt adhesive tag



U-1086  
UHF laundry tag



U-1111  
UHF jewelry tag



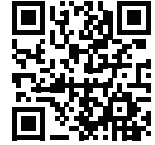
## Sunbest Technology Company Ltd

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Global Sources Verified Supplier ★★★★★

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www.globalsources.com/sunbesttech.co  
www.sunbest.com.tw





AUREL - Italy based company with over 40 years of experience, focusing on low power RF modules. AUREL products include thick film hybrid with custom design and assemblies, proprietary design radio frequency modules, avionic application modules, medical instruments and remote controls.

**CZ** AUREL je italská společnost s více než čtyřicetiletými zkušenostmi, která se zaměřuje na nízkovýkonové RF moduly. Mezi produkty AUREL patří: hybridní moduly se zákaznickým designem, RF moduly, moduly pro letecké aplikace, lékařské přístroje a dálkové ovladače.

**DE** AUREL ist ein italienisches Unternehmen mit mehr als 40-jährigen Erfahrungen, welches sich auf Kleinleistungs-HF-Module spezialisiert. Zu den Produkten von AUREL zählen: Dickfilmhybride mit kundenspezifischem Design, HF-Module, Module für Luftfahrtapplikationen, medizinische Geräte und Fernbedienungen.

**HU** Az olaszországi székhelyű AUREL cég több mint 40 éves tapasztalattal az alacsony fogyasztású RF modulokra szakosodott. Termékei közt megtalálhatóak: a vastag film-rétegű hibridek egyedi dizájnnal és összeszereléssel, saját tervezésű rádiófrekvenciás modulok, repülőelektronikai modulok, orvosi műszerek és távvezérlők.

**PL** AUREL - włoska spółka z ponad 40-letnimi doświadczeniami, zajmuje się modulami RF niskich mocy. Produkty AUREL zawierają: hybrydowe układy grubowarstwowe z własnym designem i montażem, firmowe opracowania modułów częstotliwości radiowych, moduły do aplikacji lotniczych, instrumenty medyczne oraz systemy sterowania zdalnego.

**RO** AUREL - o societate cu sediul în Italia cu peste 40 de ani de experiență, specializată în producția de module RF de putere mică. Produsele AUREL includ: pelicule groase hibrid cu design și montare personalizate, module de radiofrecvență cu tehnologie brevetată, module pentru aplicații aéroelectronice, instrumente medicale și telecomenzi.

**SK** AUREL je talianská spoločnosť s viac ako 40 - ročnými skúsenosťami, ktorá sa zameriava na nízkovýkonové RF moduly. Medzi produkty AUREL patria: hrubovrstvé hybridy so zákaznickým dizajnom, RF moduly, moduly pre letecké aplikácie, medicínske zariadenia a diaľkové ovládače.

The high versatility of the thick film technology allows economical benefits in many different application fields like biomedical, industrial control, automotive, consumer, military and scientific research. From Aurel portfolio we offer mainly various communication RF modules, receivers, transceivers, decoders and keyfob remote controls.

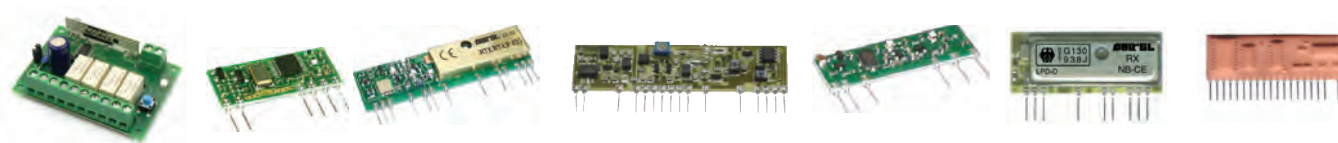
### Why AUREL?

- company specialized on low power RF modules
- over 40 years of experience
- very good price/ performance ratio

433.92MHz 868.30MHz 2.4GHz



Model	Function	AM	FM	Frequency (MHz)	Supply (V)	Current (mA)	Dimension (mm)
D4ML	Decoder				5+15	1	51.2 x 18.4 x 4.3
TX12E 1/2 TK SAW 433	Keyfob	●		433.92	12	10	65.5 x 37 x 15
TX12E 1/2/4 C 433	Keyfob	●		433.92	12	7	75 x 44 x 18.5
D1MB	Decoder				5	1	40 x 16.8 x 3.5
D2MB	Decoder				5	1	51.2 x 16 x 4.3
TX 1/2 TK SAW 433	Keyfob	●		433.92	12	10	65.5 x 37 x 15
TX 1/2/4 C 5026	Keyfob	●		433.92	12	10	75 x 43.6 x 18.5
TX 869 BOOST	Transmitter		●	868.40/869.65	5	420	33 x 23 x 8
RX-FM8SF 869.50	Receiver		●	869.50	5	5.6	40.3 x 17.5 x 5
RX AUDIO 2.4	Audio Receiver			2.400/2483.5	2.2+3.6	65	47 x 32 x 7
SIR 2008 HCS/HT12E	IR Sensor	●		433.92	2.1+3.6	9	120 x 60 x 45
SIR 2008 HCS/145026	IR Sensor	●		433.92	2.1+3.6	9	120 x 60 x 45
AS 433	Vertical Antenna			433.92			34 x 170
AS 868	Vertical Antenna			868.30			34 x 90
GP 433	Ground Plane Antenna			433.92			110 x 255
GP 868	Ground Plane Antenna			868.30			190 x 460
T, T-A	Stylus Antenna			433.92			10 x 90
T8, T8/A	Stylus Antenna			868.30			10 x 90
A24	High Gain Antenna			2.400			188 x 133 x 40
RP SMA 2.4	ZigBee Antenna			2.400-2.500			10 x 108



Model	Function	AM	FM	Frequency (MHz)	Supply (V)	Current (mA)	Dimension (mm)
BC-NBK	Receiver	●		433.92	5	2.5	38.1 x 13.7 x 5.5
AC-RX2	Receiver	●		433.92	5	2.5	38.1 x 12.3 x 5.5
AC-RX2/CS	Receiver	●		433.92	5	2.5	38.1 x 12.3 x 5.5
BC-NB 3V3	Receiver	●		433.92	3.3	0.4	38.1 x 13.7 x 5.5
RX-4M25RR01SF	Receiver	●		433.92	2.5	0.07	40.1 x 17.5 x 5.5
RX-4M30RR01SF	Receiver	●		433.92	3	0.07	40.1 x 17.5 x 5.5
RX-4MA2	Receiver	●		433.92	5	0.7	39 x 15 x 3
RX-4MM3/F	Receiver	●		433.92	3	5.8	39 x 17.5 x 5
RX-4MM5/F	Receiver	●		433.92	5	5.8	39 x 17.5 x 5
RX-4MM3++/F	Receiver	●		433.92	3	7.5	36.5 x 14.5 x 4.5
RX-4MM5++/F	Receiver	●		433.92	5	7.5	36.5 x 14.5 x 4.5
RX-MID 3V	Receiver	●		433.92	3.3	5.6	25.4 x 12.4 x 2.5
RX-4M50RR30SF	Receiver	●		433.92	5	3	40.1 x 17.5 x 5.5
RX-AM4SF	Receiver	●		433.92	5	6.5	40.3 x 17.5 x 5
RX-AM8SF	Receiver	●		868.30	5	6.5	40.3 x 17.5 x 5
RX-FM4SF 433.92	Receiver		●	433.92	5	5.6	39 x 15 x 3
RX-FM4SF 434.15	Receiver		●	434.15	5	5.6	39 x 15 x 3
RX-FM8SF 868.30	Receiver		●	868.30	5	5.6	39 x 15 x 3
TX-SAW MID 3V - 5V	Transmitter	●		433.92	1.8+5.5	3+7	25 x 12.5 x 2.5
TX-SAW MID 3V/CS - 5V/CS	Transmitter	●		433.92	1.8+5.5	3+7	25 x 12.5 x 2.5
TX-SAW 433 s/Z	Transmitter	●		433.92	3+12	5	38.1 x 13.2 x 3
TX-FM-MID	Transmitter		●	433.92	3	11+16	25.4 x 12.5 x 3
TX FM 868 MID	Transmitter		●	868.30	3	11+16	25.4 x 9 x 3
TX-8LAVSA05	Transmitter	●		868.30	20+50	2.7+5	38.1 x 13.7 x 3
TX FM 868	Transmitter		●	868.30	5	24	33 x 13.5 x 3
TX-4M10HA - HA/V	Transmitter	●		433.92	3	25	56 x 18.5 x 10
TX-8L25IA - IA/V	Transmitter	●		868.30	3	25	56 x 18.5 x 10
RTX MID 3V - 5V	Single Ch Transceiver	●		433.92	3/5	15	25.4 x 12.4 x 2.5
RTX RTL 434	Single Ch Transceiver	●		433.92	3	15	66.3 x 17.2 x 5
XTR-434	Single Ch Transceiver		●	433.92	5	11	33 x 23 x 8
XTR-7020A-4 / A-8	Multi Ch Transceiver		●	433/868	3	40	33 x 23 x 8
WIZ-7020A-4 / A-8	Multi Ch Transceiver		●	433/868	5	40	68 x 40 x 10
XTR CYP 2.4	Multi Ch Transceiver		DSSS	2402/2481	3.3	100	35 x 25 x 7
XTR VF 2.4 LP	Multi Ch Transceiver		DSSS	2402/2497	1.8+3	35	35 x 25 x 7
RX-4MHCS	Receiver	●		433.92	5	3	39 x 17.5 x 5
HCS-DEC 1/2/4	Decoder Board	●		433.92	12/24	52/62	65 x 45 x 18
HCS-TX 1/2/3	Keyfob	●		433.92	3	10	54 x 43 x 11
HCS-TX 1/2/3 868	Keyfob	●		868.30	3	10	54 x 43 x 11
HCS-FM-TX 1/2/3	Keyfob		●	433.92	3	10	54 x 43 x 11
HCS-FM-TX 1/2/3 868	Keyfob		●	868.30	3	10	54 x 43 x 11
TX 1/2/3 HCS 433	Keyfob	●		433.92	12	10	56.5 x 35 x 13.5
TX 2/4/6 M HCS	Keyfob	●		433.92	3	7	75 x 40 x 16
TX 2/4/6 M HCS 868	Keyfob	●		868.30	3	7	75 x 40 x 16
TX 12 CH	Keyfob	●		433.92	12	7	85.5 x 54 x 10.4





Over the past decade, 2J located in Bardejov/ Slovakia has established itself as a market leader within the antenna industry. Initially in developing a diverse range of products and subsequently on undertaking bespoke antenna projects for such high profile companies as Porsche or Sagem amongst others.

**CZ** Za poslední dekádu se 2J - Bardejov / Slovensko stalo jednou z předních společností v anténním průmyslu. Zpočátku vývojem různých produktů a následně mnoha zákazovými anténními projekty pro renomované společnosti jako jsou Porsche, Sagem a mnohé jiné.

**DE** Innerhalb der letzten zehnj Jahre wurde 2J-Bardejov / Slowakei eines der führenden Unternehmen in der Antennenindustrie. Anfangs durch Entwicklung verschiedener Produkte und nachfolgend durch zahlreiche Antennenprojekte im Auftrag solch renommierter Unternehmen wie Porsche, Sagem und vieler anderer.

**HU** Az elmúlt évtizedben a 2J Bártfán az antenna ipar egyik vezető gyártójává vált. Kezdetben a különböző termékek fejlesztésével, később számos egyéni projekttel neves cégek számára, mint a Porsche, Sagem, stb. vált ismertté.

**PL** W ciągu ostatniej dekady, spółka 2J - Bardejov / Słowacja stała się jedną z wiodących spółek w produkcji anten. Początkowo poprzez zaprojektowanie różnych produktów, później poprzez opracowanie wielu klienckich projektów antenowych dla takich renomowanych spółek jak Porsche, Sagem i wiele innych.

**SK** In ultimul deceniu, compania 2J din Bardejov / Slovacia s-a remarcat ca lider pe piață în domeniul industrial, inițial în dezvoltarea unei game diverse de produse și ulterior în dezvoltarea de proiecte de antenă la comandă pentru companii de renume printre care Porsche sau Sagem.

**SL** Za poslednú dekádu sa 2J - Bardejov / Slovensko stalo jednou z vedúcich spoločností v anténnom priemysle. Spočiatku vývojom rôznych produktov a následne mnohých zákazovými anténnymi projektami pre také renomované spoločnosti ako Porsche, Sagem a mnohé iné.

2J Antennae provide highly reliable antennas and RF cable products for system integrators of wireless telemetry and M2M equipment. 2J products cover 530kHz to 5.9GHz frequencies. Since its foundation, 2J Antennae has continued to be a trusted name globally for companies producing machine to machine, industrial, automotive, marine, base station and wireless solutions. Equipment and highly skilled personnel allow 2J to be largely self-sufficient. Plastic injections, SMD pick and place, product assembly and quality control are all carried out on the main site in Slovakia without a need for costly outsourcing. A new onsite anechoic chamber has been put in place to further improve design and testing abilities.

### Why 2J?

- top quality products with CE certification and IP67 resistance
- very wide production portfolio
- flexibility and quick prototyping ability
- very good price/performance ratio

### 2J GPS Modules Antennas



- AM (530 KHz - 40 MHz)
- FM (87,5 - 108 MHz)
- DAB (150 - 240 MHz)
- TETRA (380 - 500 MHz)
- TETRA (433 - 470 MHz)
- DVB-T (440 - 870 MHz)
- ISM/TETRA (433 MHz)
- ISM (868 MHz)
- AMPS (824-894 MHz)
- R-GSM (876 - 924 MHz)
- GSM (900 MHz)
- DCS (1800 MHz)
- PCS (1900 MHz)
- 3G (UMTS 2.1 GHz)
- WIFI / BLUETOOTH / ZIGBEE (2.4 GHz)
- WIFI (5.0 GHz, 5,9GHz)
- GPS/GLONASS (1572-1610 MHz)
- ERMES (169 MHz)
- ISM (915 MHz)

### 2J GSM Antennas



### 2J Telematic GSM Antennas



### 2J Combined Antennas



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# Embedded Systems

## Embedded Modules 74



## Memory Modules 78



10:54



An embedded system is a computer system designed for specific control functions within a larger system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today.

**CZ** Embedded system je počítačový systém, který je navržen pro specifické řídicí funkce v rámci většího systému, často v reálném čase. Je vložen jako část kompletního zařízení, často včetně hardwaru a mechanických částí. Embedded systémy řídí mnohá dnešní běžně používaná zařízení.

**DE** Ein Embedded-System ist ein für spezifische Steuerfunktionen innerhalb eines größeren Systems entworfenes Computersystem, das häufig Echtzeitanforderungen erfüllen muss. Es ist eingebettet als Teil des Gesamtgerätes, oft einschließlich Hardware und mechanischer Teile. Embedded-Systeme steuern zahlreiche gegenwärtig häufig benutzte Geräte.

**HU** Az általános célú számítógépekkel szemben egy beágyazott rendszer csupán néhány előre meghatározott feladatot lát el, és sokszor tartalmazhat olyan feladat-specifikus mechanikus és elektronikus alkatrészeket, melyek nem találhatók egy általános célú számítógépben.

**PL** System wbudowany (embedded) to system komputerowy, zaprojektowany do określonych funkcji sterowania w ramach większego systemu, często ograniczony obliczeniami w czasie rzeczywistym. Jest wbudowany jako część kompletnego urządzenia, często zawierającego części mechaniczne. Systemy wbudowane sterują wieloma powszechnie używanymi dzisiaj urządzeniami.

**RO** Un sistem încorporat este un sistem informatic proiectat pentru funcții de control specifice în cadrul unui sistem mai larg, adesea cu restricții de calcul în timp real. Este încorporat ca parte dintr-un dispozitiv complet, adesea incluzând hardware și piese mecanice. Sistemele încorporează controlează multe dispozitive des utilizate astăzi.

**SK** Embedded system je počítačový systém navrhnutý pre špecifické riadiace funkcie v rámci väčšieho systému, často v reálnom čase. Je vložený ako časť kompletného zariadenia, často vrátane hardvéru a mechanických častí. Embedded systémy riadia mnohé dnešné bežne používané zariadenia.

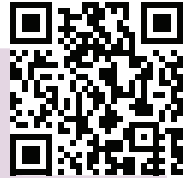
Embedded systems contain processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task. Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Physically, embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

Embedded modules, or embedded system modules (ESM) are a relatively new group of electronic components referred to modules, which can be "embedded" to a target device, providing intelligence or a complex of various functions.

Modules can be of a various kind, typically a compact computer-module (COM) or a computer module with a display. Common feature of all these modules is that by their incorporation into a design of a device you can greatly enhance performance of your device, and/or you can substantially shorten development time and a time to market, as well as decrease development costs. Usage of embedded modules is typically convenient for production batches from single units to thousands of units.





**BOLYMIN delivers Embedded System and Display products to markets all over the world. With more than 15 years dedication in professional manufacturing of display related products, BOLYMIN is now a well-established company in terms of design, manufacturing and quality assurance.**

**CZ** *BOLYMIN je celosvětový dodávateľ Embedded systémů a displejů. Již více než 15 let s profesionálním nasazením vyrábí produkty, související s displeji. Bolymin je zárukou vysoké kvality.*

**DE** *BOLYMIN ist ein globaler Lieferant von Embedded-Systemen und Displays. Seit mehr als 15 Jahren produziert er mit professionellem Einsatz displaybezogene Produkte. Bolymin ist ein Garant für die Einhaltung der Herstellungs- und Designqualität.*

**HU** *A BOLYMIN a beágyazott rendszerek és kijelzők világszerte ismert gyártója. Már több mint 15 éve gyárt szakszerűen kijelzőkkel összefüggő termékeket. A Bolymin garancia a jó minőségre és dizájnr.*

**PL** *BOLYMIN to globalny dostawca systemów embedded oraz wyciewielaczy. Już od ponad 15 lat produkuje profesjonalnie produkty związane z wyciewielaczami. Bolymin to gwarancja jakości produkcji i rozwoju.*

**RO** *BOLYMIN furnizează la nivel global produse incorporate de sistem și afișaj. Având peste 15 ani de experiență în producția profesională de produse de afișaj, Bolymin este în prezent o societate cu tradiție în proiectarea, producția și asigurarea calității.*

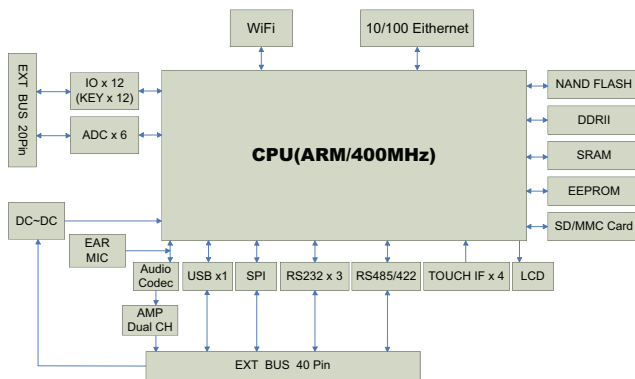
**SK** *BOLYMIN je celosvetový dodávateľ Embedded systémov a displejov. Už viac ako 15 rokov s profesionálnym nasadením vyrába produkty súvisiace s displejmi. Bolymin je zárukou kvality výroby a dizajnu.*

Bolymin's product offering spans across various application fields such as automotive electronics, medical instrument, security control, and industrial automation. Bolymin regards technology/business model innovation and customer-oriented service as two pillar stones to its sustainable growth. Bolymin displays feature an excellent price/performance ratio.

## Why BOLYMIN?

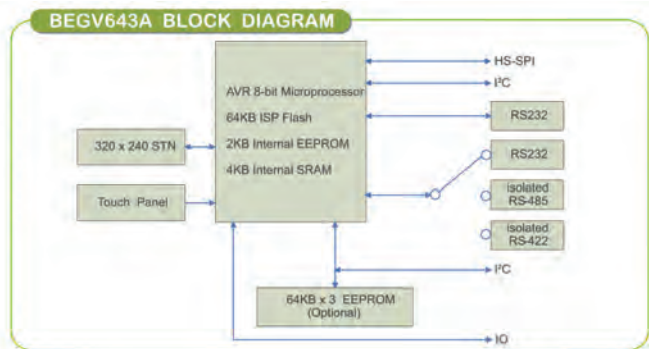
- excellent price/performance ratio
- wide portfolio
- stable and reliable delivery terms

### BEGA 220



- 400MHz 32 bit RISC architecture, ARM926EJ CPU core
- 2GB NAND Flash / 64MB DDR1 memory
- WINCE 5.0 OS
- LCD controller supporting RGB maximum 16M color at 24bpp
- On board 10 / 100Mbps high performance Ethernet with RJ45
- 1x Host USB / 1x Device USB
- 1x isolated RS485 / 422
- 3x RS232 / 1x SPI
- Audio codec with dual channels amplifiers
- 6x Channels ADC and one 4-wired touch panel
- 12 programmable IO
- 9V-28V DC requirement
- Dimension(WxHxD):195x110x25.7 mm

### BEGV641 / BEGV643



- monochrome STN LCD display
- 320x240 - BEGV643/ 240x128 px - BEGV641
- universal display embedded modules
- powerful 8-bit AVR ATMEGA644P processor
- built-in in-system programmable 64 kB Flash/ 4 kB SRAM
- built-in 128 kB EEPROM available through I2C
- 1x RS232 and 1x isolated RS485/422/232
- high-speed SPI and I2C
- operation already from 3,3V
- built-in 4 wire resistive touch panel
- white LED backlight
- free SW utilities (drivers)





VOIPAC TECHNOLOGIES focuses on development and production of miniature computers – COMs (Computer On Module). Voipac products are deployed within a diverse range of markets and industries – everywhere, where a high performance and extremely small dimensions are important.

**VOIPAC TECHNOLOGIES** se zaměřuje na vývoj a výrobu miniaturních počítačů - COMS. Voipac produkty nacházejí využití v nejrůznějších odvětvích - všude tam, kde je důležitý vysoký výkon a extrémně malé rozměry.

**VOIPAC TECHNOLOGIES** spezialisiert sich auf die Entwicklung und Produktion von Miniatur-Computern – COMS. Voipac Produkte finden ihre Anwendung in den verschiedensten Branchen – überall dort, wo hohe Leistung und extrem kleine Abmessungen eine wichtige Rolle spielen.

A **VOIPAC TECHNOLOGIES** a miniatúr számítógépek - COMS - fejlesztésére és gyártására szakosodott. Termékeit a legkülönbözőbb ágazatokban használnák - minden olyan helyen, ahol fontos a nagy teljesítmény és a rendkívül kis méret.

**VOIPAC TECHNOLOGIES** skierowana jest na rozwój i produkcję komputerów miniaturowych – COMS. Produkty Voipac znajdują wykorzystanie w najróżniejszych dziedzinach – wszędzie tam, gdzie ważne są wysokie osiągi i ekstremalnie małe wymiary.

**VOIPAC TECHNOLOGIES** este o societate specializată în dezvoltarea și producția de computere miniaturale – COMs (computer pe modul). Voipac produce și distribuie într-o gamă variată de piețe și industrii – oriunde performanța ridicată și dimensiunile extrem de mici sunt esențiale.

**VOIPAC TECHNOLOGIES** sa zameriava na vývoj a výrobu miniaturných počítačov – COMS. Voipac produkty nachádzajú využitie v najrůznějších odvetviach - všade tam, kde je dôležitý vysoký výkon a extrémne malé rozmery.

Typical industry segments: automotive, medical devices, laboratory equipment, point of sales, gaming machines, navigation systems, musical instruments, machine control, virtual reality simulation, public signage, traffic control systems, building automation, security systems, robotics, process control and auto pilots.

### Did You Know?

As the only manufacturer in the embedded COM segment, Voipac provides complete schematic of their computer modules for free to every complete development kit purchased.

### Why VOIPAC?

- high performance miniature computers (COM – Computer On Module)
- extremely small dimensions – smaller than a credit card/the same as notebook memory
- extensive development support
- passive cooling is sufficient
- any customized configuration available. MOQ: 10pcs
- modular solution – one development environment for a range of COMs (i.MX25/51/53 based)

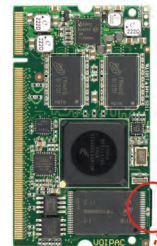
#### i.MX25 SODIMM Module

- i.MX258 ARM9 CPU, 400MHz
- 256MB NAND Flash (8bit)
- 128MB SDRAM (16bit)
- 512Kb I2C EEPROM
- 32Mb SPI Flash
- 10/100 Mbps Ethernet
- microSD socket
- 121 GPIOs
- 200pin SODIMM connector
- JTAG connector pads
- Power supply single 3.6V to 5.5V
- Dimensions 67.6 x 38.0mm
- Preinstalled OS Linux 2.6
- Extended temperature range of -20°C to +70°C
- RoHS compliant



#### i.MX53 SODIMM Module

- 1GHz Cortex™ A8 Freescale processor
- up to 32GB NAND Flash (8bit)
- up to 2GB DDR3 (16bit)
- 512Kb I2C EEPROM
- 1Mb SPI Flash
- 10/100 Mbps Ethernet
- microSD socket
- 200pin SODIMM connector
- JTAG connector pads
- Dimensions 67.6 x 38.0mm
- Extended temperature range of -20°C to +70°C
- RoHS compliant

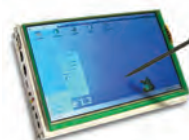


#### i.MX51 SODIMM Module

- i.MX515 ARM Cortex A8™ CPU, 800MHz
- 1GB NAND Flash
- 512MB DDR2 SDRAM
- 512Kb I2C EEPROM
- 8Mb SPI Flash
- 10/100 Mbps Ethernet
- 65 GPIOs
- 200pin SODIMM connector
- JTAG connector pads
- Power supply single 5.0V to 5.5V
- Dimensions 67.6 x 38.0mm
- Preinstalled OS Linux 2.6
- Extended temperature range of -20°C to +70°C
- RoHS compliant



#### Also available many accessories



TFTmodule 7.0"



BaseBoard



Development kits



[www.soselectronic.com/digi](http://www.soselectronic.com/digi)



DIGI INTERNATIONAL is the leader in commercial grade device networking and is an innovator of wireless machine-to-machine (M2M) device networking products. DIGI INTERNATIONAL embedded and non-embedded products are marketed under the Digi®, Rabbit® and Maxstream® brands.

**CZ** DIGI INTERNATIONAL je lídrem v oblasti komerční třídy síťových zařízení a inovátor v oblasti bezdrátových machine-to-machine (M2M) síťových zařízení. Embedded a non-embedded produkty jsou prodávány pod značkami Digi® a Rabbit®.

**DE** DIGI INTERNATIONAL ist ein führendes Unternehmen im Bereich kommerzielle Klasse der Netzwerkgeräte und ein Innovator im Bereich der drahtlosen Machine-to-Machine-(M2M-) Netzwerkgeräte. Embedded- und Non-embedded-Produkte werden unter den Handelsnamen Digi® und Rabbit®.

**HU** A DIGI INTERNATIONAL vezető a kereskedelmi hálózati berendezések és a machine-to-machine (M2M) hálózati termékek fejlesztésének területén. A DIGI INTERNATIONAL beágyazott és nem beágyazott termékei Digi® és Rabbit®.

**PL** DIGI INTERNATIONAL to przodownik w komercyjnych urządzeniach sieciowych oraz innowator bezprzewodowych produktów sieciowych machine-to-machine (M2M). Embedded i samodzielne urządzenia DIGI INTERNATIONAL sprzedawane są pod markami Digi® oraz Rabbit®.

**RO** DIGI INTERNATIONAL este lider în conectarea în rețea a dispozitivelor de uz comercial și un inovator în produsele de rețelistică a dispozitivelor M2M wireless. Produsele DIGI INTERNATIONAL încorporează și neîncorporează sunt comercializate sub mărcile Digi® și Rabbit®.

**SK** DIGI INTERNATIONAL je lídrom v oblasti komerčnej triedy sieťových zariadení a inovátor v oblasti bezdrôtových machine-to-machine (M2M) sieťových zariadení. Embedded a non-embedded produkty sú predávané pod značkou Digi® a Rabbit®.

Digi International develops reliable products and technologies to connect and securely manage local or remote electronic devices over the network or via the web, and offers the highest levels of performance, flexibility and quality. Digi International's embedded products include modules, microprocessors, single-board computers, satellite communications products, development kits, software, and design services through our subsidiary Spectrum Design Solutions. Non-embedded products include cellular routers, gateways, wireless communication adapters (ZigBee, Wi-Fi, proprietary RF), serial servers, intelligent console servers, USB connected products, remote display products, cameras, sensors and the #1 selling serial card line in the world.

### Why DIGI INTERNATIONAL?

- company specialised on networking
- high performance, flexible and reliable products

### Did You Know?

The ZigBee Alliance is an association of companies working together to enable reliable, cost effective, low-power, wirelessly networked, monitoring and control products based on an open global standard. The ZigBee Alliance membership comprises technology providers and original equipment manufacturers worldwide. Membership is open to all.

### ConnectCore

Build industry-leading products from dedicated network communication devices to multi-display image/video solutions using Digi's high-performance 32-bit ARM ConnectCore family. Connectivity options include Ethernet, 802.11abg(n) Wi-Fi, Bluetooth, 2G/3G cellular and 802.15.4/ZigBee.



#### ConnectCore® i.MX51 / Wi-i.MX51

- Integrated secure wireless 802.11abgn Wi-Fi LAN
- Powerful 2D/3D graphics and 720p video
- Embedded Linux, Windows Compact 7 and Windows CE 6.0 support
- Industrial operating temperature system-on-module
- Secure anywhere management using iDigi Manager Pro™



#### ConnectCore® i.MX53 / Wi-i.MX53

- Integrated secure wireless 802.11abgn Wi-Fi WLAN
- Integrated Bluetooth 4.0
- Powerful 2D/3D graphics, 1080p video
- Embedded Linux and Microsoft Windows Compact 7 support
- Industrial operating temperature system-on-module (SoM)
- Secure, anywhere management using iDigi Manager Pro™



#### ConnectCore® Wi-9M 2443

- High-performance 533 MHz ARM9 module
- Compact design with low-power mode support
- Integrated 802.11a/b/g and 10/100 Mbit Ethernet interfaces
- Extended and industrial operating temperature
- Development kits for Windows® Embedded CE 6.0 and Linux®



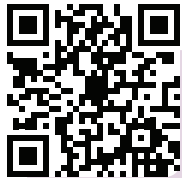
#### ConnectCore® 9M 2443

- High-performance 533 MHz ARM9 module
- Compact and extremely power-efficient design
- Integrated 10/100 Mbit Ethernet interface
- Extended and industrial operating temperature
- Development kits for Windows® Embedded CE 6.0 and Linux®

Many evaluation kits also available







APACER – a „digital storage applications integrator“, is a pioneering company in memory modules and in use of industrial SSD solutions. APACER is the recognized name in innovative memory modules that are widely used in digital media applications as well as storage, reading and sharing of digital data.

**APACER** - je průkopnická firma v paměťových modulech a využití průmyslových řešení SSD. Apacer je uznávaným výrobcem inovativních paměťových modulů, které jsou používány v digitálních multimediálních aplikacích, při ukládání, čtení a sdílení digitálních dat.

**APACER** – „digitaler Speicherintegrator“ ist ein Pionierunternehmen im Bereich Speichermodule und Einsatz industrieller SSD-Lösungen. Apacer ist ein anerkannter Hersteller von innovativen Speichermodulen, welche in digitalen Multimedia-Anwendungen eingesetzt werden sowie gleichermaßen beim Speichern, Abrufen und Austausch von digitalen Daten.

Az **APACER** - "digitális tárhely integrátor", úttörő a memória modulok és az ipari SSD megoldások gyártásában. Az Apacer a memória modulok elismert gyártója, termékeit csakúgy használják a digitális multimédiás alkalmazásokban, mint a digitális adatok tárolására, olvasására és megosztására.

**APACER** - "magazynowanie danych cyfrowych", to pionier w modułach pamięci i zastosowaniu rozwiązań przemysłowych SSD. Apacer to uznawany producent innowacyjnych modułów pamięci, które stosowane są w cyfrowych aplikacjach multimedialnych zarówno podczas zapisu, odczytu, jak również podczas dzielenia się danymi cyfrowymi.

**APACER** – „un integrator digital pentru aplicațiile de stocare“ este o societate inițiatore a modulelor de memorie și a utilizării soluțiilor industriale SSD. Apacer este un nume recunoscut în domeniul modulelor inovatoare de memorie utilizate extins în aplicațiile digitale media precum și ca dispozitiv de stocare, citire și distribuire de date digitale.

**APACER**, je priekopnícka firma v pamäťových modulech a používaní priemyselných riešení SSD. Apacer je uznávaným výrobcem inovatívnych pamäťových modulov, ktoré sú používané v digitálnych multimediálnych aplikáciách, rovnako ako pri ukladaní, čítaní a zdieľaní digitálnych dát.

SSD solutions offer the perfect replacement for traditional hard drives. These series use the standard SATA, PATA, Compact Flash and USB interface control technology to meet the storage needs of the fast-growing embedded applications. The company launched numerous innovative digital storage products which were awarded and received first-rate evaluations from media professionals and consumers.

### SATA SSD

Apacer SAFD(Serial ATA Flash Drive) Series is a SATA SSD that is more rugged, reliable and power-efficient compared to a mechanical hard drive. With no moving parts, the Apacer SAFD SSD is designed for use in rugged laptops, military devices, thin clients, Point of Sale (POS) terminals, telecom, medical instruments, surveillance systems, industrial PCs and other embedded applications. The SAFD (Serial ATA Flash Drive) SSD is the best drop-in replacement for high-maintenance HDDs where reliability is a major concern.



### Compact Flash

The just-launched fifth-generation industrial CF card features write-protection. By simply locking the lock switch on the bottom side of the card, the industrial CF card allows data to be read only, thus preventing any attempt to write. This way, the data not only can stay safe by avoiding accidental deletion but also can prevent tampering of confidential information that may result in data leakage. These advantages make the card ideal for embedded devices in such fields as medical, military, gaming and automotive applications.



The industrial CF5 card is compliant with the CFA 4.1 specifications. Apacer adopts the standard 50-pin connector and SLC chip featuring industry-level stability for the card. It is available in capacities from 128MB to 16GB. The data transfer mode is up to PIO-6, Multi-Word DMA-4 and Ultra DMA-5, with the sequential read/write speed reaching as fast as 40/30 MB/sec. To help data stay correct, this CFC5 memory card also supports 24-bit ECC function, wear-leveling function and S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology), thereby substantially enhancing product reliability.

### Why APACER?

- pioneering company in memory modules and SSD solutions
- top featured products for industrial use
- storage media with high reliability and data safety

### SD and Micro SD cards

Apacer, the global leader in memory module, offers new industrial μSD card designed for embedded systems in harsh storage environments. Features include high reliability, high storage and resistance to extended temperatures. These advantages enable the new cards to be widely applied to industrial, military, communication, surveillance, medical devices and car navigation, thereby satisfying the storage need of demanding industrial enterprises.



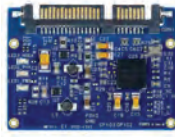
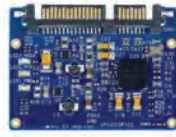


Compliant with Ver.2.0 and Ver.3.0 standards standard and SDHC Class 10 high-speed transmission standard as defined by the SD Association, the new SD cards from Apacer also supports SD and SPI modes. Available in capacities from 256 MB to 32 GB, the new SD cards can substantially accelerate data transfer.





**Serial ATA Flash Drive**

Model	SAFD 251	SAFD 254	SAFD 25P/ SAFD 25P-M"	SAFD 25M2	SAFD 25M4/ SAFD 25M4-M"
					
Interface	SATA 1.5Gb/S	SATA 3Gb/s			
Connector	(7+15) pin male				
Physical Form Factor (inch)	2,5	2,5	2,5	2,5	2,5
Capacities	256MB-32GB	8GB-64GB	SLC: 32GB-256GB MLC: 16GB-512GB"	4GB-16GB	SLC: 4GB-64GB MLC: 8GB-128GB"
Sustained Read/ Write Performance(MB/Sec)	35/25	160/135	SLC:265/230 MLC: 260/220"	100/88	SLC:160/150 MLC: 155/80"
ECC Support	8bit/512Bytes	8-15bit/512Bytes	16-24bit/1K Bytes	8-15bit/512Bytes	16-24bit/1K Bytes
Standard Op Temp. (°C)	0... + 70	0... + 70	0... + 70	0... + 70	0... + 70
Extended Op Temp. (°C)	-	-40... + 85	SLC:-40... + 85 MLC:-40... + 85* (* = Supports 32GB-256GB)"	-	SLC:-40... + 85 MLC:-40... + 85* (* = Supports 16GB-64GB)"
Shock	1,500G	1,500G	1,500G	50G	50G
Vibration	15G	15G	15G	15G	15G
MTBF(Hours)	> 2,000,000	> 2,000,000	SLC:> 2,000,000 MLC:>1,000,000"	> 2,000,000	SLC: > 2,000,000 MLC:>1,000,000"



Model	SAFD 181	SAFD 18P/ SAFD 18P-M"	SAFD 18S (JEDEC MO-297)"	SAFD 18S4/ SAFD 18S4-M (JEDEC MO-297)"
				
Interface	SATA 3Gb/s			
Connector	(7+9) pin male		(7+15) pin male	
Capacities	8GB-32GB	SLC:8GB-128GB MLC:16GB-256GB"	4GB-16GB	SLC:4GB-64GB MLC:8GB-128GB"
Sustained Read/ Write Performance(MB/Sec)	168/143	SLC:260/215 MLC:250/165"	100/88	SLC:165/150 MLC:155/80"
ECC Support	8-15bit/512Bytes	16-24bit/1K Bytes	8-15bit/512Bytes	16-24bit/1K Bytes
Standard Op Temp. (°C)	0... + 70	0... + 70	0... + 70	0... + 70
Extended Op Temp. (°C)	SLC:-40... + 85	SLC:-40... + 85 MLC:-40... + 85* (* = Supports 32GB-128GB)"	-	SLC:-40... + 85 MLC:-40... + 85* (* = Supports 16GB~64GB)"
Shock	50G	50G	50G	50G
Vibration	15G	15G	15G	15G
MTBF(Hours)	> 2,000,000	SLC:> 2,000,000 MLC:>1,000,000"	> 2,000,000	SLC:> 2,000,000 MLC:>1,000,000"






### mSATA(MO-300)

Model	M1	M4/M4-M
		
Interface	SATA 3Gb/s	SATA 3Gb/s
Form Factor	Mini PCIe (50.8mm x 29.8mm)	Mini PCIe (50.8mm x 29.8mm)
Connector	mSATA	mSATA
Capacities	4GB-16GB	SLC: 4GB-64GB MLC: 8GB-128GB"
Sustained Read/ Write Performance(MB/Sec)	100/88	SLC: 165/150 MLC: 155/80"
ECC Support	8-15bit/512Bytes	16 or 24bit/1K Bytes
Standard Op Temp. (°C)	0... + 70	0... + 70
Extended Op Temp. (°C)	--	SLC: -40... + 85 MLC: -40... + 85* (*= Supports 16GB-64GB)"
Shock	50G	50G
Vibration	15G	15G
MTBF(Hours)	> 2,000,000	SLC:> 2,000,000 MLC:>1,000,000"

### SATA Disk Chip

Model	SDC	SDC4
		
Interface	SATA 3Gb/s	SATA 3Gb/s
Physical Form Factor	18 / 32 round DIP connector	18 / 32 round DIP connector
Capacities	1GB-8GB	2GB-32GB
Sustained Read/ Write Performance(MB/Sec)	53/45	85/80
ECC Support	8-15 bit/512Bytes	16 or 24 bit/1K Bytes
Extended Op Temp. (°C)	-40... + 85	-40... + 85
Storage Temp.(°C)	-40... + 100	-40... + 100
Shock	50G	50G
Vibration	15G	15G
Humidity	5%-95%	5%-95%
MTBF(Hours)	> 2,000,000	> 2,000,000

### SATA Disk Module

Model	SDMI	SDMII	SDM4
			
Interface	SATA 1.5Gb/s	SATA 3Gb/s	SATA 3Gb/s
Connector	7-pin/22-pin	7-pin	22-pin
Capacities	128MB-8GB	512MB-4GB	1GB-16GB
Sustained Read/ Write Performance(MB/Sec)	Standard: 20/10 High Speed: 35/10"	27/23	100/88
ECC Support	8bit/512Bytes	8bit/512Bytes	8-15bit/512Bytes
Standard Op Temp. (°C)	0... + 70	0... + 70	0... + 70
Extended Op Temp. (°C)	--	--	SLC: -40... + 85 MLC: -40... + 85* (*= Supports 8GB-32GB)"
Storage Temp.(°C)	-40... + 100	-40... + 100	-40... + 100
Shock	50G	50G	50G
Vibration	15G	15G	15G
MTBF(Hours)	> 2,000,000	> 2,000,000	> 2,000,000

 Embedded Modules  
Memory Modules



**ATA Flash Drive**

Model	AFD III		AFD 4
			
<b>Model Type</b>	AFD 183	AFD 253	AFD 18M-M
<b>Interface</b>	Standard ATA/ IDE	Standard ATA/ IDE	Standard ATA/ IDE
<b>Connector</b>	ZIF 40-pin	44-pin male	ZIF 40-pin
<b>Physical Form Factor (inch)</b>	1,8	2,5	1,8
<b>Capacities</b>	1GB-32GB	256MB-64GB	4B-64GB
<b>Sustained Read/ Write Performance(MB/Sec)</b>	35/25	SLC: 35/20	75/25
<b>Transfer Mode</b>	PIO Mode-4; MWDMA Mode-2 ; UDMA Mode-4"	PIO Mode-4; MWDMA Mode-2 ; UDMA Mode-4"	PIO Mode-4; MWDMA Mode-2 ; UDMA Mode-6"
<b>ECC Support</b>	8bit/512Bytes	8bit/512Bytes	12bit/512Bytes
<b>Standard Op Temp. (°C)</b>	0... + 70	0... + 70	0... + 70
<b>Extended Op Temp. (°C)</b>	-40... + 85	-40... + 85	-
<b>Shock</b>	50G	1500G	50G
<b>Vibration</b>	15G	15G	15G
<b>MTBF(Hours)</b>	> 2,000,000	> 2,000,000	> 2,000,000

**ATA Disk Chip**







Model	ADC 3G
	
<b>Connector</b>	600mil 32-round pin DIP connector
<b>Capacities</b>	128MB-8GB
<b>Sustained Read/ Write Performance(MB/Sec)</b>	55/40
<b>Transfer Mode</b>	PIO Mode-4; MWDMA Mode-2 ; UDMA Mode-5
<b>ECC Support</b>	24bit/1K Bytes
<b>Standard Op Temp. (°C)</b>	0... + 70
<b>Extended Op Temp. (°C)</b>	-40... + 85
<b>Storage Temp.(°C)</b>	-40... + 100
<b>Shock</b>	50G
<b>Vibration</b>	15G
<b>Humidity</b>	5%-95%
<b>MTBF(Hours)</b>	> 2,000,000

**ATA Disk Module**



Model	ADM III	ADM 4/ADM4-M
		
<b>Interface</b>	Standard ATA / IDE	Standard ATA / IDE
<b>Connector</b>	40-pin (2.54mm pitch) / 44-pin (2.00mm pitch)	44-pin (2.00mm pitch)
<b>Capacities</b>	128MB-16GB	SLC:1GB-16GB MLC: 4GB-32GB"
<b>Transfer mode</b>	PIO Mode-4 ; MWDMA Mode-2; UDMA Mode-4	PIO Mode-4 ; MWDMA Mode-2; UDMA Mode-6
<b>Sustained Read/Write Performance (MB/sec)</b>	standard: 20/10 ;High Speed: 35/10	SLC:80/50 MLC:75/25"
<b>ECC Support</b>	8bit/512Bytes	12bit/512 Bytes or 24bit/1K Bytes
<b>Standard Op Temp. (°C)</b>	0... + 70	0... + 70
<b>Extended Op Temp. (°C)</b>	-40... + 85	SLC:-40... + 85
<b>Storage Temp.(°C)</b>	-40... + 100	-40... + 100
<b>Shock</b>	50G	50G
<b>Vibration</b>	15G	15G
<b>MTBF(Hours)</b>	> 2,000,000	SLC: > 2,000,000 MLC:>1,000,000"




### SATA Disk Module

Model	CFC III	CFC 4	CFC5	CompactFlash 5	ATA CF	CFast
						
Connector	50-pin	50-pin	50-pin	50-pin	50-pin	(7+17) pin male
Interface	PC Card Memory mode PC Card I/O mode True IDE mode"	PC Card Memory mode PC Card I/O mode True IDE mode"	PC Card Memory mode PC Card I/O mode True IDE mode"	PC Card Memory mode PC Card I/O mode True IDE mode"	True IDE mode	SATA 3Gb/s
Capacity	128MB-16GB	256MB-16GB	128MB-64GB	4GB-64GB	128MB-16GB	1GB-32GB
Transfer mode	PIO Mode-6 ; MWDMA Mode-4; UDMA Mode-4"	PIO Mode-6 ; MWDMA Mode-4; UDMA Mode-6"	PIO Mode-6 ; MWDMA Mode-4; UDMA Mode-5"	PIO Mode-6 ; MWDMA Mode-4; UDMA Mode-6"	PIO Mode-4 ; MWD- MA Mode-2; UDMA Mode-4	--
Sustained Read/Write Performance(MB/sec)	Standard: 35/15 High Speed: 35/25"	50/21	50/30	75/47	Standard: 20/10 High Speed: 35/10"	120/95
ECC Support	8bit/512Bytes	8-15bit/512Bytes	24bit/ 1K Bytes	8bit/512Bytes	8bit/512Bytes	28bit/1K Bytes
Standard Op Temp. (°C)	0... + 70	0... + 70	0... + 70	0... + 70	0... + 70	0... + 70
Extended Op Temp. (°C)	-40... + 85	-40... + 85	-40... + 85	-40... + 85* (*=Supports 8GB- -32GB)"	-40... + 85	-40... + 85
Storage Temp.(°C)	-40... + 100	-40... + 100	-40... + 100	-40... + 100	-40... + 100	-40... + 100
Shock	50G	50G	50G	50G	50G	50G
Vibration	15G	15G	15G	15G	15G	15G
Humidity	5%-95%	5%-95%	5%-95%	5%-95%	5%-95%	5%-95%
MTBF(Hours)	> 2,000,000	> 2,000,000	> 2,000,000	> 1,000,000	> 2,000,000	> 2,000,000


### Industrial SD Card

Model	Industrial SD	Industrial SD-M
		
Card Specification	SD 2.0 Compliance	SD 2.0 Compliance
Capacities	"SD: 256MB- -2GB SDHC:4GB- -8GB"	SDHC:4GB- -32GB
Sustained Read/ Write Performance(MB/Sec)	Up to 25/13	Up to 18/9
ECC Support	24bit/1K Bytes	24bit/1K Bytes
Standard Op Temp. (°C)	0... + 70	0... + 70
Extended Op Temp. (°C)	-40... + 85	-40... + 85* (*=Supports 4GB-32GB)"
Storage Temp.(°C)	-40... + 100	-40... + 100
Shock	50G	50G
Vibration	15G	15G
Humidity	25%-95%	25%-95%
WP Switch Cycles	Min. 1,000 cycles	Min. 1,000 cycles

### Industrial MicroSD Card

Model	Micro SDHC
	
Card Specification	SD 3.0 Compliance
Capacity	4GB-16GB
Flash Type	MLC
Max. R/W Performance (MB/sec)	19/13
ECC Support	Enhanced
Standard Op. Temp (°C)	-25-+85
Extended Op. Temp (°C)	-
Storage Temp(°C)	-40-+85
Insertion/Removal Test	10 000
Bonding Test	10 nt/s times for 6 faces and 4 corners
Humidity	40°C/93% RH 500hrs
Salt-Spray	3+/-1%NaCl; 35°C; 24hrs
Dimensions (mm)	15(L)x11(W)x1(H)

### USB Disk Module

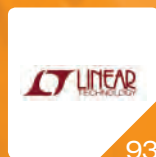
Model	UDMII Plus/UDMII Plus-M
	
Interface	USB 2.0 (Up to 480Mb/s)
Connector	10-pin USB (2 x 5 header)
Connector Pitch(mm)	Type A,B,C,D,D LP:2.54 Type E:2.0"
Capacities	SLC: 256MB-8GB MLC:4GB-32GB"
Sustained Read/ Write Performance(MB/Sec)	SLC: 30/25 MLC:30/20"
Standard Op Temp. (°C)	0... + 70
Extended OP Temp. (°C)	SLC:-40... + 85
Storage Temp. (°C)	-40... + 100
Shock	50G
Vibration	15G
Humidity	5%-95%
MTBF(Hours)	SLC> 2,000,000 MLC>1,000,000"

# Semiconductors and Sensors

## Discrete Semiconductors 84




## Integrated Circuits 87





## Semiconductor Sensors 104





Discrete semiconductors are basic electronic components, which exploit the electronic properties of semiconductor materials, like silicon, germanium, gallium arsenide and other. Serving as main basic components for rectifying and amplifying, they enabled all the huge development of electronics of our era.


 Diskrétní polovodiče jsou základní elektronické součástky, které využívají elektrické vlastnosti polovodičových materiálů jako křemík, germanium, gallium, arsenid a jiné. Slouží jako hlavní základní komponenty pro usměrňování a zesilování, umožnily celý obrovský vývoj elektroniky naší éry.

 Diskrete Halbleiter sind elementare elektronische Komponenten, die elektrische Eigenschaften von Halbleitermaterialien wie Silizium, Germanium, Galliumarsenid und anderen nutzen. Als wichtigste Basiskomponenten zur Gleichrichtung und Verstärkung haben sie die rasante Entwicklung der Elektronik unserer Zeit ermöglicht.

 A diszkrét félvezetők alap elektronikai alkatrészek, melyek a félvezető anyagok, mint a szilícium, germánium, gallium-arszenid, stb. elektromos tulajdonságait használják ki. Az egyenirányítás és erősítés alapelemeként ezek az alkatrészek tették lehetővé korunk hatalmas elektronikai fejlődését.

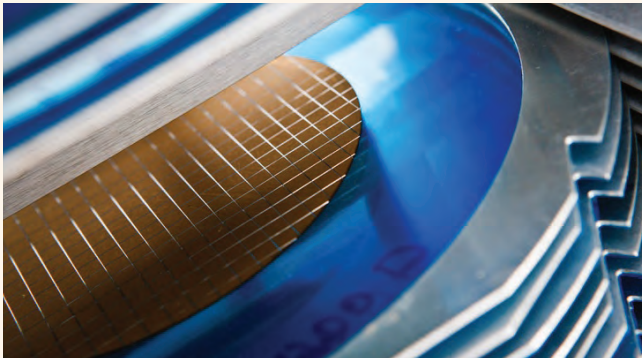
 Półprzewodniki dyskretnie to elementy elektroniczne, które wykorzystują właściwości elektroniczne materiałów półprzewodnikowych, jak krzem, german, arsenek galu i inne. Służą jako główne elementy dla prostowania i wzmacniania. To one właśnie umożliwiły ogromny rozwój elektroniki naszej ery.

 Semiconductorii discrete sunt componente electronice de bază, care exploatează proprietățile electronice ale materialelor semiconductoră, cum ar fi siliciu, germaniu, arseniură de galiu și altele. Servind drept componente principale, de bază, pentru rectificarea și amplificarea, acestea au permis uriaș dezvoltarea a electronicei din epoca noastră.

 Diskrétné polovodiče sú základné elektronické súčiastky, ktoré využívajú elektrické vlastnosti polovodičových materiálov ako křemík, germánium, gálium arsenid a iné. Slúžiace ako hlavné základné komponenty pre usmerňovanie a zosilňovanie, umožnili celý obrovský vývoj elektroniky našej éry.

Main two discrete components are diodes and transistors. Diodes in general exploit a single PN junction, and thanks to their basic feature – conductivity only in one way, they are mostly used for rectifying and everywhere, where it is necessary to ensure a one way current flow. However, practically all other features of diodes are also used, like breakdown voltage, forward voltage drop and other.

Transistors provide a real headstone of virtually all electronic devices as well as integrated circuits. Because of their ability to change their conductivity by an external stimulation – mainly by electric field, they provide a convenience of an “active component” which can be easily switched or switched-off (acting like a switch) or which can change its conductivity proportionally to a control voltage. Because in general, power necessary to control conductivity of a transistor is much smaller than a power which can be controlled, transistors act like an amplifying component. Moreover, semiconductors can change their conductivity also by for example a magnetic field, light, heat and mechanical deformation, they serve as excellent sensors.



### Switching Diodes

– diodes for general usage as small rectifying and switching diodes, with usually up to 100-300 mA and featuring relatively high speed (low capacitance).

### Rectifier Diodes

– diodes mainly used for rectifying of AC current, most often used for rectification of AC current (50-60Hz) from transformers. Diodes must provide a reliable function for given currents (most often 1 to tens of Amperes) and given voltages.

### Bridge Rectifiers

– 4 diodes connected to a “Graetz bridge”, allowing an easy implementation to a PCB as a full-wave rectifying component.

### Fast Rectifier Diodes

– diodes similar to previous group but specially designed for low forward voltage and fast recovery (short trr), what in summary greatly decreases switching losses at higher frequencies. From this reason they are mostly used at switch-mode power supplies, where frequencies usually vary from tens to hundreds of kHz.

### Schottky Diodes

– special type of diodes with substantially lower forward voltage and in general also very fast. Because of their low VF they are very often used in high-current applications, where they feature low losses.

### Capacitance Diodes

– special type of diodes which are used for their ability to substantially change their inner capacity depending on the applied reversed voltage. Usable capacity is from few pF to tens of pF, that’s why they are used in HF tuned circuits.

### Transil Suppressor Diodes

– or transient voltage suppressors (TVS) are fast diodes using avalanche breakdown. Thanks to their ability to eliminate voltage spikes exceeding their specified voltage, they are used as protective components for sensitive devices.

### Bipolar Transistors

– widest group of various transistors (NPN or PNP) for general use.

### HF Bipolar Transistors

– similar to previous group but with an emphasis on HF properties, like high gain and low noise.

### FET

– field effect transistors. A very wide group of transistors which are controlled by electric field between G and S electrodes. In general they act like a voltage controlled resistor. Because they don’t have a PN junction between G and S electrodes, in a static mode they don’t require any current to flow to the Gate of a transistor. At the same time they feature a very low resistance in an ON state, that’s why they are a very efficient low-loss component for switching of high currents.

### Thyristors and Triacs

– multilayer PN components, also known as controllable diodes. They provide an easy way to reach a controlled rectification as well as a control of AC devices.







The heart of a semiconductor device is the silicon chip. While many suppliers just buy the chips and assemble them into a package, DIOTEC has got the complete know how of semiconductor production. Especially Zener and TVS diodes, with their large variety of partnames, are a major challenge with respect to base material, logistics and diffusion technology.

**Č** Srdcem polovodiče je křemíkový čip, zatímco mnozí dodavatelé pouze kupují čipy a osazují je do pouzder, DIOTEC má kompletní know-how výroby polovodičů. Zejména Zenerovy a TVS diody, se svým širokým spektrem, jsou výzvou ohledně základního materiálu, logistiky a technologie difuze.

**D** Das Herz des Halbleiters bildet der Silizium-Chip. Während zahlreiche Anbieter die Chips lediglich zukaufen und diese dann in Gehäuse einbauen, verfügt DIOTEC über umfassendes Know-how für die Herstellung von Halbleitern. Insbesondere Zener- und TVS-Dioden mit ihrer Typenvielfalt stellen eine Herausforderung hinsichtlich Basismaterial, Logistik und Diffusionstechnologie dar.

**A** félvezetők lelke a szilícium chip. Amíg számos gyártó csak vásárolja a chipjeit és tokba ülteti azokat, a DIOTEC a félvezetőgyártásban teljes know-how-val rendelkezik. Főleg Zener és TVS diódákat gyárt széles spektrumban, nagy gondot fordítva az alapanyagokra, logisztikára és a diffúziós technológiákra.

**S**ercem półprzewodnika jest układ krzemowy. Podczas kiedy wielu dostawców tylko kupuje układy i instaluje je w obudowach, DIOTEC posiada kompletnie know-how produkcji półprzewodników. Zwłaszcza diody Zenera i TVS, ze swoim szerokim spektrum, stanowią wyzwanie z uwagi na materiał bazowy, logistykę i technologię dyfuzji.

**I**nima unui semiconductor este cipul din silicon. In timp ce multi furnizori doar cumpără cipurile și le montează într-un pachet, DIOTEC deține cunoștințele tehnice ale întregului de proces de producție a semiconductoarelor. In special diodele Zener și TVS, cu vasta diversitate de denumiri similare, reprezintă o adevărată provocare în privința materialelor de bază, a logisticii și a tehnologiei de difuzie.

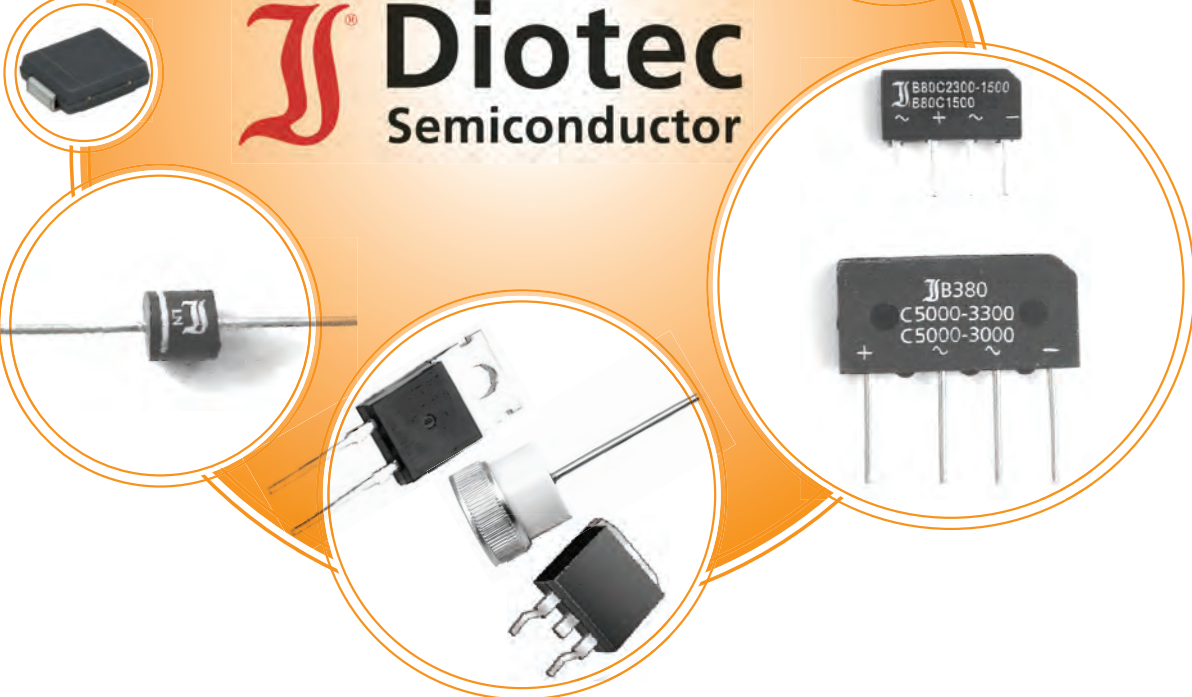
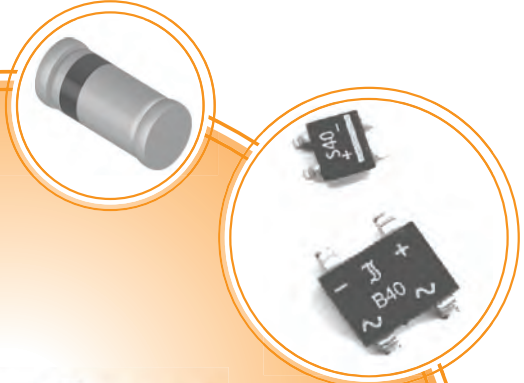
**S**rdcom polovodiča je kremíkový čip, zatiaľ čo mnohí dodávatelia iba kupujú čipy a osadzujú ich do puzdier, DIOTEC má kompletné know-how výroby polovodičov. Najmä Zenerove a TVS diódy, so svojím širokým spektrom, sú výzvou ohľadom základného materiálu, logistiky a technológie difúzie.

Diotec is one of the market leaders in this field, offering one of the widest range of products and fastest delivery time. Diotec newly produces also diodes for LED applications, ESD protection as well as diodes in new small SMT packages with enhanced power rating. The RoHS compliant (leadfree) tinning provides long lasting solderability. After two times 100% testing of electrical parameters, the parts are marked and packaged. Extensive control of all process steps ensures continuous stable quality.

### Why DIOTEC?

- Diotec itself produces silicon chips – not only assembles them to package
- wide portfolio
- double 100% testing of electrical parameters

- Switching Diodes (ER1x, ER2x, BAV21, ...)
- Rectifier Diodes (S1B, S2M, S3M, GL1M, P600, ...)
- Fast Rectifier Diodes (ES1D, BY399, UF4007, ...)
- Bridge Rectifiers (B250, B380, S380, KBPC, ...)
- Schottky Diodes (SGL1, SK15, SK34, SB130, SB360, ...)
- Zener Diodes (ZMM, ZPD, ZPY, ...)
- Transil Suppressor Diodes (P6SMB, BZW06, 1.5KE, ...)
- Current Limiting Diodes (CL20, CL40)
- Bipolar Low Power Transistors (BC327, 337, 546, 547, 556, 557, MMBT...)





SEMİKRON, Germany-based company with over 3600 employees worldwide, is an internationally leading power semiconductor manufacturer, in the field of diode/thyristor semiconductor modules, with a 30% share of the worldwide market. Semikron technology can be found in almost half the wind power installations operating worldwide today.

**CZ** SEMİKRON je německá společnost s více než 3600 zaměstnanci po celém světě, je předním mezinárodním výrobcem výkonových polovodičů, v oblasti diodových a thyristorových polovodičových modulů s 30% podílem na celosvětovém trhu. Semikron technologie lze najít nainstalované v téměř polovině větrných elektráren, provozovaných v současné době na celém světě.

**DE** SEMİKRON ist ein deutsches Unternehmen mit über 3600 Mitarbeitern weltweit, es ist ein führender internationaler Hersteller von Leistungshalbleitern im Bereich der Dioden- und Thyristorhalbleitermodule, mit einem 30%igen Anteil auf globalen Märkten. Die Semikron-Technologie findet man heute in nahezu der Hälfte aller weltweit betriebener Windkraftanlagen.

**HU** A SEMİKRON német székhelyű cég több mint 3600 alkalmazottal világszerte. Mint a nemzetközi piac egyik vezető félvezető gyártója, dióda/thyristor modulok gyártásában 30%-os piaci részesedéssel rendelkezik az egész világon. A Semikron technológiája megtalálható a világon működő szélenergia-termelő csatlakozásokban.

**PL** SEMİKRON, niemiecka spółka z ponad 3600 pracownikami na całym świecie, to międzynarodowy lider w produkcji półprzewodników mocy. W asortymencie półprzewodnikowych modułów diodowo/thyristorowych posiada 30% udział na rynku ogólnosięciowym. Technologie Semikron można znaleźć w prawie połowie instalacji elektrowni wiatrowych, działających obecnie na całym świecie.

**RO** SEMİKRON, o societate germană cu peste 3600 de angajați la nivel global, este un lider internațional în producția de semiconductoare electrice în domeniul modulelor de semiconductoare cu diode/thyristor, cu o cotă de piață de 30%. Tehnologia Semikron se regăsește în aproape jumătate din instalațiile de energie eoliană din lume.

**SK** SEMİKRON je německá spoločnosť s viac ako 3600 zamestnancami po celom svete, je popredným medzinárodným výrobcou výkonových polovodičov, v oblasti diódových a thyristorových polovodičových modulov, s 30% podielom na celosvetovom trhu. Semikron technológie možno nájsť nainštalované v takmer polovici veterných elektrární prevádzkovaných po celom svete aj dnes.

Semikron is a one-stop provider of chips, discrete semiconductors, transistor, diode and thyristor power modules, power assemblies and systems for markets such as industrial drives, wind and solar, hybrid and electric vehicles, the rail industry and power supplies. A global network of 35 companies with production plants in Brazil, China, France, Germany, India, Italy, Korea, Slovakia, South Africa and USA guarantees fast and competent on-site customer care.

### Why SEMİKRON?

- leading power semiconductor manufacturer
- over 60 years experience
- very wide portfolio
- solutions for virtually any power application

### IGBT Modules

- SEMITRANS
- SEMiX
- SKiiP
- SEMITOP
- MiniSKiiP
- SKiM



### MOSFET Modules

- SEMITOP
- SEMITRANS



### Thyristor / Diode Modules

- SEMIPACK
- SEMiX
- SEMITOP
- SEMİSTART
- SEMIPONT



### Discretes

- Diode
- Leaded
- Stud
- CapsuleThyristor: Stud, Capsule, Chips



### Bridge Rectifiers

- SEMiX
- SEMITOP
- SEMIPONT
- Power Bridge
- Miniature Leaded
- Miniature Fast on



### Drivers


- SKYPER 32, 42, 52





### Frequently used Parts


- SK 120 KQ 16 Antiparallel Thyristor Module 134A/1600V SEMİTOP2
- SKKD 100/16 Diode module 100A/1600V SEMİPACK1
- SKKD 162/16 Diode module 162A/1600V SEMİPACK2
- SKKH 250/16 E Thyristor/Diode Module 250A/1600V SEMİPACK3
- SKKT 106/16 E Thyristor Module 106A/1600V SEMİPACK1
- SKKT 162/16 E Thyristor Module 162A/1600V SEMİPACK2
- SKKT 250/16 E Thyristor Module 250A/1600V SEMİPACK3
- SKM150GB12T4 Fast IGBT4 Modules 150A/1200V SEMİTRANS2
- SKM300GB12T4 Fast IGBT4 Modules 300A/1200V SEMİTRANS3
- SKM400GB12T4 Fast IGBT4 Modules 400A/1200V SEMİTRANS3
- SKT 24/16 E Stud thyristor 24A/1600V B2


Integrated circuits are used in virtually all electronic equipment today and have revolutionized the world of electronics. Computers, mobile phones, and other digital appliances are now inextricable parts of the structure of modern societies, made possible by the low cost of production of integrated circuits.


 *Integrované obvody se používají v prakticky každém současném elektronickém zařízení a způsobily revoluci ve světě elektroniky. Počítače, mobilní telefony a jiná digitální zařízení jsou v současnosti nedílnou částí moderních společností, což bylo umožněno nízkou výrobní cenou integrovaných obvodů.*

 *Integrierte Schaltungen werden zurzeit praktisch in jedem elektronischen Gerät genutzt und sie haben die Elektronikwelt revolutioniert. Computer, Mobiltelefone und andere digitale Geräte sind heutzutage ein unabdingbarer Bestandteil moderner Gesellschaften, was durch niedrige Produktionskosten der integrierten Schaltungen ermöglicht wurde.*

 *Az integrált áramköröket manapság szinte minden elektronikai berendezésben használják, ezek forradalmasították a világon az elektronikát. A számítógépek, mobiltelefonok, és más digitális alkalmazások a modern társadalmak elválaszthatatlan részeivé váltak, amit az integrált áramkörök előállításának költségeinek jelentős csökkenése tett lehetővé.*

 *Układy scalone stosowane są praktycznie we wszystkich dzisiejszych urządzeniach elektronicznych i praktycznie zrewolucjonizowały świat elektroniki. Komputery, telefony komórkowe oraz inne urządzenia cyfrowe to obecnie nieodzowne części współczesnej społeczności a wszystko dzięki niskim kosztom produkcji układów scalonych.*

 *Circuitele integrate sunt utilizate astăzi, teoretic, la toate echipamentele electronice și au revoluționat lumea electronicelor. Calculatoarele, telefoane mobile, și alte aparate digitale sunt acum părți inextricabile ale structurii societăților moderne, devenite posibile prin costul redus al producției de circuite integrate.*

 *Integrované obvody sa používajú v prakticky každom súčasnóm elektronickom zariadení a spôsobili revolúciu vo svete elektroniky. Počítače, mobilné telefony a iné digitálne zariadenia sú v súčasnosti neoddeliteľnou časťou moderných spoločností, čo bolo umožnené nízkou výrobnou cenou integrovaných obvodov.*

## Classification:

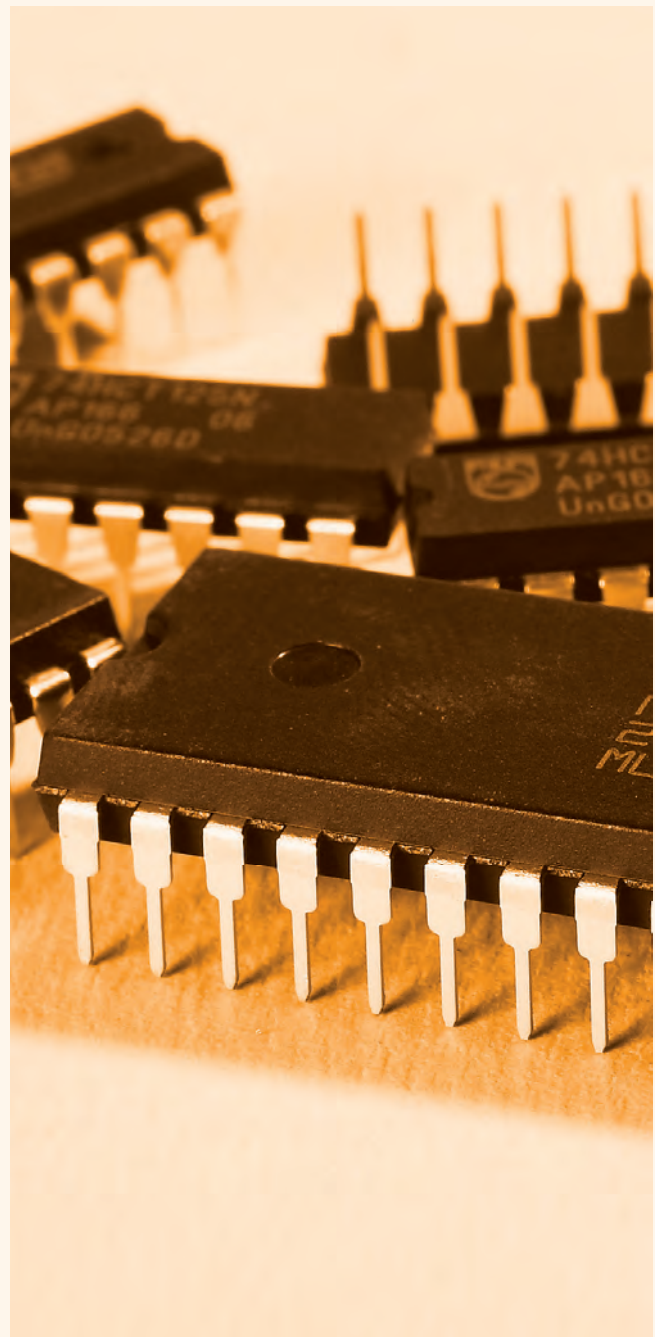
Thanks to advanced production technologies, integrated circuits provide countless various functions. Most often fields of their use are power management, amplification and signal processing, data processing and data storage, and many other. From the signal point of view we can divide them to analogue and digital ICs. As an interface between these two groups we can place mixed signal ICs, like for example analogue-to-digital and digital-to-analogue converters. To the group of ICs we can assign also various semiconductor sensors, often combining hybrid technology on a common substrate. Diversity of nowadays integrated circuits is really huge. Roughly we can divide integrated circuits to:

- ICs for power management
- Analogue ICs
- Digital ICs
- Memories
- Microprocessors 8, 16/32 bits
- DSP processors
- Mixed signal ICs
- RTC and supervising ICs
- Converters
- Sensors

Besides above mentioned producers of semiconductors, we also distribute semiconductors of many other companies like NXP, Freescale, Cypress, Exar, Silicon Laboratories, Winbond, Infineon, Vishay, Allegro, Austria Microsystems, Altera, Fujitsu, International Rectifier, Ixys, Micrel, ON Semiconductor, Power Integrations, Renesas, Xilinx, Zarlink.

### Among favourite ICs of our customers also belong:

- iCoupler – Analog Devices
- MAXIM Interface products
- RTC circuits and digital potentiometers DALLAS
- A/D converters – Linear Technology, Texas Instruments, Intersil
- FRAM memories – RAMTRON
- RFID Products - EM MICROELECTRONIC
- ICs for DC/DC power supplies - NATIONAL SEMICONDUCTOR
- SRAM and FLASH – SAMSUNG
- ICs for audio recording and reproduction - NUVOTON
- and many other ...







ATMEL Corporation is a worldwide leader in the design and manufacture of microcontrollers, capacitive touch solutions, advanced logic, mixed-signal, nonvolatile memory and radio frequency (RF) components. Leveraging one of the industry's broadest intellectual property (IP) technology portfolios, Atmel® is able to provide the electronics industry with complete system solutions.

**ATMEL Corporation** je světovým lídrem v návrhu a výrobě mikrokontrolérů, kapacitních dotykových řešení, pokročilých logických, mixed-signal, paměťových a vysokofrekvenčních (HF) komponentů. Díky širokému portfoliu technologického intelektuálního vlastnictví (IP) je Atmel schopný poskytovat kompletní systémová řešení.

**ATMEL Corporation** ist ein weltweit führendes Unternehmen in der Konzeption und Herstellung von Mikrocontrollern, kapazitiven Berührungslösungen, fortschrittlichen Logik-, Mixed-Signal-, Speicher- und Hochfrequenz-(HF)-Komponenten. Dank dem breiten Portfolio von technologischem geistigem Eigentum (IP) kann Atmel komplette Systemlösungen anbieten.

Az **ATMEL Corporation** a világ vezető mikrokontroller, kapacitív érintőfelület, haladó logikai, vegyes jelű, memória és magas frekvenciás (HF) modul gyártója. A széles intellektuális technológiai tulajdon (IP) portfóliójának köszönhetően az Atmel teljes körű rendszerszintű megoldásokat képes szolgáltatni.

**ATMEL Corporation** jest światowym liderem w rozwoju i produkcji mikrokontrolerów, dotykowych rozwiązań pojemnościowych, zaawansowanych układów logicznych, mieszanosygnowych, pamięciowych oraz wysokoczęstotliwościowych (HF). Dzięki szerokiej gamie technologicznej własności intelektualnej (IP), Atmel zdolny jest zaoferować kompletne rozwiązania systemowe.

**ATMEL Corporation** este un lider global în proiectarea și producția de micro-controlere, soluții capacitive tactile, componente de logistică avansată, de memorie nonvolatilă și frecvență radio (HF). Valorificând unul din cele mai vaste portofolii de tehnologie în proprietate intelectuală, Atmel® furnizează industriei electronice soluții complete de sistem.

**ATMEL Corporation** je svetovým lídrom v návrhu a výrobe mikrokontrolérov, kapacitných dotykových riešení, pokročilých logických, mixed-signal, pamäťových a vysokofrekvenčných (HF) komponentov. Vďaka širokému portfóliu technologického intelektuálneho vlastníctva (IP), je Atmel schopný poskytovať kompletne systémové riešenia.

Atmel® AVR® 8- and 32-bit microcontrollers deliver a unique combination of performance, power efficiency, and design flexibility. Optimized to speed time to market, they are based on the industry's most code-efficient architecture for C and assembly programming. No other microcontrollers deliver more computing performance with better power efficiency. Industry-leading development tools and design support let you get to market faster. Once there, the large AVR family lets you reuse your knowledge when improving your products and expanding to new markets—easily and cost-effectively.

## Why ATMEL?

- Atmel microcontrollers feature a unique combination of performance, power efficiency, and design flexibility
- wide range of development tools and extensive design support
- huge amount of example source codes freely available

## 8051 Architecture

Atmel offers a broad range of microcontrollers based on the 8051 architecture ranging in code density from 2K bytes to 128K bytes. The product line includes 8-bit microcontrollers based on the powerful, low-power Single-Cycle AT89LP core as well as MCS-51® industry standard socket drop-in devices and small footprint 14/16/20/28-pin derivatives, all manufactured in advanced Flash technologies. Most members in this product line include ISP (In-System Programming) capability, while some also support the high-speed (X2) mode which doubles the internal clock frequency for CPU and peripherals upon user selection.



AT89C2051, AT89C4051, AT89C5x, AT89LPx, AT89Sx,...

## AVR® 8-Bit RISC

Atmel's low power, high performance AVR microcontrollers handle demanding 8- and 16-bit applications. With a single cycle instruction RISC CPU, innovative picoPower® technology, and a rich feature set, the AVR architecture ensures fast code execution combined with the lowest possible power consumption. Whether you program in C or assembly, the tuned AVR instructions decrease program size and development time. A variety of internal oscillators, timers, UARTs, SPIs, Pulse Width Modulation, pull-up resistors, ADCs, Analog Comparators and Watch-Dog Timers are some of the features available for creative engineers.



ATmega8, ATmega16, ATmega32, ATmega128, ATmega162, ATmega 168,...

## AVR32 32-bit MCU

Atmel has created the first processor architected specifically for 21st century applications that require both performance and low power consumption. The AVR32 32-bit RISC processor core is designed to do more processing per clock cycle so the same throughput can be achieved at a lower clock frequency with substantially less power consumption.

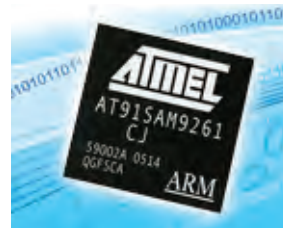
The Harvard architecture and multiple high-speed system buses guarantee exceptional processing performance. Both UC3 and AP7 subfamilies are supported by Atmel's large range of development tools, and the free AVR32 Studio makes it easy to start developing C/C++ code.



AT91M, AT91F, AT91R

## AT91SAM 32-bit ARM

Atmel's AT91SAM 32-bit ARM Flash MCUs and Embedded MPUs are designed for system control, wired & wireless connectivity, user interface management, low power and ease of use. They have received wide acceptance in markets like POS terminals, security, building automation, industrial control, medical, white goods, PC and gaming peripherals, toys and cellular phone accessories. A comprehensive and high-quality eco-system provides access to development tools, Flash programming, software and worldwide technical support.



SAM7, SAM9



MICROCHIP Technology Inc. is a leading provider of microcontroller and analog semiconductors, providing low-risk product development, lower total system cost and faster time to market. Microchip products are worldwide known top featured products like PIC® microcontrollers, dsPIC® digital signal controllers, Analog, Memory, Flash IP-Solutions, Wireless, Interface, Safe & security solutions.

**CZ** MICROCHIP Technology Inc. je přední výrobce mikrokontrolérů a analogových polovodičů, poskytující nízkorozikový vývoj produktu, nižší celkovou cenu systému a rychlejší uvedení výrobku na trh. Produkty Microchip jsou světově známé špičkové komponenty jako mikrokontroléry PIC®, dsPIC®, digitální signálové kontroléry, analogová a paměťová řešení, bezpečnostní, bezdrátové a komunikační řešení.

**DE** MICROCHIP Technology Inc. bietet als führender Produzent von Mikrocontrollern und analogen Halbleitern eine risikoarme Produktentwicklung, niedrigeren Gesamtpreis für Systemlösungen sowie eine schnellere Markteinführung neuer Produkte an. Die Microchip Produkte sind weltweit bekannte Spitzenkomponenten wie etwa die PIC®-Mikrocontroller, digitale dsPIC®-Signalcontroller, analoge und Speicherlösungen, Sicherheits-, drahtlose und Kommunikationslösungen.

**HU** A MICROCHIP Technology Inc. a fő mikrokontroller és analóg félvezetőgyártók közé tartozik, mely alacsony kockázatú termékefejlesztést, alacsonyabb rendszer árákat és a termék gyorsabb piacra való bevezetését nyújtja. A Microchip világszerte ismert kiváló termékei közé tartoznak a PIC® mikrokontrollerek, a dsPIC® digitális jelfeldolgozók, az analóg és memória megoldások, a biztonsági, vezeték nélküli és kommunikációs megoldások.

**PL** MICROCHIP Technology Inc. to wiodący producent mikrokontrolerów i półprzewodników analogowych, oferujący nisko-ryzykowe zaprojektowanie produktu, niższą cenę całkowitą systemu oraz szybsze wprowadzenie produktu na rynek. Produkty Microchip to znane na całym świecie elementy jak mikrokontrolery PIC®, cyfrowe sterowniki sygnałowe dsPIC®, systemy analogowe i pamięciowe, rozwiązania bezpieczeństwa, bezprzewodowe i komunikacyjne.

**RO** MICROCHIP Technology Inc. este un furnizor important de micro-controloare și semi-conductoarele analogice, oferind dezvoltări de produs cu risc scăzut, costuri reduse și timp redus de lansare pe piață. Produsele Microchip sunt cunoscute în toata lumea ca niște produse marcante cum ar fi micro-controloarele PIC®, controloarele digitale de semnal dsPIC®, soluții de proprietate intelectuală Analog, Memory și Flash, soluții de securitate wireless, de interfață.

**SK** MICROCHIP Technology Inc. je vedúci výrobca mikrokontrolérov a analógových polovodičov, poskytujúci nízkorozikový vývoj produktu, nižšiu celkovú cenu systému a rýchlejšie uvedenie výrobku na trh. Produkty Microchip sú svetovo známe špičkové komponenty ako mikrokontroléry PIC®, dsPIC® digitálne signálové kontroléry, analógové a pamäťové riešenia, bezpečnostné, bezdrôtové a komunikačné riešenia.

Headquartered in Chandler, Arizona/USA, Microchip offers outstanding technical support along with dependable delivery and quality. Microchip microcontrollers feature excellent properties, very low power consumption and also very good EMI/EMC properties.

Microchip's 16-bit, PIC24 MCUs and dsPIC® Digital Signal Controllers provide designers with an easy upgrade path from 8-bit

PIC® microcontrollers and a cost effective option to 32-bit MCUs. The broad product line includes everything from eXtreme Low Power microcontrollers to high performance digital signal controllers. Combined with hardware and free software these 16-bit products make the design of mTouch™ Sensing, Graphics, Connectivity, Digital Power Conversion, Smart Energy and Motor Control solutions easy to implement.

### Broad Portfolio

Pin and code-compatible across families 16 to 70 MIPS PIC24 MCU & dsPIC® DSC families, Flexible memory options up to 536 KB, Single Cycle Execution, Integrated WDT, POR, BOR and LVD. Fast DMA EEPROM.

### Free Software Libraries

mTouch™ Sensing Solutions, and Speech, USB-OTG, CAN and Ethernet, Motor Control, SMPS and Audio.

### Innovative Peripherals

Graphics Control and Interface, Integrated Op Amps, USB-OTG, CAN, LIN with Supporting Software, Digital Power Conversion and Motor Control Peripherals and Libraries.

## 8-bit PIC®

Microchip's 8-bit PIC microcontrollers provide the performance required for 4, 8 and 16-bit microcontroller applications. Microchip's PIC microcontrollers, available in 6 to 80-pin packages and from 384 bytes to 128 Kbytes of program memory. By combining RISC features with a modified Harvard dual-bus architecture, Microchip's fast and flexible 10 MIPS PIC18F core is the most popular architecture for new microcontroller designs. A simple instruction set and seamless migration between product families make PIC microcontrollers the logical choice for designs requiring flexibility and performance.



## 16-bit PIC®

Microchip offers two 16-bit Microcontroller (MCU) families plus two 16-bit Digital Signal Controller (DSC) families that give you compatible options across a wide spectrum of price, performance and feature sets.

Whether your system requires the lowest cost 16-bit solution, the most powerful 16-bit MCU in the industry, or DSP capability, Microchip offers a broad range of products while preserving the compatibility that helps save you time and money on subsequent designs.



## 32-bit PIC®

Whilst the PIC32 can provide an easy and logical upgrade for existing users of Microchip's 8- & 16-bit PIC® microcontrollers, it also delivers true 32-bit performance with more memory to solve many of the increasingly complex embedded designs. The PIC32 family is supported by Microchip's MPLAB® development environment. Microchip offers a full set of development tools, code examples, USB, graphics, TCP/IP, and File System software all available with free source code. Industry partners offer real-time operating systems, development tools, graphical/GUI packages, file system, and networking middleware.



## Serial EEPROM

Microchip offers the broadest range of Serial EEPROM devices (from 128 bits to 1 Mbit) over the widest operating voltage range (1.7 to 5.5V). Microchip offers a wide selection of innovative packages including small SOT-23 and SC-70 packages - as well as die options. Innovative low-power designs along with Microchip's "Triple Test Flow" ensure high performance and quality at low costs.





STMICROELECTRONICS is one of the world's largest semiconductor companies. Offering one of the industry's broadest product portfolios, ST serves customers with innovative semiconductor solutions by leveraging its vast array of technologies, design expertise and combination of intellectual property portfolio, strategic partnerships and manufacturing strength.

**STMICROELECTRONICS** je jedním z největších světových výrobců polovodičů. Nabízí jedno z nejširších produktových portfolií. ST přináší zákazníkům inovativní řešení polovodičů s využitím široké škály technologií, designu a odborných znalostí v kombinaci duševního vlastnictví, strategických partnerství a výrobních kapacit.

**STMICROELECTRONICS** ist einer der weltgrößten Halbleiterproduzenten. Es bietet eines der breitesten Produktportfolios an. ST versorgt die Kunden mit innovativen Halbleiter-Lösungen unter Nutzung einer breiten Skala von Technologien, Design und Fachkenntnissen in Kombination mit geistigem Eigentum, strategischen Partnerschaften und Produktionskapazitäten.

Az **STMICROELECTRONICS** a világ egyik legnagyobb félvezetőgyártója, az egyik legszélesebb termékportfólióval rendelkezik. Úgyfeleinek innovatív megoldásokat kínál a félvezetők területén a technológiák, dizájn széles skálájának és szaktudásuk kihasználásával a szellemi tulajdon, stratégiai partnerreik és gyártókapacitásuk kombinálásával.

**STMICROELECTRONICS** to jeden z największych producentów półprzewodników na świecie. Dysponuje jedną z najszerzych ofert produktów. ST oferuje klientom innowacyjne rozwiązania półprzewodników z wykorzystaniem szerokiej gamy technologii, designu oraz znajomości fachowych w kombinacji z własnością intelektualną, partnerstwem strategicznym i możliwościami, produkcyjnymi.

**STMICROELECTRONICS** este una din cele mai importante companii producătoare de semiconductoare din lume. Având unul din cele mai extinse portofolii de produse din industrie, ST oferă clienților semiconductoare inovatoare, folosindu-și gama vastă de tehnologii, expertiza de proiectare și combinarea portofoliului de proprietate intelectuală, parteneriate strategice și puterea de producție.

**STMICROELECTRONICS** je jedným z najväčších svetových výrobcov polovodičov. Ponúka jedno z najširších produktových portfólií. ST prináša zákazníkovi inovatívne riešenia polovodičov s využitím širokej škály technológií, dizajnu a odborných znalostí v kombinácii duševného vlastníctva, strategických partnerstiev a výrobných kapacít.

STMicroelectronics is among the world leaders in many different fields, including semiconductors for industrial applications, power solutions, MEMS (Micro-Electro-Mechanical Systems) for portable and consumer devices, MPEG decoders and smartcard chips, automotive integrated circuits, computer peripherals and wireless.

## Why STMICROELECTRONICS?

- one of the world's largest semiconductor companies
- reliable components
- wide portfolio from classic to high-end components

## Amplifiers and Comparators



ST offers a wide range of op amps and comparators including micropower solutions, high-speed and precision devices, as well as specific current-sense amplifiers.

### Voltage Comparators

single, dual or quad voltage comparators, low-power, low-voltage, with or without strobe, rail-to-rail high-speed micropower comparators, in CMOS or in BiCMOS technology for the performances required in different applications. STMicroelectronics applies an automotive-grade policy designed to deliver products that meet the specific and rigorous demands of the automotive market. Automotive grade products are AEC-Q100 qualified and tested with certified high-reliability flow.

- LM2901/2903, TS391, LM393/339, LMV331/332/334, TS3021/3022/3011

## Power Conversion Modules



ST's portfolio of highly-integrated, high-efficiency power conversion modules include DC-DC modules, AC-DC power supply modules and switch power modules.

**ST's SLLIMM™** small low-loss intelligent molded module family of IPMs combines optimized silicon chips, integrated in three main inverter blocks:

### Power stage

- Short-circuit rugged IGBTs
- Freewheeling diodes

### Driving network

- High-voltage gate drivers
- Discrete gate resistors
- Integrated bootstrap diodes

### Protection and optional features

- Smart shutdown function
- Comparators for fault protection against overcurrent and short circuit
- NTC sensor for temperature control
- Op-amps for advanced current sensing
- Deadtime, interlocking function and undervoltage lockout

They are available in the DBC-based SDIP package offering extremely low thermal resistance with optimum quality level and cost effectiveness or in the full molded 3.5 cm, SLLIMM-nano package (NDIP) which is ideal for small, built-in motor applications up to 100 W in free air. - STGIPN3H60, STGIPS14K60, STGIPS20K60.

## Protection Devices



ST's leading position in demanding markets, including the automotive, computer, consumer, industrial and telecom segments, is based on application expertise and leading-edge technologies such as: High-current crowbar protection for lightning surges,

High-efficiency clamping protection for power surges and ESD, Application-specific protection: serial current limiter, thermal shutdown, CMOS and SPI interface compatibility. ST's large protection portfolio brings immunity, flexibility and reliability to our customers' electronic systems.

**USB port protection:** Ever since USB 1.0, ST has been developing specific USB port dataline and VBUS protection devices in a single package. The range now covers USB 2.0, USB 3.0, as well as the µUSB universal port. The range is compliant with the highest IEC 6100-4-2 standard and with USB 2.0 and USB 3.0 eye diagrams. For layout and assembly flexibility, ST's USB protection series are available in SOT, µQFN, or flip-chip packages. DVIULC6, ESDA-1K, ESDA14V2.

## Power Management ICs



As one of the world's leading suppliers of both integrated and discrete power conversion semiconductors, ST's power management devices enable energy-saving, high-power-density and lower-standby-power design solutions. Product portfolio includes highly integrated

AC-to-DC and DC-to-DC switching, linear power conversion ICs, battery management devices, supervisors, resets, power over Ethernet, and power path management ICs.

**High Voltage Converters:** The new high-voltage converters meet the energy-saving regulations and conservation requirements inciting improvements in energy efficiency. VIPerPlus converters combine the innovative 800 V avalanche-rugged SuperMESH™ power MOSFET with state-of-the-art PWM circuitry. HVLED LED drivers, operating directly from the rectified mains with minimum external parts, provide an efficient, compact and cost-effective solution to drive LEDs: accurate all primary-current control avoids the use of secondary sensing, reducing costs and complexity of the application; internal power MOSFET and high-voltage start-up allow compact application; zero-voltage switching operation boosts efficiency. - VIPER100, VIPER53, HVLED805, UC3844/45, L6566, TSM1011/2/3/4, LK112, L4931, L6924, STM809

**Multi-output Regulators:** ST offers a complete portfolio of DC-DC multi-output converters, addressing different applications. The PM66xx family of multifunction regulators features very high efficiency in a small form factor package. The PM66xxA family has an extended VIN and temperature range. All devices are available in compact VFQFPN. PM6680, PM6612, ST2S08

**Powered Devices:** Power over Ethernet (PoE) applications should now be compliant with the recently approved IEEE 802.3 at specification, commonly known as PoE+. The design of power supply sections of all powered devices can be greatly simplified with the PM880x family, integrating a power over Ethernet (PoE) interface and a current-mode PWM controller. The PoE interface incorporates all the functions required by the communication standard, including detection, classification, undervoltage lockout (UVLO) and in-rush current limitation.



### Sensors and Mems



ST's growing portfolio of sensors includes:

#### MEMS-based sensors

accelerometers, gyroscopes, digital compasses, pressure sensors, iNEMO inertial modules and microphones

ST's state-of-the-art analog and digital accelerometers feature up to  $\pm 24g$  full scale, high resolution, smart embedded functionalities and advanced power-saving features. A set of smart SPI/I<sup>2</sup>C programmable embedded functions, such as low-power mode, auto wake-up function, free-fall and 6D-orientation detection are integrated into the LIS331DLx family. To address automotive applications, ST has designed the AISxxx accelerometers that offer extended temperature range and are AEC-Q100 qualified.

#### Analog and digital temperature sensors

STMicroelectronics' temperature sensors include both precision analog temperature sensor ICs and precision digital temperature sensor ICs. ST's digital temperature sensors feature low power consumption, up to 12-bit resolution and can operate over a temperature range as wide as  $-55$  to  $+125$  °C. LM334, STLM75, STTS75

#### FingerTip capacitive multi-touch controllers and S-Touch® resistive controllers

- STMT04, STMT07

Capacitive multi-touch controllers: The S-Touch® FingerTip controller provides true multi-touch capability supporting unlimited simultaneous touches.

### Thyristors And AC Switches



ST offers a complete range of thyristors and AC switches with voltage ratings up to 1200 V, current ratings up to 120 A and a range of packages from miniature surface-mounted packages to high power dissipation isolated and non-isolated packages. The latest extension to the AC switch range features the SMBflat package, which is smaller than SOT-223 and is aimed at the 0.8 A device range, SCRs, Triacs and ACS types. The PCB can be designed so the SMBflat and SOT-223 are fully interchangeable for increased production flexibility. - BTW67/8/9, TS1220, TS820

Standard and sensitive-gate SCRs are invaluable when simple gate drive or mains voltage is the given environment of the system. ST's SCR devices allow a peak voltage up to 1200 V, a maximum current up to 50 A, with gate trigger current either well under 1 mA for sensitive types or  $\times 10$  mA for standard gate versions. They are available in SOT-23, SOT-223, TO-92, DPAK, IPAK, TO-202-3, TO-220, RD-91 and TO-P3 packages.

High-temperature SCRs are designed for all modes of control found in applications such as overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, inrush current-limiting circuits, capacitive discharge ignition and voltage regulation circuits. Featuring a high temperature design (150 °C), the device maintains a good voltage drop, which allows high current density in the circuits or smaller heatsinks. The sensitive gate allows a current down to 5 mA to trigger IC drive. These SCRs are now available in 12 A, with two package versions. - TN1205H.

### Transistors



**Power Transistors:** Based on proprietary leading-edge low- and high-voltage technologies, ST offers a broad portfolio of power MOSFETs with breakdown voltages ranging from  $-60$  V to 1500 V. - STB50NF25, STF20NF20

ST's proprietary **SuperMESH**, **SuperMESH 3**, and **SuperMESH 5** technologies are designed to minimize on-state resistance, optimize switching performance, and sustain high-energy pulses in avalanche and commutation modes. These devices are available with breakdown voltages up to 1500 V, drain current up to 40 A and on-resistance as low as  $0.18 \Omega$  in a wide range of compact and high dissipation packages: D2PAK, I2PAK, IPAK, ISOTOP, SOT 223, TO 220, TO 247, TO 252, TO 3PF, STD3NK80, STD7NM80

**IGBTs:** These devices supply a maximum collector current of up to 30 A and a maximum switching frequency of up to 1 kHz. ST's proprietary technology used for this voltage range is PowerMESH. They are ideal for automotive applications. The available packages range from miniature to power packages: IPAK, TO 220, TO 247, TO 251, TO 252. - STGD18N40, STGP10NB37

**High Voltage Power:** These devices are ideal for applications including lighting and power supply. They are available with collector-emitter voltages of up to 700 V, collector currents of up to 60 A and a minimum hFE of up to 70. The available packages are D2PAK, DPAK, ISOTOP, TO-3PF, DIP-8, SOT-223, SOT-32, SOT-82, TO-220, TO-247, TO-3, TO-92. ST's proprietary technology used for this voltage range is planar high voltage. - BUL742, STD616C

**Bipolar Small Signal 0.5 - 5 GHz:** These devices are ideal for applications including automatic meter reading. This device family works with a supply voltage of 3.6 V and, operating at up to 5 GHz, is capable of delivering an output power of up to 29 dBm. The available packages are SOT-343, SOT-89. ST's proprietary technology used for this voltage range is NPN RF bipolar technology (HSB3).

### Communication & Connectivity ICs



ST's mobile communications product portfolio has now moved to ST-Ericsson ([www.stericsson.com](http://www.stericsson.com)). ST's communication portfolio retains solutions for ZigBee® large-scale mesh networks, and wireless tracking networks. We also continue to offer high-performance DSL solutions for customer-premise equipment (CPE), Ethernet products for LAN applications and powerline communication ICs.

**Standalone Bluetooth receivers** support the Bluetooth specification V2.1 + EDR (Lisbon) and are optimized in terms of RF performances and costs. - STA2500D.

**RF communication ICs:** Sub-GHz RF proprietary transceivers with excellent receiver sensitivity and unbeatable low current consumption. Error-free transmission in harsh-environmental or challenging-logistical conditions are guaranteed because of the supported frequency hopping, auto-acknowledgement and antenna diversity embedded algorithms. SPIRIT1, STB5701.

### Embedded Microprocessors



Embedded microprocessors, or eMPUs, offer powerful processing cores, can manage external memory resources and a wealth of peripherals, whilst remaining flexible enough to serve a broad range of applications. ST's SPEAr® family of embedded MPUs meet these challenges head-on with state-of-the-art architecture, silicon technology and intellectual property, targeting networked devices used for communication, display and control.

**SPEAr Embedded Microprocessors:** Highly integrated, the SPEAr® eMPU family are 32-bit ARM® ARM926EJ-S or Cortex-A9-based devices for cost-sensitive applications requiring significant processing and connectivity capabilities at lower power consumptions. - SPEAr300/310/320

#### Advantages

- Based on an industry-standard ARM® core
- Architecture includes proven IPs for connectivity, memory interfaces and high-performance internal bus system
- Full range ASSP portfolio
- Development kits are available to allow a full custom project approach
- Clear path to architecture and technology evolution
- Optional configurable embedded logic block allows selected customers to develop a customized SPEAr solution for a specific business

### Audio ICs



Worldwide leader in high-performance audio solutions, ST's have a wide portfolio of digital, analog and mixed-signal integrated circuits.

**Analog Audio Processor ICs:** Our analog audio processor ICs offer features such as digital volume control, surround sound, bass-middle-treble control, balance control - TDA7309, TDA7430, TDA7448

**Based on a VLIW DSP core** specially optimized for audio applications, the integrated MP3 decoders add voice recording/playback capabilities to personal players, with extremely low power consumption, typically 85 mW at 2.4 V. Delivered in compact SO28, TQFP44 and BGA8x8 packages, MP3 chipsets decode a 320 Kbit/s bitstream. - STA013

**Digital Audio ICs** - For the higher output power range, ST offers its latest generation of digital audio power amplifiers, based on ST's FFX technology. Combining all-digital and high-efficiency full flexible amplification, ST's audio power solutions can be used in a wide range of consumer audio products. - STA510F, STA518

### Analog & Mixed Signal ICs



ST offers a wide range of high-performance analog and mixed-signal products. These circuits perform several functions or system sub-functions, with some being an entire system-on-chip (SoC) or system-in-package (SIP). The products include circuits for data conversion, timer functions, power switches, interfaces, multiple or single drivers and half-bridge drivers.

**Data Conversion:** ST's high performance analog-to-digital converters combine high-speed with ultra-low power dissipation. The ADC technology in  $0.25 \mu\text{m}$  CMOS provides a very efficient speed-to-power ratio and results in a highly cost-effective integration for the application. - TSA1203/04

**Intelligent Power Switches for Industry:** ST offers a series of intelligent power switches (IPS) for high-side and low-side configurations. These devices integrate the control section (logic interface, drivers, diagnostic and protection features) and the power stage on the same chip, with benefits in terms of compactness, increased system reliability and cost effectiveness. - L295, L6360, TDE1707

## Motor Control ICs & Modules



ST's global system approach to motion control key function greatly simplifies the design of flexible motor controllers. Ideal for driving brush DC, bipolar stepper and permanent magnet 3-phase brushless motors, ST's motor control solutions offer an open, scalable and integrated answer to the market's most demanding motion control performances.

**Integrated Motor Drive:** The SPIMD20 is a step forward in motion control. It offers a complete motor drive solution in a single, robust and reliable module, including full bridge IGBT inverter, control unit and communication interface based on real-time industrial Ethernet. It is ready to be integrated in any brushless 3-phase motor up to 2 kW (i.e. 6.4 Nm @ 3000 rpm). The flexibility of the concept allows you to use the SPIMD20 as the first brick in a motion distributed solution, implementing proprietary or open solutions. The architecture is suitable for the most common industrial safety standards. – SPIMD20

**Stepper and DC:** ST offers integrated circuits designed to sense and control the current in stepper and DC motors. When used in conjunction with dual H-bridge products, the chipset forms a constant-current drive for an inductive load and performs all interface functions from the control logic through to the power stage. – L297, L6258, L6506

**Dual H – Bridge:** Making the design of single, dual DC, and stepper motors much easier, ST's motor drivers combine control logic and the power stages on the same chip.

**Single H – Bridge:** ST's single H-Bridge bipolar or DMOS drivers help to reduce the number of components by combining both the gate driver and power stage on a single chip. These drivers control and drive one DC motor or one phase of a bipolar stepper motor. Offering multiple package options, including Multiwatt, these ICs are suitable for various applications. – L6201/2/3, TEA3718

**Microstepping and Multimotor:** Designing DC and stepper motors becomes much easier with the outstanding performance, features, and support of the latest motor driver families: dSPIN, FlexSPIN, and easySPIN. Key benefits of dSPIN (L6470/2) motor drivers: Fully-digital motion control allows the user to set a variety of features: target speed, acceleration/ deceleration, absolute and relative position. With the integrated motion engine and SPI interface, no need for external microcontroller or DSP, the innovative voltage mode control (available on the L6470) allows 128 microsteps per step featuring the best motion resolution ever reached in monolithic stepper motor drivers. – L6258, L6219, L6472

## Clocks & Timing Circuits



STMicroelectronics offers a portfolio including frequency timing generators, clock distribution ICs, TIMEKEEPER® devices and real-time clock (RTC) ICs. These provide best-in-class performance for accuracy and ultra-low power consumption to address battery-powered applications, communication, networking and industrial applications.

**Timer, Industry Standard:** ST's industry-standard frequency generators are circuits designed in bipolar technology. In the time-delay operating mode, the time is precisely controlled by an external RC oscillator. The circuits may be triggered and reset on the falling edge. The output can source or sink up to 200 mA. – NE555, SA556, SE555

**Timer, Low Power:** ST's low-power frequency generators are circuits designed in CMOS technology. Timing remains accurate in both monostable and astable modes. Their higher input impedance requires smaller capacitors. – TS555, TS556

**Timekeeper Supervisors:** Timekeeper supervisors are self-contained devices that include a real time clock, programmable alarms, a watchdog timer, and a square wave output which provides the control of an external low-power static RAM. The 16 TIMEKEEPER® registers offer in addition to standard date and time: calibration, alarm, century, watchdog, and square wave output data. – M48T01

**Real-Time Clock (RTC) ICs:** ST's serial real-time clock devices combine the RTC function with the supervisor functions. The features related to supervising a microprocessor include a programmable watchdog, an early power-fail warning circuit and the power-on reset/low-voltage detect. The programmable alarm with repeat mode may be used in the battery back-up mode. – M41T56, M41T60, M41T93

**Battery & Crystal Options:** These devices are detachable lithium power sources in 4-pin SNAPHAT housing designed to be snapped on after the surface mounting of the SOIC. They provide battery backup power for supervisory functions such as power-on reset/low-voltage detect, early power-fail warning, battery monitor and tamper detect for secure applications. – M4T28-BR12SH, M4T32-BR12SH

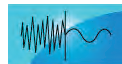
**Timekeepers:** These devices are non-volatile static RAMs with different densities together with a dedicated real-time clock circuit. A special DIP CAPHAT™ package houses the circuit with a quartz crystal and a long life lithium cell to form a highly integrated battery backed-up memory and real-time clock solution. The battery cell has sufficient capacity and storage life to maintain data and clock functionality for an accumulated time period of at least 10 years in the absence of power. – M48T08, M48T02, M48T58.

## Diodes



ST offers Schottky and ultrafast rectifier solutions for all market requirements. ST's latest developments include ULVFM™ ultra-low VF diodes, improved avalanche rating, and the integration of higher currents in low-profile PowerFLAT™ packages. For power converter applications where silicon diodes reach the limits of their operating temperature and power density, ST silicon carbide devices take over with optimal reliability. – STPS0540, STPS10L40, STPS130/40.

## EMI Filtering & Signal Conditioning



Resistors, capacitors, inductors, ESD diodes and multiple other functions in a single, tiny package, to provide new solutions for the converging market. ST IPAD devices can cover many functions such as ESD protection, EMI low-pass filtering, line termination, pull-up or pull-down resistance, differential to common-mode as well as wide-band RF coupling, and high- or low-band filtering.

**Memory and SIM card IPAD:** ST has developed a complete range of IPAD™ components dedicated to memory-card interfaces such as micro-SD cards, T-Flash or SIM cards. Available in CSP or micro-QFN packages, these filters cover new standards such as SDA3.0 (SDR 104). – EMIF03, EMIF06, EMIF09

**USB IPAD:** ST has developed a complete range of IPAD™ components dedicated to USB interfaces. These devices combine EMI low-pass or common-mode filters, ESD protection, pull-up or pull-down resistors to support USB 2.0 and OTG (On-The-Go) specifications. – EMIF02, USBUF, USBDF, ECMF02

## Logic, Signal Switches



ST manufactures a broad line of standard logic devices including HCMOS standard logic devices for 3.3 V and 5 V applications, LED drivers and front-panel controllers, level translators, single, double and triple buffer circuits, analog and digital switches, power switches, pulser ICs and Xpander devices.

**LED Driver (Power Logic):** ST's LED drivers are monolithic, low-voltage, low-current, multiple power current sources that provide 5 mA to 100 mA constant current. The balanced turn on/off improves system performances by reducing the bypass capacitance in applications where parasitic inductance generates ringing or noise in the system. The LED's brightness can be controlled by using an external resistor to adjust the output current. – STP04CM05, STP24DP05, STPIC6C595

**Single Gates:** ST's single-gate devices are designed for applications where traditional dual, quad, or hex functions are not desired. In order to meet space-constrained application requirements, ST offers these devices in SOT-23, SOT-323 and flip-chip packages. – 74V1Gxx

## Microcontrollers



ST's product portfolio contains a comprehensive range of microcontrollers, starting from robust, low-cost 8-bit MCUs to 32-bit ARM-based Cortex™-M3 Flash microcontrollers.

**STM32 – 32-bit ARM Cortex MCUs:** The STM32 family of 32 bit Flash microcontrollers based on the ARM Cortex™ M processor is designed to offer new degrees of freedom to MCU users. It offers 32 bit product range that combines high performance, real time capabilities, digital signal processing, and low power, low voltage operation, while maintaining full integration and ease of development. The unparalleled and large range of STM32 devices, based on an industry-standard core and accompanied by a vast choice of tools and software, makes this family of products the ideal choice, both for small projects and for entire platform decisions. STM32F10x

**STMTouch:** The STMTouch family is a user-friendly platform for fast and safe development in proximity, key, capacitive-screen and resistive-screen applications. STMTouch benefits from the industry-acclaimed STM32 and STM8 architectures combined with very-low-power technologies and low-energy oriented features. – STM8T141, STM8TL53C4

**STR7 32-bit ARM7 MCUs:** The STR7 family combines the industry-standard ARM7TDMI® 32-bit RISC core, with a comprehensive set of peripherals and ST's 0.18 µm embedded Flash technology in the STR710, STR730 and STR750 ranges. – STR712Fxx, STR715Fxx, STR736Fxx

**Ultra-low-power MCUs:** The ultra-low-power EnergyLite™ MCU platform is based on the 8-bit STM8L and 32-bit STM32L MCUs, processed on proprietary 130 nm ultra-low-leakage process technology. The EnergyLite platform enables STM8L and STM32L microcontrollers to operate at the industry's lowest power consumption with 1.3 µA with SRAM retention and full RTC running, and 300 nA in standby. – STM32L151, STM32L162

## Memories



ST offers a wide range of non-volatile memories. The serial EEPROM family ranges from 1 Kbit to 2 Mbits and offers different serial interfaces: I<sup>2</sup>C, SPI, Microwire. The innovative family of Dual Interface EEPROMs offers new features and capabilities. The EEPROM memory bank provides read and write access by either a standard I<sup>2</sup>C interface or by an ISO 15693 RF interface. This new type of wireless memory enables on-board energy savings and provides easy and convenient remote access to electronic product parameters. ST offers a wide range of RFID reader ICs and tag ICs for contactless short-range and long-range applications. The products comply with the ISO 14443 and ISO 15693 RFID standards based on the 13.56 MHz carrier frequency. They can also communicate with ISO 15693-capable NFC devices.

**Dual Interface EEPROM:** features and capabilities. The EEPROM memory bank can be accessed either by a low power I<sup>2</sup>C interface or by an ISO 15693 RF interface operating at 13.56 MHz. In addition, the family features a 32-bit password protection mechanism. Dual Interface EEPROMs are able to transmit information from the heart of the application either to an ISO 15693-capable NFC smartphone or to an industrial RFID reader. – M24LR04/16/64

**EEPROM, Serial:** The EEPROM portfolio includes devices covering compatibility with all major bus types (I<sup>2</sup>C, Microwire, SPI), a wide scale of operating voltages (from 1.7 to 5.5 V), a wide temperature range, large density and speed ranges (1 Kbit to 2 Mbits, SPI up to 20 MHz, I<sup>2</sup>C up to 1 MHz). Completing this portfolio, ST offers a build-your-own custom-EEPROM capability, enabling design engineers to achieve a higher flexibility in optimizing the system parameters. – M93S46, M95020, M24Cxx



LINEAR TECHNOLOGY Corporation designs, manufactures and markets a broad line of high performance integrated circuits, which excel in virtually all important values like low noise, low temperature drift, low power consumption and other. Applications for the Linear Technology's products include virtually all industrial segments.

**LINEAR TECHNOLOGY Corporation** navrhuje, vyrábí a dodává širokou linii špičkových integrovaných obvodů, které excelují ve všech důležitých vlastnostech jako nízký šum, malý tepelný drift, nízká spotřeba, vysoká rychlost a jiné. Aplikace pro produkty Linear Technology zahrnují prakticky všechny průmyslové segmenty.

**LINEAR TECHNOLOGY Corporation** entwirft, produziert und vermarktet eine breite Palette von spitzentmaßigen integrierten Schaltungen, welche in allen wichtigen Eigenschaften wie geringe Rauschwerte, kleiner Temperaturdrift, niedriger Stromverbrauch, hohe Geschwindigkeit und andere herausragen. Die Anwendungen für Linear Technology Produkte umfassen praktisch alle Industriebereiche.

**A LINEAR TECHNOLOGY Corporation** tervez, gyárt és szállít integrált áramköröket, melyek kitűnnek minden fontos tulajdonságban, mint pl. az alacsony zajszint, alacsony hő-eltolódás, alacsony fogyasztás, nagy sebesség, stb.. A Linear Technology termékeihez tartozó alkalmazások lefedik gyakorlatilag az összes ipari ágazatot.

**LINEAR TECHNOLOGY Corporation** rozwija i dostarcza szeroką gamę wyjątkowych układów scalonych, które wiodą prym we wszystkich ważnych parametrach jak niski szum, mały dryft cieplny, niski pobór, wysoka prędkość i inne. Aplikacje dla produktów Linear Technology obejmują praktycznie wszystkie sektory przemysłowe.

**LINEAR TECHNOLOGY Corporation** proiectează, produce și comercializează o linie extinsă de circuite integrate de înaltă performanță care excellează în toate aspectele esențiale cum ar fi nivelul zgomotului, variația scăzută a temperaturii, consum scăzut de energie și altele. Aplicațiile pentru produsele Linear Technology includ realmente toate segmentele industriale.

**LINEAR TECHNOLOGY Corporation** navrhuje, vyrába a dodáva širokú líniu špičkových integrovaných obvodov, ktoré excelujú vo všetkých dôležitých vlastnostiach ako nízký šum, malý tepelný drift, nízka spotreba, vysoká rýchlosť a iné. Aplikácie pre produkty Linear Technology zahŕňajú prakticky všetky priemyselné segmenty.

The Company's principal product categories include amplifiers, battery management, data converters, high frequency, interface, voltage regulators and voltage references. LT targets the most demanding market segments and deliver unparalleled quality and performance.

## Why LINEAR TECHNOLOGY?

- top quality high performance semiconductors
- very high reliability – functionality guaranteed in the whole temperature range and some types are 100% tested at temperature extremes
- for the development support, we can visit you with an LT technician

## Automotive Electronic Solutions

This selection guide features high performance, high reliability solutions for a wide range of functions commonly used in today's automobiles, including telematics, infotainment systems, body electronics, engine management, safety systems and GPS navigation systems.



## DC/DC uModule Power Products

uModule power products are complete power management solutions integrating the DC/DC controller, inductor, power transistors, input and output capacitors, and compensation components within a compact, IC-like form factor. Supported by Linear's rigorous testing and high reliability processes, the uModule power product family simplifies the design and layout of your next design.



- Point-of-Load Regulators
- Battery Chargers
- LED Drivers

## High Performance DC/DC Controllers

High performance DC/DC switching regulator controllers for applications including datacom, telecom, industrial, automotive, medical, avionics, control systems and consumer products. Linear makes power design easier by providing industry-leading field application engineering support; a broad selection of demonstration boards with schematics, layout files and parts lists SwitcherCAD software for simulation; application notes and comprehensive technical documentation.



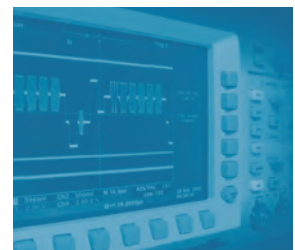
## Industrial Signal Chain

Analog-to-digital converters, digital-to-analog converters, amplifiers, comparators, filters, voltage references, RMS-to-DC converters and silicon oscillators designed for demanding industrial applications. These precise, flexible and rugged devices feature parameters fully guaranteed over the -40°C to 85°C temperature range.



## Linear Low Dropout (LDO) Regulator Solutions

Broad line of high performance low dropout (LDO) linear regulators with fast transient response, excellent line and load regulation, and very wide input voltage range from 0.9V to 100V. Output currents range from 20mA to 10A, with positive, negative and multiple output versions available. Many devices offer output voltage operation <0.8V and some feature operation as low as 0V, even with a single supply. Most are stable with ceramic output capacitors. LDO regulators can be applied in virtually any application



## Power Management for LEDs

A light-emitting diode (LED) is a semiconductor device that emits incoherent narrow-spectrum light when electrically forward biased, resulting in a form of electroluminescence. The color of the emitted light depends on the chemical composition of the semiconductor material used, and can be near-ultraviolet, visible or infrared. LEDs are more prevalent today than ever before, replacing traditional incandescent bulbs and fluorescent lights in many applications.





## Data Conversion

Data converters translate real world signals such as temperature, pressure, or voice into the digital realm and back again. Linear Technology's high performance analog to digital converters (ADCs) offer solutions for applications ranging from 24-bit precision measurements to 250MSPS communications systems. Our a to d topologies include delta sigma, SAR (successive approximation register) adc, and high speed pipeline analog to digital. Our digital to analog converters (DACs) offer a range of resolutions, output ranges and package densities. We offer voltage output d to a, current output d to a, and high speed digital to analog.

### Analog-to-Digital Converters (ADC)

Linear Technology offers a complete family of high performance analog to digital converter products (ADCs), including 16-bit to 24-bit delta sigma converters for precision measurements, up to 16-bit high-speed pipeline ADCs for communications and 8-bit to 18-bit low power successive approximation register (SAR) analog to digital converter for everything in between. Our analog to digital converter portfolio offers unmatched noise performance (SINAD, SNR and SFDR), low power consumption and small package size. - LTC2440, LTC2404, LTC2369, LTC2370

- **No Latency Delta Sigma ADCs:** LTC2473, LTC2496, LTC2453
- **General Purpose SAR ADCs:** LTC2376, LTC2370, LTC2367

### Digital-to-Analog Converters (DAC)

Linear Technology offers a complete family of digital to analog converters (DACs), offering both voltage output and current output, serial and parallel interfaces and a wide range of resolutions and package densities. Product lines include digital to analog converters consisting of precision DACs with up to 18-bit resolution for precision industrial applications, low power DACs in tiny packages for control-loop applications, and high-speed DACs with output frequencies of up to 50MSPS.

- **Voltage Output DACs:** LTC2656B, LTC2655B, LTC2605
- **Current Output DACs:** LTC2756, LTC2758, LTC2754B
- **High Speed DACs:** LTC1668, LTC1667, LTC1666
- **Special Function DACs:** LTC1426, LTC1428, LTC1840

### Switches and Multiplexers

SPI and I2C serially controlled multiplexers for data conversion applications and industry-standard analog switches. - LTC202, LTC1380, LTC201

### Signal Chain $\mu$ Module Receivers

The signal chain modules use a System-in-Package (SiP) technology similar to multi-chip modules (MCM) to integrate components with different technologies along with passive components to make an integrated subsystem. The micromodule ( $\mu$ Module) receivers consist of high-performance, high-speed ADCs with fixed-gain, high-speed amplifiers and anti-alias filters. The integrated ADC + driver products include integrated bypass capacitance and simplify the high frequency layout required to preserve the AC performance. The board space savings are significant for instrumentation applications such as spectrum analyzers, oscilloscopes (oscillographs) and communications test equipment or for communications applications such as high sensitivity receivers, software defined radio (SDR) or signal intelligence receivers. - LTM9010, LTM9004, LTM9005

## Signal Conditioning

Linear Technology's Signal Conditioning product category includes high performance analog IC's such as operational amplifiers (op amps), comparators, filters, voltage references, RMS-to-DC converters and oscillators.

### Operational Amplifiers (Op Amps)

Linear Technology manufactures a broad line of high performance operational amplifiers (op amps) each one designed for the unexpected. Fully specified over temperature, look to Linear for signal conditioning solutions when performance matters. Amplifier product families include high speed amplifiers, precision amplifiers, low noise amplifiers, and micropower amplifiers as well as special function amplifiers such as current sense, programmable gain and differential high speed analog to digital converter (ADC) drivers.

- **High Speed Amplifiers:** LTC6409, LTC6360, LTC6252
- **Precision Amplifiers:** LTC6362, LTC6253, LTC6257
- **Low Noise Amplifiers:** LT1028, LT6200, LTC6360
- **Low Power Amplifiers:** LT6004, LT1491A, LTC1077
- **Low Bias Current Amplifiers:** LTC6081, LTC6084, LTC2052
- **High Output Current Amplifiers:** LT1210, LT1970A, LT1813HV
- **Current Feedback Amplifiers:** LT1210, LT1396, LT1253
- **Current Sense Amplifiers:** LTC6109, LTC6109, LT1999
- **Programmable Gain Amplifiers:** LT1991, LTC6412, LTC6915
- **Instrumentation Amplifiers:** LTC2053, LT1167, LT1101
- **Difference Amplifiers:** LT1991, LT1995
- **Differential Amplifiers:** LTC6409, LTC6405, LT6350

### Comparators

Linear Technology specializes in high speed comparators and micropower comparators that offer simple, flexible features such as split input and output supplies, Over-the-Top inputs, integrated references and compact packages. Our high speed comparator

products offer propagation delays as fast as 7ns. Our micropower comparator product line offers supply currents as low as 300nA while still offering excellent precision and innovative features.

- **High Speed Comparators:** LT1715, LT1721, LTC6702
- **Micropower Comparators:** LTC1540, LTC6702, LT1716
- **High Speed DACs:** LTC1668, LTC1667, LTC1666
- **Application Specific Comparators:** LTC1540, LTC1440, LTC1042

### Filters

Linear Technology's line of continuous time and switched capacitor filters provide simple, flexible frequency discrimination solutions. Our specially designed filter products can accommodate any frequency response (lowpass, highpass or bandpass) and a wide range of frequencies.

- **Lowpass Filters:** LTC6605, LTC1569, LTC6603
- **Filter Building Blocks:** LT1568, LTC1562, LTC1164

### Voltage References

Linear Technology offers a broad line of series and shunt precision voltage references. Shunt voltage references operate in a manner that is functionally equivalent to a Zener diode. Series voltage references operate in a manner that is functionally equivalent to a 3 terminal regulator. Many of Linear Technology's voltage references are designed to operate in either series or shunt mode. All of our products offer excellent initial accuracy and low drift over time and temperature. Linear Technology's "Reference+" parts combine precision voltage references with comparators or amplifiers.

- **Shunt Voltage References:** LT1634, LT1004, LT1009
- **Series Voltage References:** LT6654, LT6656, LTC6654
- **Micropower Voltage References:** LT6656, LT1634, LT1790
- **Reference Plus Comparator or Amplifier:** LTC1540, LTC1843, LTC1440

### RMS-DC Conversion

RMS to DC conversion is the truest way to measure the energy contained in an AC waveform. Linear Technology's simple, true RMS-to-DC converters use an innovative delta-sigma computational technique that features high linearity and accuracy suitable for a wide variety of AC measurement applications. - LTC1966, LTC1967, LTC1968

### Precision Resistor Networks

Quad resistor networks with excellent matching specifications over the entire temperature range. All resistors can be accessed and biased independently, making them a convenient and versatile choice for any application that can benefit from matched resistors. These resistor networks provide precise ratiometric stability required in highly accurate difference amplifiers, voltage references and bridge circuits. - LT5400A, LT5400B

### Thermocouple Compensators

CJC devices use curvature correction circuitry to match the „bow“ found in all thermocouples, providing accurate cold junction compensation over a wide temperature range. - LT1025, LTK001

### Signal Chain $\mu$ Module Receivers

Signal Chain  $\mu$ Module Receivers: The signal chain modules use a System-in-Package (SiP) technology similar to multi-chip modules (MCM) to integrate components with different technologies along with passive components to make an integrated subsystem. The micromodule ( $\mu$ Module) receivers consist of high-performance, high-speed ADCs with fixed-gain, high-speed amplifiers and anti-alias filters. The integrated ADC + driver products include integrated bypass capacitance and simplify the high frequency layout required to preserve the AC performance. The board space savings are significant for instrumentation applications such as spectrum analyzers, oscilloscopes (oscillographs) and communications test equipment or for communications applications such as high sensitivity receivers, software defined radio (SDR) or signal intelligence receivers. - LTM9012, LTM9005, LTM9004

## Power Management

Linear Technology's high-performance analog ICs provide efficient solutions for power management and conversion applications in the automotive, telecommunications, industrial, medical, computing, military and high-end consumer markets. Our ICs provide unmatched power densities and software design simulation tools to provide fast and accurate power supply designs.

### Switching Regulator

Linear Technology manufactures a broad line of high performance switching regulator ICs with both synchronous and non-synchronous internal switches. These switching voltage regulators offer typical input voltage capability from 2.25V up to 60V, switching frequencies up to 4MHz and high efficiency operation up to 96%. Also with Burst Mode operation, quiescent currents in the tens of micro-amps level can be attained. This combination of features allows very small, low profile circuit implementations with minimum external components. Topologies include buck (step-down) switching regulators, boost (step-up) switching regulators, buck-boost switching regulator, inverting switching regulators, and flyback and isolated topology switching regulators. LTM8062, LTM8047, LTM8026, LTM8008, LTC3891, LTC3861, LTC3856

### LDO Linear Regulators

Linear Technology manufactures a broad line of high performance low dropout linear regulators (LDO). These LDOs offer very low dropout, fast transient response, excel-

lent line and load regulation, and have a very wide input voltage range, from 0.9V to 80V. Output currents range from 100mA to 10A, with positive, negative and multiple outputs. – LT3010, LT3060, LT3029

### µModule Regulators

Linear Technology's µModule power products are complete power management solutions integrating the DC/DC controller, power transistors, input and output capacitors, compensation components and inductor within a compact, IC-like form factor. Supported by Linear Technology's rigorous testing and high reliability processes, the µModule power product family simplifies the design and layout of your next point of load regulator, battery charger or LED driver solution. – LTM8047, LTM8062, LTM4627, LTM4628

### µModule LED Drivers

Linear Technology's µModule power products are complete power management solutions integrating the DC/DC controller, power transistors, input and output capacitors, compensation components and inductor within a compact, IC-like form factor. Supported by Linear Technology's rigorous testing and high reliability processes, the µModule power product family simplifies the design and layout of your next LED driver solution. – LTM8040, LTM8042

### µModule Battery Charger

Linear Technology's recent technical achievements in the performance of switching regulators and innovative packaging methods have finally allowed a new generation of battery chargers, including all the circuit components such as the inductor and power MOSFETs, to be shrunk and encapsulated in such a tiny size that they resemble a surface mount IC. These battery chargers are complete solutions containing the DC/DC controller, MOSFETs, inductor, input and output bypass capacitors and compensation circuitry in only 2.25cm. Supported by Linear Technology's rigorous testing and high reliability processes, the µModule family simplifies the design and layout of your next power supply. – LTM8061, LTM8062

### Isolated µModule Transceivers

Linear Technology's Isolator µModule Technology is a new development platform that allows Linear to reliably integrate inductive/magnetic isolation, discrete components, ICs and power onto a single substrate PCB. This high level of integration results in products that require no external components. All resistors, capacitors, inductors and ICs are onboard. – LTM2881, LTM2882

### Signal Chain µModule Receivers

The signal chain modules use a System-in-Package (SiP) technology similar to multi-chip modules (MCM) to integrate components with different technologies along with passive components to make an integrated subsystem. The micromodule (µModule) receivers consist of high-performance, high-speed ADCs with fixed-gain, high-speed amplifiers and anti-alias filters. The integrated ADC + driver products include integrated bypass capacitance and simplify the high frequency layout required to preserve the AC performance. The board space savings are significant for instrumentation applications such as spectrum analyzers, oscilloscopes (oscillographs) and communications test equipment or for communications applications such as high sensitivity receivers, software defined radio (SDR) or signal intelligence receivers. – LTM9012, LTM9005, LTM9004

### PMIC & Multifunction

Many of Linear Technology's battery management products combine the functionality of our standalone battery chargers with one or more other functions. Power management IC (PMIC) products combine battery charging, PowerPath control and one or more DC-DC regulators for a complete power solution for handheld products. Linear Technology's PowerPath products and architecture allow the load to be powered from both Vin and the battery, ensuring shorter charging times and more flexibility for the portable device designer. They also enable "instant on" in systems with a depleted battery. Other features combined with our battery chargers include dual inputs for USB and Wall Adapter, switching regulators, comparators, or LDOs. – LTC4156, LTC4155, LTC4085

### LED Driver ICs

Linear Technology has a very broad line of LED driver ICs for automotive, display backlighting, handheld and general lighting applications. They are configured as either Inductorless white LED drivers (for LEDs in parallel), or switching regulator based white LED drivers (for LEDs in series). Topologies include boost regulator LED drivers, buck regulator LED drivers, buck-boost LED drivers, SEPIC topology led drivers and more. Regardless of topology, these LED driver ICs offer the highest efficiency, lowest noise, and the smallest footprints. Other features of Linear Technology LED driver include integrated Schottky diodes, accurate LED current matching and multiple output capability. – LT3474, LT3597, LT3746

### Battery Management

Linear Technology manufactures a comprehensive line of high performance battery charger IC for any rechargeable battery chemistry, including Lithium-Ion, Lead Acid, and Nickel based. These battery charger IC are offered in linear or switching topologies and are completely autonomous in operation. Our battery charger IC offer many standard features for battery safety and management, including on-chip battery pre-conditioning, thermal regulation, NTC interface and dual Smart Battery systems management with SMBus or I2C interface. – LTC4150, LTC6803, LTC4071

### Power-Over-Ethernet (PoE) Interface Controllers

Power Over Ethernet (POE) Controller ICs for both the sourcing (PSE) and receiving (PD) sides of the IEEE 802.3af application. Industry-leading devices that meet the compliance requirements as well as the ruggedness requirements of the application.

– LTC4265, LTC4270, LTC4266

### System Supervisor, Monitor and Control

This extensive family of parts includes voltage supply monitors, trackers, margining controllers, sequencers, push button controllers and the new power monitors. All of these devices improve DC/DC converter functionality and feature a high degree of accuracy, integration and configurability, resulting in more cost efficient designs that would otherwise be burdened with multiple complicated components when designed the "traditional way". The System Monitor and Control family strives to provide convenient all-in-one solutions for many of today's growing number of digital power management applications. – LT2940, LT41800, LT4363

### Power Control

Power control products include ideal diodes, PowerPath controllers, MOSFET drivers, bridge drivers and other non-regulator power applications. – LTC552, LTC4415, LTC4412

### Digital Power Management

Linear Technology manufactures a broad line of high performance DC/DC controllers featuring digitally controlled output voltages for CPU core power applications and other applications requiring dynamically adjustable outputs. These controllers support most CPU manufacturers product offerings including Intel, AMD and Transmeta. In addition, the key benefits of using these controllers include small solution footprint, reduced levels of capacitance, high conversion efficiencies, fast transient response and improved thermal management. – LTC2974, LTC2978, LTC3816

### Current Source

Constant current sources can be designed using a number of standard analog building blocks, including op amps, LED drivers and battery chargers. Linear Technology also offers a family of dedicated constant current sources that offer ease of use and design, voltage, current and thermal protection and built in current limiting. – LTM8042, LT3080, LTM8040

### Energy Harvesting

Linear Technology manufactures a wide range of ultra-low power ICs targeted for energy harvesting applications. Power management products that convert energy from Vibration (Piezo), PhotoVoltaic (Solar) and Thermal (TEC, TEG, Thermopiles, Thermocouples) sources provide high efficiency conversion to regulated voltages or to charge batteries and super capacitor storage elements. Boost converters that operate from as little as 20mV or battery chargers with Maximum Power Point capability expand the possibilities for a wide variety of industrial automation and control, wireless sensor, transportation, automotive and building management applications. Ultra-low quiescent current linear regulators, op amps, comparators, voltage supervisors, analog to digital converters, digital to analog converters and micropower voltage references provide additional fundamental building blocks required for autonomous systems. – LTC3105, LTC3388, LTC4071

### Supercapacitor Chargers

Supercapacitors, capacitors with up to 100F of charge storage, are emerging as an alternative to batteries in applications where the importance of power delivery trumps that of total energy storage. Supercapacitors have a number of advantages over batteries that make them a superior solution when short term, high power is needed, such as in power ride-through applications. These advantages include lower effective series resistance (ESR) and enhanced durability in the face of repeated charging. Linear Technology offers a portfolio of linear, switching and switched capacitor ICs designed to charge supercapacitors (also known as ultracapacitors). These parts offer input or output current limiting, automatic cell balancing and a range of protection features that make them uniquely suited to super cap charging. – LTC3226, LTC3625, LTC4425

Linear Technology's Interface products encompass a wide variety of industry-standard communication devices, including RS485 transceivers that enable long-range equipment communication, to I2C/SMBus digital interface devices that improve inter-chip communication. Our RS485, RS232, multiprotocol and CAN transceivers easily support today's fastest data rates, high node count, and low voltage supplies, while high ESD, failsafe, fault-protection and galvanic isolation all increase system reliability. Profibus (Process Field Bus) compatible devices easily meet the robust requirements of fieldbus solutions in factory and process automation environments. The I2C/SMBus bus buffers, multiplexers, rise time accelerators and isolators help digital systems meet specific I2C bus requirements, such as maximum bus capacitance and rise times, using unique features like selectable rise time acceleration strength and stuck bus recovery.

### RS232/RS562 Transceivers

The RS232 standard (formally TIA-232) specifies data transmission over a simple unterminated, multiconductor cable at rates up to 20kbps. The standard specifies the electrical characteristics and connector for an all-encompassing point-to-point modem interface. Although the original specification was intended for modems, subsequent versions of the standard shed unneeded signals to expand its scope and use as a general purpose serial interface at data rates up to 1Mbps. The RS562 standard is a similar low voltage version of the RS232 standard, with the primary difference being RS232 specifies a minimum driver output voltage of ±5V and RS562 specifies a minimum driver output voltage of ±3.7V, easing power supply requirements. Linear Technology offers single, dual, and combination transceivers of up to five RS232/RS562 drivers and receivers for 1.8V to 5.5V power supplies. Data terminal equipment (DTE) or data communications equipment (DCE) configurations are also available in 3.3V or 5V versions. Galvanically isolated modules, like the LTM2882, break ground loops and provide a convenient self-powered, isolated, low EMI solution that drastically reduces component count and design complexity. – LTC2801, LTC2804, LTM2882



FTDI – located in Glasgow/UK, are specialists in converting peripherals with FIFO/UART and other industrial interfaces to Universal Serial Bus (USB). They offer the easiest route to USB migration by combining USB Serial (USB RS232) and USB FIFO silicon solutions.

**FTDI, který sídlí v Glasgow ve Velké Británii je specialistou na konverzi periférií s FIFO / UART a jinými průmyslovými rozhraními na USB rozhraní. Nabízí tu nejjednodušší cestu na migraci přes USB kombinováním USB sériových portů (USB RS232) a USB FIFO řešení.**

**FTDI mit Sitz in Glasgow in Großbritannien ist ein Spezialist für die Umwandlung von Peripheriegeräten mit FIFO / UART und anderen industriellen Schnittstellen auf USB-Schnittstelle. Es bietet den einfachsten Weg zur USB-Migration durch Kombination von seriellen USB-Schnittstellen (USB RS232) und USB-FIFO-Silizium-Lösungen.**

**Az FTDI, melynek székhelye a nagy-britanniai Glasgowban található, a FIFO / UART perifériák és más ipari interfészek USB-re való átalakításának specialista. A legegyszerűbb módot kínálja az USB-re történő migrációra az USB soros portok (USB RS232) kombinációjával és az USB FIFO szilíciumos megoldásaival.**

**FTDI z siedzibą w Glasgow / Wielka Brytania, jest specjalistą w konwersji peryferii z przemysłowymi złączami FIFO / UART oraz innymi, dla interfejsów USB. Oferuje najprostszą możliwą drogę do migracji za pośrednictwem USB, za pomocą kombinacji portów szeregowych USB (USB RS232) oraz krzemowych rozwiązań USB FIFO.**

**FTDI – cu sediul în Glasgow/UK, este o societate specializată în convertirea perifericelor cu FIFO/UART și a altor interfețe industriale către Universal Serial Bus (USB). Oferă cea mai ușoară cale spre migrarea USB prin combinarea Serialului USB (USB RS232) cu soluțiile USB FIFO din silicon.**

**FTDI, ktorý sídlí v Glasgove vo Veľkej Británii, je špecialistom pre konverziu periférií s FIFO / UART a inými priemyselnými rozhraniami na USB rozhranie. Ponúkajú tú najjednoduchšiu cestu na migráciu cez USB kombinováním USB sériových portov (USB RS232) a USB FIFO kremikových riešení.**

FTDI's USB to serial UART interface devices simplifies USB to serial designs. Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port. A common feature of all FTDI products is an extensive support and royalty free USB drivers. FTDI's "total" solutions offer reduced development and debug costs and a fast time to market. FTDI products are very popular because of their simple incorporation into a target device, providing a full USB connectivity of a target device in a very short time.

### Why FTDI?

- very popular easy to use USB connectivity ICs and modules
- extensive customer support
- royalty free drivers

### FTDI - USB Host/ Device Interface Controllers

Device	VINCULUM		FT SERIES					
	Vinculum-I	Vinculum-II	Hi-Speed			Full-Speed		
	VNC1L	VNC2	FT232H	FT2232H	FT4232H	FT2232D	FT232R	FT245R
<b>Description</b>	USB 2.0 Host / Device Controller	Programmable <sup>1</sup> USB 2.0 Host / Device Controller	Hi-Speed USB 2.0 Device to Single UART/FIFO IC	Hi-Speed USB 2.0 Device to Dual UART/FIFO IC	Hi-Speed USB 2.0 Device to Quad UART IC	USB 2.0 Device to Dual UART / FIFO IC	USB 2.0 Device to UART IC	USB 2.0 Device to FIFO IC
<b>USB Speed</b>	Full / Low Speed <sup>6</sup> Full / Low Speed <sup>6</sup>	High / Full Speed <sup>6</sup>	High / Full Speed <sup>6</sup>	High / Full Speed <sup>6</sup>	Full Speed <sup>6</sup> Full Speed <sup>6</sup>	Full Speed <sup>6</sup>		
<b>USB Transfer Types</b>	Bulk / Interrupt	Bulk / Interrupt / Isochronous	Bulk	Bulk	Bulk	Bulk	Bulk	Bulk
<b>No. USB Ports</b>	2	2	1	1	1	1	1	1
<b>No. External Channels</b>	Flexible <sup>2</sup>	Flexible <sup>2</sup>	1	2	4	2	1	1
<b>Supported External Interfaces</b>	ASYNF FIFO, UART, SPI slave, GPIO	ASYNF FIFO, SYNC FIFO, UART, 2x SPI slave, 1 x SPI master, GPIO, PWM, Debug Port	UART, ASYNF FIFO, SYNC FIFO, MPSSE <sup>3</sup> , SPI/I2C/JTAG, Fast Serial, GPIO, FT1248 <sup>7</sup>	UART, ASYNF FIFO, SYNC FIFO, 2 x MPSSE <sup>3</sup> , Fast serial, 8051 MCU emulation, 16 GPIOs	UART, 2 x MPSSE <sup>3</sup> Controllers, 32 GPIOs	UART, ASYNF FIFO, MPSSE <sup>3</sup> , Fast serial, 8051 MCU emulation, 8 GPIOs	UART with 4 GPIO pins	ASYNF FIFO
<b>Core</b>	8-bit Harvard MCU core	16/32-bit Harvard MCU Core	–	–	–	–	–	–
<b>Internal Memory</b>	4KB RAM 64KB Flash	16KB RAM 256KB Flash	1KB RX/TX buffer per channel	4KB RX/TX buffer per channel	2KB RX/TX buffer per channel	384Byte – RX 128Byte – TX per channel	256Byte – TX 128Byte – RX	256Byte – TX 128Byte – RX
<b>Port Speed</b>	Up to 1Mbaud	Up to 6Mbaud	Up to 40MByte/s (FIFO) / Up to 12Mbaud (UART)	Up to 40MByte/s				
<b>(FIFO) / Up to 12Mbaud (UART)</b>	Up to 12Mbaud	Up to 3Mbaud	Up to 3Mbaud	Up to 1MByte/s				
<b>Configuration Data Storage</b>	Internal Flash	Internal Flash	External EEPROM	External EEPROM	External			
<b>EEPROM</b>	External EPROM	Internal EEPROM	Internal EEPROM					
<b>Clocking</b>	12MHz crystal	12MHz crystal	12MHz crystal	12MHz crystal	12MHz crystal	6MHz crystal	Internal <sup>4</sup>	Internal <sup>4</sup>
<b>Operating Temperature</b>	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
<b>Core Power Supply</b>	+3V3	+1V8 <sup>5</sup>	+1V8 <sup>5</sup>	+3V3	+3V3	+5V	+3V3 to +5V25 <sup>4</sup>	+3V3 to +5V25 <sup>4</sup>
<b>I/O Power Supply</b>	+3V3	+3V3	+3V3 <sup>6</sup>	+3V3	+3V3	+3V3 to +5V	+1V8V to +5V	+1V8 to +5V
<b>Packages</b>	48-pin LQFP	32/48/64-pin LQFP & QFN	48-pin LQFP & QFN	64-pin LQFP & QFN	64-pin LQFP & QFN	48-pin LQFP	32-pin QFN / 28-pin SSOP	32-pin QFN / 28-pin SSOP

<sup>1</sup> VNC2 supports ability to run user developed custom firmware. Firmware development supported via Vinculum-II Software toolchain.

<sup>2</sup> Vinculum devices support flexible IO configuration. VNC1L I/O configuration is set by available firmware image. VNC2 supports user configurable I/O settings through the on-chip I/O multiplexing feature.

<sup>3</sup> MPSSE - Multi-Protocol Synchronous Serial Engine, configurable serial controller for supporting SPI, I2C, JTAG & GPIO interfacing, supports speeds up to 30Mbps.

<sup>4</sup> Power supply range, using external crystal +3V3 to +5V25, using internal oscillator +4V to +5V25.

<sup>5</sup> Internally generated from +3V3 supply.

<sup>6</sup> Internal regulator.

<sup>7</sup> Serial/ Parallel synchronous interface.

<sup>8</sup> Low Speed (1.5 Mbit/s), Full Speed (12 Mbit/s) and Hi-speed (480 Mbit/s)



### Vinculum-II Development Modules

Vinculum-II (VNC2) is FTDI's 2nd generation, user programmable dual USB 2.0 Host/ Device Controller. The device features a powerful 16/32-bit wide (instruction/data) MCU core with 256kB Flash & 16kB RAM. UART, FIFO, SPI Slave, SPI Master and a PWM interface are supported.

Part Number	V2DIP1-32	V2DIP1-48	V2DIP1-64	V2DIP2-32	V2DIP2-48
<b>Description</b>	VNC2 Module with single SB connector	VNC2 Module with single USB connector	VNC2 Module with single USB connector	VNC2 Module with two USB connectors	VNC2 Module with two USB connectors
<b>FTDI Chip</b>	VNC2-32L	VNC2-48L	VNC2-64L	VNC2-32L	VNC2-48L
<b>Footprint</b>	24 pin x 0.6" wide x 0.1" pitch DIP	24 pin x 0.6" wide x 0.1" pitch DIP	60 pin x 0.8" wide x 0.1" pitch DIP	24 pin x 0.6" wide x 0.1" pitch DIP	40 pin x 0.6" wide x 0.1" pitch DIP
<b>Other connections</b>	1 type A USB socket. 6 way key 0.1" SIL Debug connector	1 type A USB socket. 6 way key 0.1" SIL Debug connector	1 type A USB socket 6 way key 0.1" SIL Debug connector	2 type A USB socket 6 way key 0.1" SIL Debug connector	2 type A USB socket 6 way key 0.1" SIL Debug connector
<b>USB speed</b>	12Mbit/s (FS)	12Mbit/s (FS)	12Mbit/s (FS)	12Mbit/s (FS)	12Mbit/s (FS)
<b>USB Host/Device</b>	Host/ Device	Host/ Device	Host/ Device	Host/ Device	Host/ Device
<b>Interfaces</b>	as per VNC2	as per VNC2	as per VNC2	as per VNC2	as per VNC2
<b>Supply voltages</b>	5V	5V	5V	5V	5V
<b>Temp range</b>	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
<b>Notes</b>	2nd VNC2 USB port available on DIP pins. Requires VNC2 Debug/ Programmer Module for IDE connection.	2nd VNC2 USB port available on DIP pins. Requires VNC2 Debug/ Programmer Module for IDE connection.	2nd VNC2 USB port available on DIP pins. Requires VNC2 Debug/ Programmer Module for IDE connection.	Requires VNC2 Debug/ Programmer Module for IDE connection.	Requires VNC2 Debug/ Programmer Module for IDE connection.

Part Number	V2DIP2-64	VNC2 DEBUG MODULE	VNCLO-MB1A	VNCLO-SHLD-1A	V2-EVAL
<b>Description</b>	VNC2 Module with two USB connectors	Vinculum-II Debug/ Programmer Module	Vinco Vinculum-II Development Platform	Prototyping shield PCB and components for VNCLO-MB1A	Complete VNC2 Evaluation & Development Kit
<b>FTDI Chip</b>	VNC2-64L	FT232R	VNC2-64L	—	Requires a daughtercard with VNC2.
<b>Footprint</b>	60 pin x 0.8" wide x 0.1" pitch DIP	12.8x28mm	Arduino-enhanced	Arduino-enhanced	—
<b>Other connections</b>	2 type A USB socket 6 way key 0.1" SIL Debug connector	1 type B Mini USB socket. 6 way key 0.1" SIL Debug connector	1 Mini-B USB socket 1 type A USB socket 46 0.1" pitch IO pins 6 way key 0.1" SIL Debug connector	3 LEDs, 2 switches (one reset), 3 resistors, 6 socket strips and prototyping area for PTH & SMT	2 Type A USB sockets 1 Type B USB Socket All IO available on pin headers
<b>USB speed</b>	12Mbit/s (FS)	12Mbit/s (FS)	12Mbit/s (FS)	—	12Mbit/s (FS)
<b>USB Host/Device</b>	Host/ Device	USB Device	Host/ Device	—	Host/ Device
<b>Interfaces</b>	as per VNC2	—	UART, SPI Master, SPI Slave, Parallel FIFO, ACD	—	UART, SPI Master, SPI Slave, Parallel FIFO
<b>Supply voltages</b>	5V	5V (bus powered)	9V/bus powered option (PSU optional)	—	5V/bus powered option (PSU supplied)
<b>Temp range</b>	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	— -40°C to +85°C	
<b>Notes</b>	Requires VNC2 Debug/ Programmer Module for IDE connection.	Provides interface to V2DIP/ Vinco modules for debug and programming.	Requires VNC2 Debug/ Programmer Module for IDE connection. Inspired by the Arduino form factor. Compatible with Arduino shields.	Inspired by the Arduino form factor and will mechanically fit to Arduino shields.	Fully integrated development module containing the debug port and prototyping area. Requires daughtercard: V2-EVALEXT32, V2-EVAL-EXT48, V2-EVALEXT64.

\* Free Toolchain (IDE) for firmware development • Free VNC2 drivers provided with IDE • Free sample code tutorials provided with IDE • VNC2 Interfaces are defined by user firmware

### FTDI - USB Host/ Device Interface Controllers

Part Number	VDIP1	VDIP2	VDRIVE2	VMUSIC2	VF2F2
<b>Description</b>	VNC1L Module with single USB connector	VNC1L Module with two USB connectors	VNC1L Flash Drive Module	VNC1L Audio Player Module	Disk to Disk Copier
<b>FTDI Chip</b>	VNC1L	VNC1L	VNC1L	VNC1L	VNC1L
<b>Footprint</b>	24 pin x 0.6" wide x 0.1" pitch DIP	40 pin x 0.6" wide x 0.1" pitch DIP	–	–	–
<b>Other connections</b>	1 Type A USB	2 Type A USB	1 Type A USB socket 8 way key 2mm SIL connector	1 Type A USB socket 3.5mm stereo audio jack 8 way key 2mm SIL connector	2 Type A USB socket
<b>USB speed</b>	12Mbit/s (FS)	12Mbit/s (FS)	12Mbit/s (FS)	12Mbit/s (FS)	12Mbit/s (FS)
<b>Interfaces</b>	UART, SPI Slave, ASYNC FIFO	UART, SPI Slave, ASYNC FIFO	UART, SPI Slave	UART, SPI Slave	UART, SPI Master, SPI Slave, Parallel FIFO
<b>Supply voltages</b>	5V	5V	5V	5V	5V
<b>Temp range</b>	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
<b>Notes</b>	Supplied with VDAP firmware pre-installed.	Supplied with VDAP firmware pre-installed.	Supplied with VDAP firmware pre-installed.	Supplied with VMSC firmware pre-installed.	Supplied with VF2F firmware pre-installed.






Part Number	V-EVAL (EU, JPN, UK, US)	VPROG- 1
<b>Description</b>	Complete VNC1L evaluation & development kit	Kit for programming VNC1L/VNC2-48L devices
<b>FTDI Chip</b>	VNC1L	FT232R
<b>Footprint</b>	–	–
<b>Other connections</b>	2 Type A USB sockets 1 Type B USB Socket All I/O available on pin headers	1 Mini-B USB connector to PC
<b>USB speed</b>	12Mbit/s (FS)	12Mbit/s (FS)
<b>Interfaces</b>	UART, SPI Slave, ASYNC FIFO	UART, SPI Slave, ASYNC FIFO
<b>Supply voltages</b>	5V/bus powered option PSU supplied	5V (bus powered)
<b>Temp range</b>	-40°C to +85°C	-40°C to +85°C
<b>Notes</b>	Fully integrated development module containing prototyping area.	Program VNC1L / VNC2-48L IC's before assembly. Daughtercards for IC's DIP modules sold separately.








We provide you with something in addition:

- free samples for your projects
- loyalty program with bonuses for OnLine Shop purchases
- direct meetings and consultations with representatives of components manufacturers
- emotional experiences through the unique marketing communication (interesting events, competitions, shows, SOS cinema, etc.)






### USB Converter Modules based on FTDI Hi-Speed ICs (480Mbit/s)

Part Number	UM232H	FT2232H MINI MODULE	FT4232H MINI MODULE	FT-MOD-4232HUB	MORPH-IC-II
<b>Description</b>	Single Channel USB 2.0 Hi-Speed Module	Dual Channel USB 2.0 Hi-Speed Module	Quad Channel USB 2.0 Hi-Speed Module	USB Hi-Speed FT4232H Serial/ Hub Module	USB 2.0 based FPGA Development Platform
					
<b>FTDI Chip</b>	FT232H	FT2232H	FT4232H	FT4232H	FT2232H
<b>Footprint</b>	28 pin x 0.6" wide x 0.1" pitch DIP	2 double row 0.1" pitch male connectors	2 double row 0.1" pitch male connectors	36 pin x 0.8" wide x 0.1" pitch DIP	2 double row 0.1" pitch male connectors
<b>Other connections</b>	1 mini-B USB connector	1 mini-B USB connector	1 mini-B USB connector	2 Type A USB sockets, 1 Type A USB plug	Type B USB Socket, JTAG 10 pin 0.1" header
<b>External ports</b>	1	2	4	1	VHDL Configured
<b>Interfaces</b>	UART, FIFO, MPSSE, FT1248	UART, FIFO, MPSSE	UART, MPSSE	UART, MPSSE	VHDL Configured
<b>I/O levels</b>	3V3	3V3	3V3	3V3	1V5/ 1V8/ 2V5/3V3
<b>Notes</b>	Bus powered or self powered	Bus powered or self powered	Bus powered or self powered	3 downstream USB ports, 2 MPSSE, 2 UART ports. Bus powered.	Supplied with VHDL reference designs, software samples & utilities. Temp range 0°C to +85°C

### USB Converter Modules based on FTDI Full Speed ICs (12MBit/s)

Part Number	UM232R	UM245R	MM232R	UB232R	FTDI USB-KEY
<b>Description</b>	FT232R USB to UART DIP Module	FT245R USB to FIFO DIP Module	FT232R USB to UART Miniature Module	USB Mini-B to UART Module	USB Security Access Dongle
					
<b>FTDI Chip</b>	FT232R	FT245R	FT232R	FT232R	FT232R
<b>Footprint</b>	24 pin x 0.6" wide x 0.1" pitch DIP	24 pin x 0.6" wide x 0.1" pitch DIP	16 pin x 0.1" pitch	8 pin x 0.1" pitch DIP	—
<b>Other connections</b>	1 Type B USB socket	1 Type B USB socket	1 Type B USB socket	1 Mini-B USB connector	1 Type A USB Plug
<b>No. of external ports</b>	1	1	1	1	—
<b>Interfaces</b>	UART	FIFO	UART	UART	—
<b>I/O levels</b>	1V8 to 5V	1V8 to 5V	1V8 to 5V	1V8 to 5V	5V (bus powered)
<b>Notes</b>	Bus powered or self powered	Bus powered or self powered	Bus powered or self powered	Bus powered or self powered	Uses FTDI Chip-ID

### Instant USB Application Modules

Part Number	DB9-USB-X	USB-COMXXX-PLUS1	USB-COMXXX-PLUS2	USB-COMXXX-PLUS4	EVAL232R
<b>Description</b>	Instant USB Adapter Retrofit Connector Module with integrated RS232	Single port USB to RS232/ RS422/RS485 Module - defined by XXX	2 Port USB to RS232/ RS422/ RS485 Module - defined by XXX	4 Port USB to RS232/ RS422/ RS485 Module - defined by XXX	USB to RS232 module
					
<b>FTDI Chip</b>	FT232R	FT232R	FT2232H	FT4232H	FT232R
<b>Serial Interfaces</b>	RS232	RS232 / RS422/ RS485	RS232 / RS422/ RS485	RS232 / RS422 / RS485	RS232
<b>Other connections</b>	1 Mini-B USB	1 Type B USB Socket, 1 DB9M	1 Mini-B USB, 2 DB9M	1 Mini-B USB, 4 DB9M	1 Type B USB, 1 DB9M
<b>USB speed</b>	12Mbit/s (FS)	12Mbit/s (FS)	480Mbits/s (HS)	480Mbits/s (HS)	12Mbit/s (FS)
<b>No. of external ports</b>	1	1	2	4	1
<b>Max Baud Rate</b>	1 Mbaud	1 / 3 / 3 Mbaud	3 / 10 / 10 Mbaud	3 / 10 / 10 Mbaud	1 Mbaud
<b>Power Supply</b>	5V (bus powered)	5V (bus powered), 55mA	5V (bus powered),60mA	5V (bus powered), 70mA	5V (bus powered)
<b>Notes</b>	PC-AT standard footprints X = DB9F = Female X = DB9M = Male	LEDs indicate Power, RX/TX activity	LEDs indicate Power, RX/TX activity	LEDs indicate Power, RX/TX activity	LEDs indicate RX/ TX activity. CBUS I/O available on header pins



### USB to Legacy RS232 Converter Cables

	Part Number	IO Levels	Max Baud Rate	RX/TX LED	Cable Length	Cable Termination	Temperature Range	Notes
<b>Premium USB to Legacy RS232 Converter</b> 	US232R-10	RS232	1 Mbaud	RX/TX LED	10cm	DB9	-20°C to +80°C	Retaining nut on DB9 connector.
	US232R-100				1m			
	US232R-500				5m			
<b>USB-Serial Converter</b> 	UT232R-200	RS232	1 Mbaud	-	2m	DB9	-20°C to +80°C	Retaining screw on DB9 connector.
	UT232R-500				5m			
<b>Economy USB to Serial Converter</b> 	UC232R-10	RS232	230 kBaud	-	10cm	DB9	-20°C to +80°C	With plastic enclosure.
	UC232R-10-NE				10cm			No plastic enclosure.

### USB to Legacy RS232 Converter Cables

	Part Number	IO Levels	Power Output PIN	Max Baud Rate	RX/TX LED	Cable Length	Cable Termination	Temperature Range	Notes
<b>RS232 Converter</b> 	USB-RS232-WE-1800-BT_0.0	RS232	0V	1 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	Option of transparent or black USB connector.  LEDs for visual indication of traffic on the cable.
	USB-RS232-WE-1800-BT_3.3		3V3			1.8m			
	USB-RS232-WE-1800-BT_5.0		5V			1.8m			
	USB-RS232-WE-5000-BT_0.0		0V			5m			
	USB-RS232-WE-5000-BT_3.3		3V3			5m			
	USB-RS232-WE-5000-BT_5.0		5V			5m			
<b>RS422 Converter</b> 	USB-RS422-WE-1800-BT	RS422	0V	3 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	Also available as PCB.
	USB-RS422-WE-5000-BT		5m						
<b>RS485 Converter</b> 	USB-RS485-WE-1800-BT	RS485	0V	3 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	
	USB-RS485-WE-5000-BT		5m						

### USB to TTL Serial Cables

	Part Number	IO Levels	Power Output PIN	Max Baud Rate	RX/TX LED	Cable Length	Cable End	Temperature Range	Notes		
<b>Type A USB to wire end TTL Serial</b> 	TTL-232RG-VREG1V8-WE	1V8	1V8@100mA	3 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	LEDs for visual indication of traffic on the cable. Transparent USB connector.		
	TTL-232RG-VREG3V3-WE	3V3	3V3@250mA								
	TTL-232RG-VSW3V3-WE	3V3	3V3@50mA								
	TTL-232RG-VSW5V-WE	5V	5V@450mA								
	TTL-232RG-VIP-WE	1V8 to 5V25'	V8 to 5V25'								
	TTL-232R-3V3-WE	3V3	5V@75mA							-	Available as PCB.
	TTL-232R-5V-WE	5V	5V@75mA								
<b>Type A USB to SIP Connector</b> 	TTL-232R-5V	5V	5V@75mA	3 Mbaud	-	1.8m	Single in line socket	-40°C to +85°C	0.1" pitch		
	TTL-232R-3V3	3V3	5V@75mA						2mm pitch, for VMUSIC2 & VDRIVE2		
	TTL-232R-3V3-2MM	3V3	5V@75mA								
<b>Type A USB to 3.5mm Audio Jack</b> 	TTL-232R-5V-AJ	5V	-	3 Mbaud	-	1.8m	Audio Jack	-40°C to +85°C	Tip - Tx, Ring - Rx, Sleeve Ground		
	TTL-232R-3V3-AJ	3V3									

\* All cables are powered from the host USB port, except TTL-232RG-VIP-WE • All cables use FTDI royalty free drivers - available on Windows, MAC, Linux, and WinCE • All cables FCC/CE approved • Custom cable options on request subject to MOQ/NRE

### FT-X series Chips

- Battery charger detection to enable higher current, faster charging.
- Extensive clocking features; internal clock generation and external clock out.
- Internal 3V3 level converter.
- Integrated crystal and MTP memory to save board space and maximize flexibility.

- Extended temperature range support, -40° to +85°C.
- Low power consumption:
  - 8mA active (typical)
  - 125uA suspend (typical)
- Input/ output voltage support, 1.8V to 3.3V, with 5V tolerance.

Device	FT200XD	FT201X	FT220X	FT221X	FT230X	FT231X	FT240X
<b>Description</b>	I <sup>2</sup> C slave to USB 2.0 Full Speed	I <sup>2</sup> C slave to USB 2.0 Full Speed	SPI/FT1248 (4-bits) to USB 2.0 Full Speed	SPI/FT1248 (8-bits) to USB2.0 Full Speed	Basic UART to USB 2.0 Full Speed	Full UART to USB 2.0 Full Speed	FIFO to USB 2.0 Full Speed
<b>Performance</b>	3.4 Mbits/sec	3.4 Mbits/sec	.5 MByte/sec	1 MByte/sec	3 Mbaud	3 Mbaud	1 Mbyte/sec
<b>CBUS Pins *</b>	1	6	1	1	4	4	2
<b>Clock Oscillator</b>	Internal	Internal	Internal	Internal	Internal	Internal	Internal
<b>EE/MTP Memory</b>	Internal	Internal	Internal	Internal	Internal	Internal	Internal
<b>Packages</b>	10-pin DFN	16-pin SSOP/ 16-pin QFN	16-pin SSOP/ 16-pin QFN	20-pin SSOP/ 20-pin QFN	16-pin SSOP/ 16-pin QFN	20-pin SSOP/ 20-pin QFN	24-pin SSOP/ 24-pin QFN

\* Configurable as GPIO, LED drivers, or clock signals

### Breakout Modules

Breakout modules, such as the USB to I2C, UMFT200XD, provide the simplest method to connect to a USB host, and interface directly into your system via the appropriate IO.



- 4 PCB traces slot directly into a USB Host (A Port)
- USB protocol engine and interface bridge integrated into FT-X Series silicon devices
- Interface connector provided for system integration
- Choice of module per interface required

Module	Interface
UMFT201XB	I2C
UMFT200XD	I2C
UMFT220XB	FT1248
UMFT230XB	UART

### UMFT231XC -Battery Charging Detection (BCD)

Development board provides for USB to UART bridge functionality as well as battery charging detection (BCD), and battery charging via LTC4053.



FT231X device supports BCD to simplify and optimize battery charging in portable systems.

- Detects Dedicated Charging Port (DCP) or Standard Downstream Port (SDP,) enabling selection of higher battery charging current, 1.8A or .5A.
- CBUS pins enable control of charging rate.
- Complete sleep and suspend capabilities.

### FT-X Series Support, Evaluation Modules

Evaluation modules are larger than breakout modules, and provide access to all pins.



- Manufactured in DIP form factor (0.3" wide).
- Easy to integrate into system boards for thorough prototyping, system emulation, and check-out.
- USB protocol engine and interface bridge integrated into FT-X Series silicon devices.
- Choice of module per interface required.

Module	Interface
UMFT201XA	FT1248 (4 bit)
UMFT220XA	I2C
UMFT221XA	Basic UART
UMFT231XA	FullUART
UMFT240XA	FIFO





ELNEC / Slovakia, founded in 1991, is Europe's leading provider of solutions for programming NAND Flash memories, microcontrollers and other programmable devices.

**ELNEC / Slovensko**, založen v r. 1991, je popřední Evropský poskytovatel řešení pro programování NAND Flash paměti, mikrokontrolerů a jiných programovatelných obvodů.

**ELNEC / Slowakei**, gegründet im Jahr 1991, ist ein führender europäischer Anbieter von Lösungen zur Programmierung von NAND Flash-Speichern, Mikrocontrollern und anderen programmierbaren Schaltkreisen.

Az 1991-ben alapított ELNEC, Európa vezető szolgáltatója a NAND Flash memóriák, mikrovezérlők és egyéb eszközök programozó megoldásainak terén.

**ELNEC / Słowacja**, założona w 1991 roku, jest wiodącym europejskim dostawcą rozwiązań w zakresie programowania pamięci NAND Flash, mikrokontrolerów oraz innych obwodów do programowania.

**ELNEC Slovacia**, fondata in 1991, este un lider european specializat in furnizarea de solutii pentru programarea memoriilor Flash NAND, a microcontrolerelor si a altor echipamente programabile.

**ELNEC / Slovenko**, založený v roku 1991, je popředný evropský poskytovatel řešení pre programovanie NAND Flash pamätí, mikrokontrolérov a iných programovatelných obvodov.

From the beginning the company was oriented towards development and production of tools for developers and electronics manufactures. Elnec is committed to set a new standard in the industry by providing highly universal, reliable and cost effective programming solutions for devices in any package, whether programmed in a socket or through ISP on a circuit board. Elnec provides solutions which cover customers' needs for device programming from the lowest to the highest in volume.

All Elnec Device Programmers use the same Software and Algorithms. All Elnec products are backed with a comprehensive Technical support (within next working day response guarantee) and life-time free Software updates. All Elnec Universal and Production Programmers are backed with worldwide unique 3-year warranty.

### Why ELNEC?

- Europe's leading provider for programming solutions
- top quality products, fast programming
- strong technical support

### Did You Know?

In some territories Elnec's products are sold also under ODM names B&K Precision (USA), Dataman (UK & USA), Minato (Japan) and Grifo (Italy).

### Elnec's Product Covers:

#### Production Programmers

(multi-site concurrent programmers designated for electronics manufacturers and programming centers)



#### Programming Adapters

(more than 800 models of universal, specialized and BGA adapters)



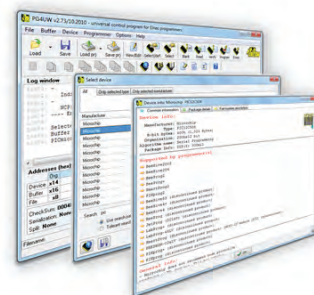
#### Universal Programmers

(single-site programmers designated for developers, small manufacturers, universities, chiptuning, etc.)



#### Software

There are available regular version and OnDemand versions of software. Regular version is issued normally every 3-4 weeks, OnDemand versions are released on demand - for hot new devices support and bugs fixes - often daily.



#### Specialized Programmers

(specialized single-site programmers designated for a wide variety of users, from hobbyists to professionals)





### BeeProg2

Extremely fast universal USB/LPT interfaced programmer

- 69485 supported devices from 297 manufacturers by 2.89 version of SW (10. May. 2012) - check current information at [www.elnec.com](http://www.elnec.com)
- extremely fast programming, one of the fastest programmers in this category. Programs 64-Mbit NOR Flash memory less than 9 seconds and 1Gbit NAND Flash less than 70 sec.
- 48-pins powerful pindrivers, no adapter required for any DIL devices
- ISP connector for in-circuit programming
- dual connection to PC: USB (up to 480 Mbit/s) or parallel (printer) port
- USB 2.0 (high speed, full speed) and 1.1 compatible interface
- alternatively high-speed IEEE 1284 (ECP/EPP) printer-port (LPT) interface
- comfortable and easy to use control program, work with all versions of MS Windows from Windows 2000 to Windows 7 64-bit
- unique quick reaction to customer's needs - software update can be ready within a day from request by OnDemand software
- Multiprogramming possible by attaching more programmers to one PC
- approved by CE laboratory to meet CE requirements
- warranty - 3 year



### BeeProg2C

Cost effective, extremely fast universal USB interfaced programmer

- 68403 supported devices from 294 manufacturers by 2.89 version of SW (10. May. 2012) - check current information at [www.elnec.com](http://www.elnec.com)
- extremely fast programming, one of the fastest programmers in this category. Programs 64-Mbit NOR Flash memory less than 9 seconds and 1Gbit NAND Flash less than 70 sec.
- 48-pins powerful pindrivers, no adapter required for any DIL devices
- ISP connector for in-circuit programming
- connection to PC: USB 2.0 (up to 480 Mbit/s, high speed/full speed) and 1.1 compatible interface
- after upgrade to BeeProg2, also high-speed IEEE 1284 (ECP/EPP) printer-port (LPT) interface is available
- comfortable and easy to use control program, work with all versions of MS Windows from Windows 2000 to Windows 7 64-bit
- unique quick reaction to customer's needs - software update can be ready within a day from request by OnDemand software
- Multiprogramming possible by attaching more programmers to one PC
- approved by CE laboratory to meet CE requirements
- warranty - 3 years



### SEEpog

Serial EEPROM programmer

- 8402 supported devices from 142 manufacturers by 2.89 version of SW (10. May. 2012)
- small and powerful portable programmer of all 8-pins serial EEPROMs
- supports interfaces IIC (24Cxx), Microwire (93Cxx), SPI (25Cxx)
- supports programming LV (3.3V) EEPROM
- comfortable and easy to use control program, work with all versions of MS Windows from Windows 2000 to Windows 7 64-bit
- free SW update, download from Internet
- approved by CE laboratory to meet CE requirements
- connection to PC - VIA PRINTER PORT ONLY
- power supply, cable and SW included



### SmartProg2

Universal, ISP capable programmer

- 29016 supported devices from 218 manufacturers by 2.89 version of SW (10. May. 2012) - check current information at [www.elnec.com](http://www.elnec.com)
- small, fast and powerful universal programmer
- DIL40 ZIF socket, devices in DIL package up to 40 pins are supported without adapters
- connector for in-circuit programming (ISP)
- connection to PC: USB port
- USB 2.0 full speed and USB 1.1 compatible
- comfortable and easy to use control program, work with all versions of MS Windows from Windows 2000 to Windows 7 64-bit
- free SW update, download from Internet
- power supply, cable and software included
- approved by CE laboratory to meet CE requirements
- warranty - 3 years



### MEMprog2

Universal memory programmer

- 13455 supported devices from 195 manufacturers by 2.89 version of SW (10. May. 2012) - check current information at [www.elnec.com](http://www.elnec.com)
- small, fast and powerful programmer of EPROM, EEPROM, Flash EPROM, NVRAM and serial EEPROM
- DIL40 ZIF socket, memories in DIL package up to 40 pins are supported without adapters
- connection to PC: USB port
- USB 2.0 full speed and USB 1.1 compatible
- upgradeable to SmartProg2 programmer.
- comfortable and easy to use control program, works with all versions of MS Windows from Windows 2000 to Windows 7 64-bit
- free SW update, download from Internet
- power supply, cable and software included
- approved by CE laboratory to meet CE requirements



We don't know words "it is not possible", together we surely will find a solution!





SENSIRION is a leading Swiss high-tech company with headquarters in Stäfa. Highly skilled team of more than 250 employees develops and produces high-quality sensor components and systems for a variety of OEM applications. Sensirion owes its success to its unique and innovative CMOSens® Technology (30 patents).

**SENSIRION** je přední švýcarská high-tech společnost, s centrálou ve městě Stäfa. Vysoce kvalifikovaný tým více než 250 zaměstnanců vyvíjí a vyrábí vysoce kvalitní senzory a systémy pro různé OEM aplikace. SENSIRION vděčí za úspěch své unikátní a inovativní technologii CMOSens® (30 patentů).

**SENSIRION** ist ein führendes Schweizer High-Tech-Unternehmen mit Sitz in der Stadt Stäfa. Hochqualifiziertes Team mit mehr als 250 Angestellten entwickelt und fertigt hochqualitative Sensoren und Systeme für verschiedene OEM-Anwendungen. Sensirion verdankt den Erfolg seiner einzigartigen und innovativen Technologie CMOSens® (30 Patente).

A SENSIRION vezetõ svájci high-tech cég, központja Stäfa városában található. Magasan képzett csapata több mint 250 alkalmazottból fejezti és gyártja a kiváló minőségű érzékelõket és rendszereket a különbözõ OEM alkalmazásokhoz. A Sensirion sikereit az egyedülálló és innovatív CMOSens® technológiának is köszönheti (30 szabadalom).

**SENSIRION** to wiodąca high-tech spółka szwajcarska, z centralą w mieście Stäfa. Wysoko wykwalifikowany zespół ponad 250 pracowników rozwija i produkuje wysokiej jakości czujniki i systemy dla różnych aplikacji OEM. Sensirion zawdzięcza swój sukces swej unikatowej i innowacyjnej technologii CMOSens® (30 patentów).

**SENSIRION** este o importantă companie elvețiană de înaltă tehnologie cu sediul în Stäfa. Echipa extrem de competentă cuprinzând peste 250 de angajați dezvoltă și produce componente și sisteme pentru senzori de înaltă calitate pentru o varietate de aplicații OEM. Sensirion își datorează succesul Tehnologiei sale unice și inovatoare CMOSens® (30 de brevete).

**SENSIRION** je vedúca švajčiarska high-tech spoločnosť s centrálou v meste Stäfa. Vysoce kvalifikovaný tím viac než 250 zamestnancov vyvíja a vyrába vysokokvalitné senzory a systémy pre rôzne OEM aplikácie. Sensirion vďačí za úspech svojej unikátnej a inovatívnej technológii CMOSens® (30 patentov).

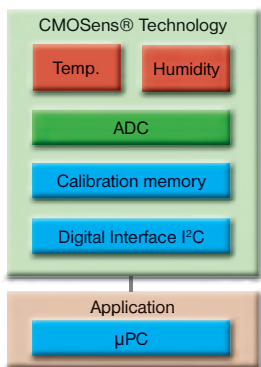
CMOSens® Technology integrates sensor elements and evaluation circuitry within a single semiconductor chip. In the highly competitive global market, this system integration into a single semiconductor chip offers unbeatable customer benefits, in particular its high reliability and precision at low cost. Competence of Sensirion as a reliable OEM partner is underlined by a strict quality approach and a professional quality managements system, which has been certified in accordance with the ISO 9001 and ISO/TS 16949 standards.

Measuring of temperature and humidity in 1 component saves production costs and enables a very precise measuring of a dew point.

### Why SENSIRION?

- excellent reliability and long term stability
- low power consumption and very small dimensions of the final solution
- humidity sensors are individually calibrated in a precision humidity chamber - no expensive and time demanding calibration

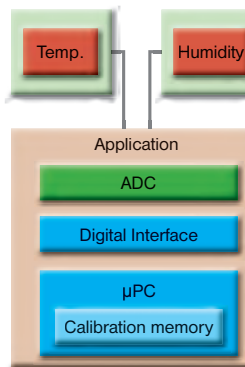
SENSIRION solution with integrated SHT sensor



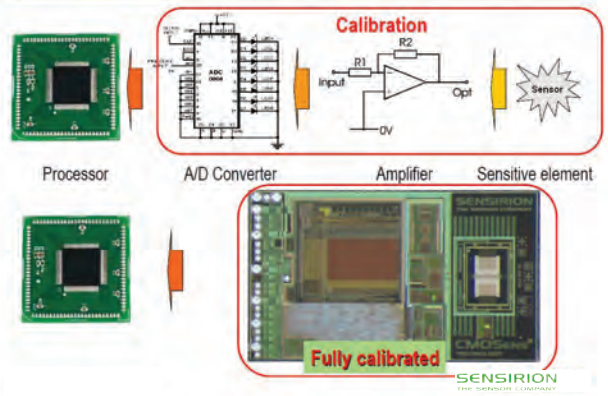
Total cost of application



Standard solution with discrete components



### Conventional vs. CMOSens® Technology



## Digital Humidity and Temperature Sensors

Sensirion's digital humidity and temperature sensors provide excellent performance over the full measurement ranges of 0 to 100% RH and -40 to 125°C. Typical accuracy limits of standard sensors are ±2% RH and ±0.3°C. Even better accuracy limits are possible with premium versions (SHTx5). In addition, the digital communication mode enables cutting-edge low power consumption. This makes the sensors the ideal choice for battery-powered devices.

Humidity Sensor	Packaging	Max. RH tolerance*	Max. T tolerance	Sensor Output
SHT10	SMD	±4.5%RH	±0.5°C	Digital Sbus
SHT11	SMD	±3%RH	±0.4°C	Digital Sbus
SHT15	SMD	±2%RH	±0.3°C	Digital Sbus
SHT21	DFN	±3%RH	±0.4°C	I2C, PWM, SDM
SHT25	DFN	±2%RH	±0.3°C	I2C
SHT71	Pins	±3%RH	±0.4°C	Digital Sbus
SHT75	Pins	±1.8%RH	±0.3°C	Digital Sbus

**Differential Pressure Sensors**

Sensirion's differential pressure sensors for air or non-corrosive gases allow ultra-low differential pressure measurements. Providing fast results, the sensors are drift-free and do not exhibit any position sensitivity. In addition, these digital and analog differential pressure sensors are unrivalled in size and reliability.

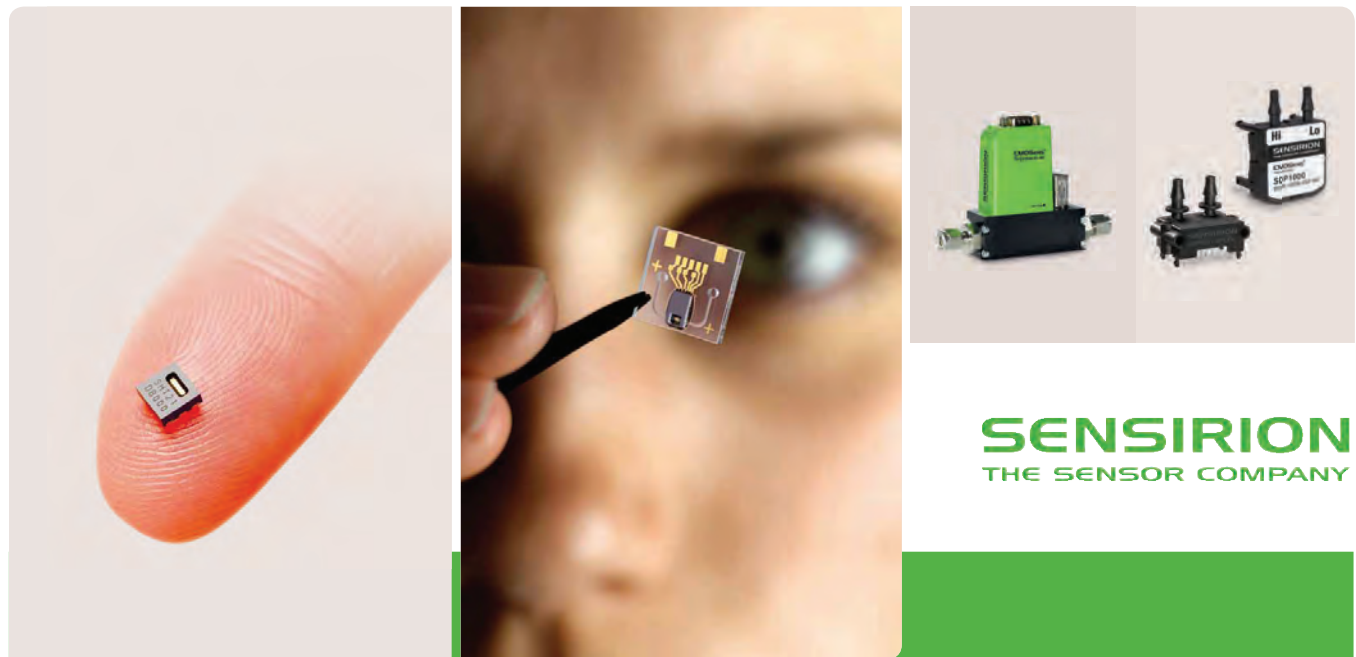
Thanks to their thermal flow-through operating principle, Sensirion's CMOSens® differential pressure sensors outperform traditional piezoresistive membrane sensors in terms of sensitivity at low differential pressure, offset drift and hysteresis.

	Output		Range			Performance		Features		
	interface	characteristics	pascal	inch water	bidirectional	accuracy	speed	for massflow	fail-safe certified	low power
<b>Digital Pressure Sensors:</b>										
SDP500/510		I²C	L	500 Pa	2"		+	+++		
SDP600/610-25Pa		I²C	L	25Pa	0.1"	x	++	+++		
SDP600/610-125Pa		I²C	L	125Pa	0.5"	x	++	+++		
SDP600/610-500Pa		I²C	L	500 Pa	2"	x	++	+++		
SDP601/611		I²C	L	500 Pa	2"	x	++	+++	x	
SDP606/616		I²C	L	500 Pa	2"	x	++	+++		x
SDP620/630		I²C	L	500 Pa	2"	x	++	+++		x
SDP621/631		I²C	L	500 Pa	2"	x	++	+++	x	x
ASP1400		RS-232	L	100 Pa	0.4"	x	+++	+		
<b>Analog Pressure Sensors:</b>										
SDP1000-L008		0..4V	L	20Pa	0.08"		+++	++		
SDP1000-L025		0..4V	L	62 Pa	0.25"	x	+++	++		
SDP1000-L05		0..4V	L	125 Pa	0.5"		+++	++		
SDP1000-L/-R		0..4V	L	500 Pa	2"		+++	++		
SDP1108-R		0..4V	R	500 Pa	2"		+++	+++		
SDP1108-MFA1		0..4V	R	500 Pa	2"		+++	+++	x	
SDP2108-R		0..4V	R	3500 Pa	14"		+++	+++		
SDP2000-L		0..4V	L	3500 Pa	14"		+++	++		


Discrete Semiconductor

Integrated Circuits


Semiconductor Sensors




**SENSIRION**  
THE SENSOR COMPANY



**Humidity Sensors (RH&T)**



**Liquid Flow Sensors**



**Mass Flow Meters & Controllers for Gases**



**Differential Pressure Sensors**





Founded in 1962, FIGARO Engineering using its innovative gas sensing technologies, globally provides cost-effective gas sensing solutions for a wide range of applications in the fields of home and personal safety, industrial safety, air quality control, HVAC, home appliances, and the automotive industry.

**FIGARO Engineering**, založena v r. 1962, poskytuje, používaním inovatívnych technológií k detekcii plynů, cenově efektivní řešení pro široké spektrum aplikací na poli domácí, osobní a průmyslové bezpečnosti, kvality ovzduší a automobilového průmyslu.

**FIGARO Engineering**, gegründet 1962, bietet durch Verwendung von innovativen Technologien zur Gasdetektion kosteneffiziente Lösungen für ein breites Spektrum von Anwendungen im Bereich der häuslichen, persönlichen und industriellen Sicherheit, der Luftqualität sowie in der Automobilindustrie.

**A FIGARO Engineering-et** 1962-ben alapították. Elérhető árú megoldásokat kínál innovatív technológia alkalmazásával a gázok érzékelésére és széles termékínálatlall rendelkezik az otthoni, személyes és ipari biztonságtechnikában, levegő minőség vizsgálatban és az autópárhban.

**FIGARO Engineering**, założona w r. 1962, oferuje, poprzez wykorzystanie innowacyjnej technologii detekcji gazu, cenowo wygodne rozwiązania dla szerokiej gamy aplikacji w dziedzinie bezpieczeństwa domowego, osobistego i przemysłowego, jakości powietrza i przemysłu motoryzacyjnego.

**Înființată în 1963**, FIGARO Engineering, utilizându-și tehnologiile inovative de detectare a gazului, furnizează la nivel mondial soluții rentabile de detectare a gazului pentru o paletă vastă de aplicații în domeniul siguranței personale, siguranței industriale, controlului calității aerului, HVAC, dispozitivelor domestice și industriei de automobile.

**FIGARO Engineering**, založená v r. 1962, poskytuje, používaním inovatívnych technológiu na detekciu plynu, cenovo efektívne riešenia pre široké spektrum aplikácií na poli domácej, osobnej a priemyselnej bezpečnosti, kvality vzduchu a v automobilovom priemysle.

Discrete Semiconductors / Integrated Circuits / Semiconductor Sensors

### Why FIGARO?

- pioneering company in the gas sensors development and production
- wide range of high quality sensors
- sensors available for all common gases

Figaro's advanced high-volume production facilities are ready to meet all your gas sensor needs. Popular applications of Figaro Gas Sensors include residential gas and carbon monoxide (CO) detectors, breath alcohol analyzers, carbon dioxide (CO2) monitoring and many other. Figaro sensors are able to detect all common kinds of gases like Alcohol, Ammonia, Carbon dioxide, Carbon monoxide, General air contaminants, Halocarbon gas, Hydrogen, Hydrogen sulfide, LP gas, Methane, Oxygen and Solvent vapors.

### Did You Know?

**Mr. Naoyoshi Taguchi** (former chairman of Figaro) became the first person in the world to succeed in the development of a semiconductor device which could detect low concentrations of combustible and reducing gases when used with a simple electrical circuit. His work was completed in 1968, and in October of 1968 he and his associates established mass production and started selling the TGS (Taguchi Gas Sensor).

### Application example

#### Domestic safety:

- Gas alarm
- CO alarm
- Gas boiler safety switch

#### Air quality control:

- Air purifier
- Air conditioner
- Ventilation control

#### Automotive:

- Cabin air quality
- Air purifier
- LPG alarm for RV
- Breath alcohol tester
- Gas driven car

#### Appliance control:

- Microwave oven
- Air purifier
- Cooker hood

#### Industrial health & safety:

- Combustible gas detector
- Toxic gas detector
- Refrigerant leak detector
- Oxygen monitor



## Gas Sensors

Target gas	Range	Model No.	Type	Typical application
Alcohol	0 - 1,000ppm	TGS 3820	S	Personal alcohol checkers
Alcohol & solvent vapors	0 - 5,000ppm	TGS 2620	S	Alcohol & solvent vapor detectors
Ammonia	0 - 300ppm	TGS 826	S	Refrigerant leak detectors
Carbon dioxide	0 - 100ppm	TGS 2444	S	Refrigerant leak detectors, ventilation control for agricultural & poultry industries
	0 - 50,000ppm	TGS 4160	E(S)	Air quality control in buildings, homes & the agricultural industry
Carbon monoxide	0 - 10,000ppm	TGS 4161	E(S)	Air quality control in buildings, homes & the agricultural industry
	0 - 1,000ppm	TGS 2442	S	Gas alarms for homes
Dissolved oxygen	0 - 1,000ppm	TGS 5042	E(L)	Gas alarms for homes, recreational vehicles, boats, gas boilers, parking garages
	0 - 80ppm	KDS-25B	E(L)	Dissolved oxygen monitors
Gasoline & diesel exhaust	0 - 1,000ppm CO + 0-10ppm NO <sub>2</sub>	TGS 2201	S	Automobile ventilation control
General air contaminants	0 - 30ppm	TGS 2600	S	Indoor air quality control
	0 - 30ppm	TGS 2602	S	Indoor air quality control
Halocarbon gas	0 - 3,000ppm	TGS 832	S	Refrigerant leak detectors
	0 - 3,000ppm	TGS 2630	S	Refrigerant leak detectors
Hydrogen	0 - 1,000ppm	TGS 821	S	Hydrogen leak detectors
Hydrogen, Methane & LP	0 - 100%LEL	TGS 6812	C	Hydrogen & combustible gas leak detectors for fuel cells
Hydrogen sulfide	0 - 100ppm	TGS 825	S	Industrial gas detectors
LP gas	0 - 20%LEL	TGS 2610	S	Gas alarms for homes, recreational vehicles, boats, gas boilers
Methane	0 - 20%LEL	TGS 2611	S	Gas alarms for homes, recreational vehicles, boats, gas boilers
Methane & CO	0 - 25%LEL CH <sub>4</sub> + 0-1,000ppm CO	TGS 3870	S	Gas alarms for homes, gas boilers
Methane & LP	0 - 20%LEL	TGS 2612	S	Gas alarms for homes, recreational vehicles, boats, gas boilers
	0 - 100%LEL	TGS 6810	C	Gas alarms for homes, recreational vehicles, boats, gas boilers
	0 - 100%LEL	TGS 6811	C	Industrial gas detectors
Oxygen	0 - 30%	SK-25	E(L)	Oxygen monitors
	0 - 100%	KE-25	E(L)	Oxygen monitors
	0 - 100%	KE-50	E(L)	Oxygen monitors
Water vapor	0 - 150g/m <sup>3</sup>	TGS 2180	S	Microwave oven

Do you want to gain a free sample of any component?

Let us know about your project at [marketing@soselectronic.com](mailto:marketing@soselectronic.com) and we will with pleasure help you with a choice and evaluation of components!

Many of our customers saved a lot of time and costs in developing with our technical support.

Together we find the most effective solution for designing of your application.







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# Optoelectronics and Electroacoustics

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**Optocouplers, also called as opto-isolators, consist of a light source (usually an LED) and a light sensitive component in one common package. They provide a possibility to transfer electrical signals by utilizing light to provide coupling with electrical (galvanic) isolation between its input and output. Optical sensors are in general all light-sensitive electronic components.**

**Optočleny** sestávajú z zdroja svetla (obvykle LED) a svetlolicitlivého komponentu v jednom spoločnom púzde. Poskytujú možnosť prenášať elektrické signály s elektrickým (galvanickým) oddelením medzi vstupom a výstupom. Optické senzory sú obecně všechny světlocitlivé elektronické součástky.

**Optokoppler**, genannt auch Optoisolator, bestehen aus einer Lichtquelle (gewöhnlich LED) und einer lichtempfindlichen Komponente, die in einem gemeinsamen Gehäuse untergebracht sind. Sie bieten die Möglichkeit der Übertragung von elektrischen Signalen unter Nutzung des Lichts, um eine Kopplung bei galvanisch getrennten Ein- und Ausgängen zu erzielen. Optische Sensoren sind im Allgemeinen alle lichtempfindlichen elektronischen Komponenten.

Az optocsatlók, vagy más néven optoleválasztók egy fényforrásból (általában LED) és egy fényérzékeny alkatrészből állnak egyetlen tokzásban. Az elektromos jelek átvitelét biztosítja a fény segítségével a bemenet és a kimenet között. Általánosságban minden fényérzékeny elektronikus alkatrész lehet optikai érzékelő.

**Transoptory**, nazywane też optoizolatorami, składają się ze źródła światła (zazwyczaj LED) i elementu światłoczułego w jednej wspólnej obudowie. Umożliwiają przeniesienie sygnałów elektrycznych, wykorzystując do połączenia światło, z oddzieleniem elektrycznym (galwanicznym) między wejściem a wyjściem. Czujniki optyczne to generalnie wszystkie światłoczułe części elektroniczne.

**Optocuploarele**, denumite și opto-izolatoare, constau dintr-o sursă de lumină (de obicei un LED) și o componentă sensibilă la lumină într-un pachet comun. Acestea oferă posibilitatea de a transfera semnale electrice prin utilizarea luminii, ca să asigure cuplarea cu izolația electrică (galvanică) dintre intrarea și ieșirea ei. Senzorii optici sunt în general toți componente electronice sensibile la lumină.

**Optočleny**, nazývané tiež optoizolátory, pozostávajú zo zdroja svetla (obyčajne LED) a svetlolicitlivého komponentu v jednom spoločnom púzde. Poskytujú možnosť prenášať elektrické signály využívajúc na prepojenie svetlo, s elektrickým (galvanickým) oddelením medzi vstupom a výstupom. Optické senzory sú vo všeobecnosti všetky svetlolicitlivé elektronické súčiastky.

The main purpose of an opto-isolator is to easily couple two electronic circuits with a high difference of voltages or where even a small difference in potentials would cause a problem. Another reason of using optocouplers is to reach a much higher safety and reliability of a circuitry on the input side, thanks to a galvanic isolation input/output. As a result, when using optocouplers, input and output circuit has no common ground neither other interconnection. Typical insulation strength of small optocouplers is few kVolts, what makes them suitable for use in the most of common power line electronic devices.

Optical sensors are another group of components serving as a general light sensors, but more often for example as receivers in infrared data communication, motion detectors and other applications.

### Classification

Both these groups have several subgroups, often with similar or even common features. The same component can sometimes be used for several purposes, for example a phototransistor can serve as a general light sensor and also as an infrared communication receiver. In this category you can find photoresistors, PIN photodiodes, phototransistors, IR LEDs, IR receivers and transceivers with demodulators, optocouplers with transistor output, optotriacs and other. A term "sensor" is also used to a component with a LED and a phototransistor assembled so, that they are sensitive to a close mechanical object (reflexive types) or to an object inserted into a trace of light (slotted types).

### Terms

#### CTR

- current transfer ratio of an optocoupler. It represents a ratio of an output current to an input current. An important parameter when using optocouplers in very low power consumption devices, or on places where an optocoupler has to transfer linear signals.

#### Optocoupler with a transistor output

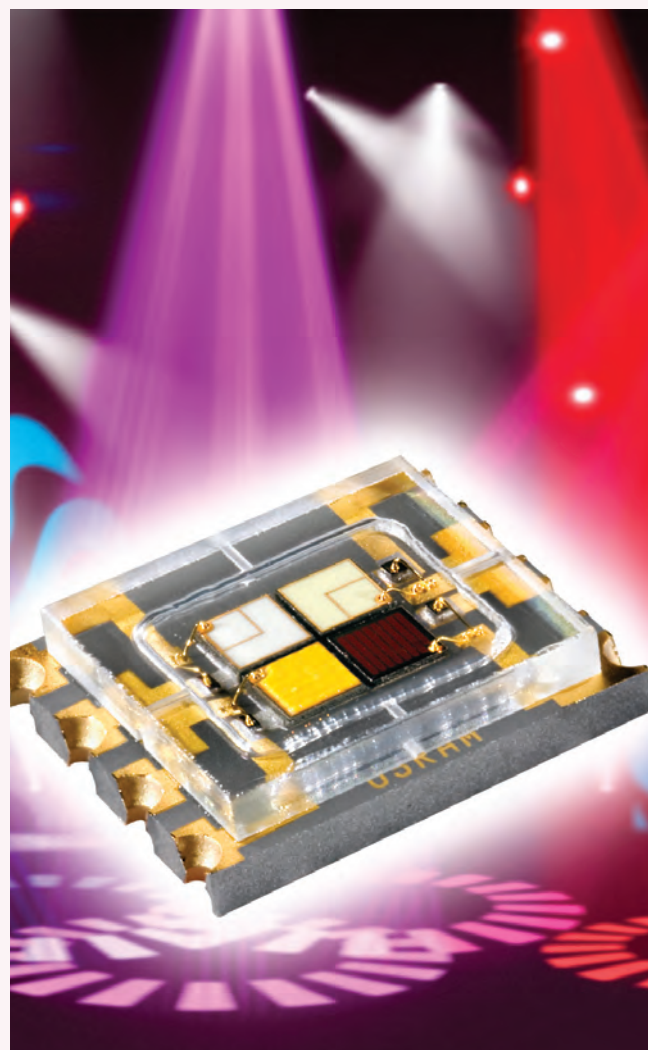
- most often used type of an optocoupler containing an LED and a transistor. Thanks to its configuration it can be used in a very wide variety of designs.

#### Optotriac

- an optocoupler consisting of an LED and a triac. It can be conveniently used to switch more powerful AC components, like for example a relay with an AC coil. In general, optotriac is the most simple kind of an SSR.

#### SSR

- solid state relay. A semiconductor relay with a MOSFET or a triac on the output side. According to a type, they can be used to switch DC or AC currents.



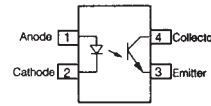
Brief Overview of Our Range

Optocouplers with Transistor Output

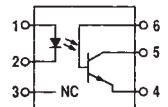
Type	Ch.	CTR[%]	I <sub>F</sub> [mA]	I <sub>CEO</sub> [V]	U <sub>ISOL</sub> [V]	Package	Img.	Note
4 N 35	1	100	60	30	2500	DIP6	2	
CNY 17/III	1	100-200	90	70	5300	DIP6	2	
PC 817 XJ0000F	1	50-600	50	35	5000	DIP4	1	
PC 357 N3T	1	200-400	50	35	3750	MFP4	1	
SFH 615A-3	1	100-200	60	70	5300	DIP4	1	
TLP 598 GA	1	-	50	400	2500	DIP6	3	FET output
TLP 621	1	50-600	60	55	5000	DIP4	1	

CTR - Transfer Ratio  
I<sub>F</sub> - Average Forward Current

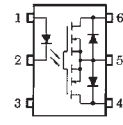
U<sub>CEO</sub> - Collector-Emitter Voltage  
U<sub>ISOL</sub> - Isolation Voltage input/output



Img.1



Img.2



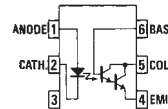
Img.3

Optocouplers with Darlington Output

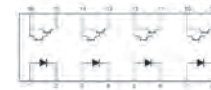
Type	Ch.	CTR[%]	I <sub>F</sub> [mA]	U <sub>CEO</sub> [V]	t <sub>on/off</sub> [usV]	U <sub>ISOL</sub> [V]	Img.
4 N 33	1	500	80	30	5/100	2500	DIP6 5
LTV 815	1	1600	50	35	60	5000	DIP4 7
LTV 845	4	1600	50	35	60	5000	DIP16 6
PC 355NTJ000F	1	600-7500	50	35	60	3750	MFP4 7

CTR - Transfer Ratio  
I<sub>F</sub> - Average Forward Current

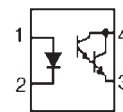
U<sub>CEO</sub> - Collector-Emitter Voltage  
U<sub>ISOL</sub> - Isolation Voltage input/output



Img.5



Img.6



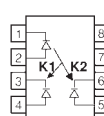
Img.7

Linear Optocouplers

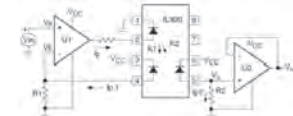
A unique optocoupler using two separate isolated photodiodes with matched characteristics, one of which is used as a feedback element. The combination of the linear photodiodes and the feedback concept enables construction of simple but accurate linear isolating circuits. Applications include switch mode power supply feedback and isolation of process control transducers. IL 300 has transfer gain (K3) of between 0,56 (min.) and 1,56 (max.).

Type	Freq. resp.	Non-linearity	I <sub>F</sub> [mA]	tr[us]	U <sub>ISOL</sub> [V]	Pack.	Img.
HCPL 7840-000E	100kHz	< 0,004%	-	2-10	3750	DIP8	9
IL 300	200kHz	< 0,01%	60	1,75	5300	DIP8	10,11

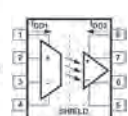
Also available many other types, incl. MosFET / IGBT drivers like PVI1050N and other.



Img.9



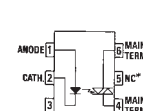
Img.10 Application circuit



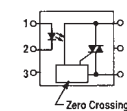
Img.11

Optotriacs

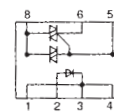
Type	U <sub>OUT</sub> [V]	I <sub>OUT</sub> [mA]	I <sub>FT</sub> [mA]	Rate [V/us]	Zero switch.	U <sub>ISOL</sub> [V]	Pack.	Img.
MOC 3020	400	1000	30	100	-	5300	DIP6	12
MOC 3041	400	1000	15	2000	+	7500	DIP6	13
MOC 3051	600	1000	15	2000	-	7500	DIP6	12
MOC 3081	800	1000	15	1500	+	7500	DIP6	13
MOC 3083	800	1000	5	1500	+	7500	DIP6	13
PR 36 MF 12 NSZF	600	600	10	100	-	4000	DIP8	14
PR 36 MF 22 NSZ	600	600	10	100	+	4000	DIP8	15



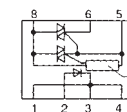
Img.12



Img.13



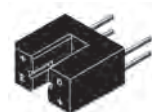
Img.14



Img.15

Optical Sensors

TCST 1103



CNY 70



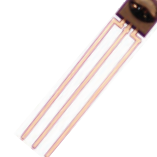
LTH 209



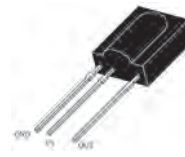
Type	Description
TCST 1103	Optical sensor, I <sub>F</sub> =60mA, U <sub>ce0</sub> =70V
CNY 70	Reflective optical sensor, I <sub>F</sub> =50mA, U <sub>ce0</sub> =32V
LTH 209-01	Reflective optical sensor, I <sub>F</sub> =60mA, U <sub>ce0</sub> =30V

IR Receivers / Transmitters

SFH 5110



TSOP 1736



TFDU 4100





Type	Description
SFH 5110-36	IR receiver+demodul., 950nm, 36kHz, TTL out
SFH 5110-38	IR receiver + demodulator 38kHz
TSOP 1736	IR receiver+demodul., 36 kHz, TTL output
TFDU 4100	Hybrid IR Transceiver 115,2kBd


High power solid state relays can be found in chapter Relays.





A light-emitting diode is a semiconductor light source deploying the effect called electroluminescence. Introduced as a practical electronic component in 1962, early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.


 Světlo emitující dioda je polovodičový zdroj světla, využívající efekt zvaný elektroluminiscenční. Jako prakticky použitelné elektronické komponenty byly uvedeny v r. 1962. První LED emitovaly červené světlo nízké intenzity, v současnosti jsou vysoce svítivé, dostupné pro celé viditelné spektrum, jakož i UV a infračervené vlnové délky.

 Eine Leuchtdiode ist eine Halbleiter-Lichtquelle, die den Effekt der sog. Elektrolumineszenz nutzt. Als eine praktisch anwendbare elektronische Komponente wurden sie 1962 eingeführt. Die ersten LEDs emittierten Rotlicht von geringer Intensität, die modernen Versionen zeichnen sich jedoch durch eine hohe Helligkeit aus und sind für das ganze sichtbare Spektrum sowie UV- und Infrarot-Wellenlängen erhaltlich.

 A fényemittáló dióda egy félvezető fényforrás, mely az elektrolumineszcenciát használja ki. Az első gyakorlatban is használható elektronikai alkatrészt 1962-ben mutatták be. A korai LED-ek alacsony intenzitású piros fényt bocsátottak ki, a mai modern változataik viszont már rendkívül magas fényerővel elérhetőek a teljes látható, ultraibolya és infravörös tartományokban is.

 Dioda emitująca światło to półprzewodnikowe źródło światła, wykorzystujące efekt nazwany elektroluminescencją. Jako element elektroniczny do zastosowania praktycznego, zostały zaprezentowane w roku 1962. Pierwsze LED emitowały światło czerwone o niskim natężeniu, jednak współczesne wersje są wysoko świecące, dostępne w całym spektrum widzialnym, jak również dla długości fal UV i dla podczerwieni.

 O diodă emițătoare de lumină este o sursă de lumină semiconductoră, producând efectul denumit electroluminiscență. Introduse ca o componentă electronică practică în 1962, primele LED-uri emiteau o lumină roșie de intensitate slabă, dar versiunile moderne sunt disponibile pe lungimi de undă vizibile, ultraviolete și infraroșii, cu o luminanță foarte puternică.

 Svetlo emitujúca dióda je polovodičový zdroj svetla využívajúci efekt zvaný elektroluminiscencia. Ako prakticky použiteľný elektronický komponent, boli uvedené v r. 1962. Prvé LED emitovali červené svetlo nízkej intenzity, ale moderné verzie sú vysoko svietivé, dostupné pre celé viditeľné spectrum, ako aj UV a infračervené vlnové dĺžky.

LEDs are often small in area (less than 1 mm<sup>2</sup>), and integrated optical components may be used to shape its radiation pattern. LEDs are for a long period used as indicator lamps in many devices and still more used for lighting purposes, mainly because of their high efficiency and very long lifetime, estimated to at least 35000-50000 hrs. A big advantage over CFL (compact fluorescent light) sources is, that LEDs are very easily dimmable and feature virtually immediate switching. Though, in presence, efficiency of LEDs is slightly lower than that of CFLs, usable light output of both sources is practically the same or even better at LEDs, because of better utilization of luminous flux.

LEDs are still more used in applications like general lighting, automotive lighting, advertising, traffic signals, displays backlight. LEDs have allowed new text/ video displays, and sensors to be developed, while their high switching rates are also useful in communications technology. Infrared LEDs are also used in the remote control units of many commercial products.

There are many integrated circuits with an output suitable for direct driving of LED displays. This fact makes LED displays a very easy to use versatile component. LED displays in general aren't suitable for usage in direct sunlight conditions, where their legibility is usually too low.

### Classification

LEDs can be divided into two main categories - LEDs for indication (illumination, colour backlight etc.) and white LEDs for lighting purposes. There are naturally many other criteria like shape and size (dimensions), power and luminous flux, colour of emitted light, mounting technology (SMT or through hole). In the LED production range we can also find infrared, as well as ultraviolet LEDs. When your application is intended only for indoor use, you usually don't necessarily need to use types with the highest luminosity. It is also advisable to observe a minimum recommended current of a LED (if specified) - some types shouldn't be operated at very low currents, due to spectral properties not meeting specifications. If deeper dimming is necessary, it is better to operate LED in a pulse mode with a minimum recommended current (or higher), reaching a lower luminous flux thanks to a lower duty cycle.

### LED Displays

There are 3 main types of LED displays - 7 segment, alphanumerical and matrix. 7-segment types are the most common types in a shape of 1 digit. 7-segment types are also ideal for long digit string multiplexing, saving a driving bus width. Alphanumerical displays usually have 14 or 16 segments arranged in a form providing possibility to create any usual alphabetical character or a number. Matrix LEDs, as already a name says, have a grid of LED segments (circles or squares) arranged in a form of a matrix, enabling to display even some simple graphical symbols.



### Terms

#### Dominant Wavelength

- wavelength at which a LED has maximum luminous flux, i.e. this parameter describes colour of emitted light.

#### Colour Temperature

- a characteristic of visible light. Color temperature is conventionally stated in the units of absolute temperature, the kelvins (K), and is only applicable at white LEDs. It is very important in applications like lighting, photography, publishing, manufacturing. Commonly used terms are warm-white (approx. 2500K), neutral-white (3500K) and cold-white (above 4500K).

#### CRI

- colour rendition index, is a quantitative measure of the ability of a light source to reproduce the colors of various objects faithfully in comparison with an ideal or natural light source. Light sources with a high CRI are desirable in color-critical applications such as photography and cinematography, shops lighting. Values range from 0 to 100.

#### Viewing Angle

- typically defined as the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.

#### Forward Voltage

- voltage drop on a LED when driven with a specified current. Values usually range are from 1.8 to 3.7V per chip, depending on a LED type.

#### Binning

- sorting of LEDs according to luminous intensity, nominal voltage, color temperature and other parameters.



KINGBRIGHT is a worldwide leading manufacturer of LED for over 30 years. Kingbright has been supplying a large number of well-known clients all over the world with high quality LED products, technical innovations and support. Kingbright's production facilities are equipped with the cutting edge manufacturing equipment offering a high production capacity.

**CZ** KINGBRIGHT je předním výrobcem LED již přes 30 let. Kingbright dodává kvalitní LED produkty, technické inovace a podporu velkému počtu známých výrobců. Výrobní linky společnosti Kingbright disponují špičkovým vybavením a nabízejí vysokou produkční kapacitu.

**DE** KINGBRIGHT ist bereits seit über 30 Jahren führender Hersteller von LEDs. Kingbright beliefert mit seinen LED-Produkten, technischen Innovationen und Support eine Vielzahl namhafter Hersteller. Die Produktionsanlagen des Unternehmens Kingbright sind spitzennmäßig ausgestattet und bieten eine hohe Produktionskapazität an.

**HU** A KINGBRIGHT már több mint 30 éve jeleskedik a LED gyártásban. A Kingbright jó minőségű LED termékeket, technológiai újításokat és támogatást nyújt számos neves gyártónak. Gyártószorai kitűnnek csúcsmínőségű felszereltségükkel és hatalmas termelőkapacitást biztosítanak.

**PL** KINGBRIGHT to wiodący producent LED już od ponad 30 lat. Kingbright dostarcza swoje jakościowe produkty LED, innowacje i wsparcie techniczne wielkiej ilości znanych producentów. Linie produkcyjne Kingbright dysponują najwyższej klasy wyposażeniem i dysponują wysoką wydajnością produkcyjną.

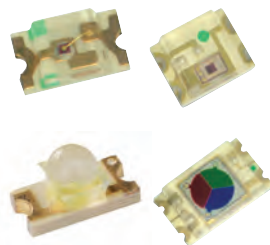
**RO** KINGBRIGHT este un producător global de LED-uri de peste 30 de ani. Kingbright a oferit unui număr mare de clienți renumiți din toată lumea produse LED de o înaltă calitate, inovații tehnice și servicii de asistență. Utilitățile de producție ale Kingbright sunt dotate cu echipamente de producție de ultimă generație furnizând un randament de fabricație ridicat.

**SK** KINGBRIGHT je vedúci výrobca LED už vyše 30 rokov. Kingbright dodáva svoje kvalitné LED produkty, technické inovácie a podporu veľkému počtu známých výrobcov. Výrobné linky spoločnosti Kingbright disponujú špičkovým vybavením a ponúkajú vysokú produkčnú kapacitu.

Experience and production capacity enables the company to offer short leadtimes even on high volume requirements and bespoke customer developments. All Kingbright products are RoHS Compliant and made in accordance with current quality and environmental guidelines.

## Why KINGBRIGHT?

- a worldwide leading manufacturer of LED for over 30 years
- well proven reliable LEDs for industrial applications
- extensive line of LEDs in all kinds of packages



### SMD LEDs

- Different packages (0402, 0603, 0805, 1206, SOT23, PLCC2,4, Xpower(10x10mm), TopLED and other with height 0,65mm to 1,9mm)
- Different emitted colours (red, orange, yellow, green, blue)
- Special types (with lens, side emitted, double and multicolour LED, IR emitters And phototransistors , ultra slim types)



### High Power and SuperFlux LEDs

- High power and high brightness LEDs
- LED modules and LED strips
- SuperFlux LEDs for automotive industry
- LED bulbs and clusters
- Different colours and RGB



### Standard LEDs

- Standard PCB mounting LEDs incl. blue, white and RGB LEDs
- Different diameter and shapes (round, oval, flat top, cylindrical, rectangular, squar, big LED, super LED, Bi-Color & Bi-Polar LED, Full Color LED, blinking LED, low current LED, resistor LED, Subminiature Solid State LED
- IR emitters and phototransistors
- Low consumption LED
- High power LED, HiFlux LED
- Series with high precision luminous intensity



### Accessories

- Light guides
- Holders
- Sockets



Optocouplers and Optosensors  
LED Diodes and Displays  
LCD, TFT, OLED Displays and Modules  
Electroacoustic Components

### Top-Emitting PLCC SMD LED

**KA-2214**  
2.2mm x 1.4mm



**KA-3021**  
3.0mm x 2.0mm (1208)



**KA-3022-4.5SF**  
3.0mm x 2.2mm



**KA-3528**  
3.5mm x 2.8mm



### Top-Emitting Chip SMD LED

**KPHHS-1005**  
0402



**KP-1608**  
0603



**KPT-1608**  
0603 Super Thin



**KPTD-1608**  
0603



**KP-2012**  
0805



**KPT-2012**  
0805



**KPTC-2012**  
0805



**KPHCM-2012**  
0805



**KP-23-F**  
3.0mm x 2.4mm



**KPL-3015**  
1106



**KP-3216**  
1206



**KPT-3216**  
1206 Super Thin



**KPC-3216**  
1206



**KPTL-3216**  
1206



**KPTD-3216**  
1206 Dome Lens



**KPD-3224**  
3.2mm x 2.4mm



**KPED-3528**  
3.5mm x 2.8mm



**KPED-3820**  
3.5mm x 2.8mm



### Right Angle SMD LED

**KPA-1606**  
0602



**KPA-2106**  
0802



**KPJA-2107**  
0802



**KPA-3010**  
1104



**KPA-3210**  
1304



**KA-2810A**  
2.8mm x 0.8mm



**KA-4008**  
4.0mm x 0.8mm



**KA-4040**  
4.0mm x 4.0mm



### Multi-Color SMD LED

**KPTB-1612**  
0605



**KPTB-1615**  
2.0mm x 1.25mm



**KPHBM-2012**  
2.0mm x 1.25mm



**KPBVA-3010**  
1104



**KM-23ESG**  
SOT-23



**KP-23xxx**  
3.0mm x 2.4mm



**KPB-3025**  
1109



**KPBL-3025**  
1109



**KPBD-3224**  
3.2mm x 2.4mm



**KA-2735**  
2.7mm x 3.5mm



**AAA-3528**  
3.5mm x 2.8mm



**KA AF-5060**  
5.0mm x 6.0mm



### Subminiature SMD LED

**KM2520xxx03**  
2.5mm x 2mm



**KM2520xxx08**  
2.5mm x 2mm



**KM2520xxx09**  
2.5mm x 2mm



**KM-27-03**  
2.21mm x 2.21mm



**KM-27-09**  
2.21mm x 2.21mm



### Reverse Mount SMD LED

**KPTR-3216**  
1206



### SOT-23 SMD LED

**KM-23-F**  
SOT-23



### Subminiature LED

**KM2520xxx01**  
1.9mm Round





#### Oval LED

L-5603  
5.2mm



#### Round LED

L-2060  
1.8mm



L-1154  
T-1 (3mm)



L-132X  
T-1 (3mm)



L-7104  
1.8mm



L-174X  
3.2mm



L-174A2  
3.2mm



L-7113  
T-1 5mm



L-1503  
T-1 5mm



L-2060  
1.8mm



L-1154  
T-1 (3mm)



L-132X  
T-1 (3mm)



L-793  
8mm



L-813  
10mm



DLx/6  
20mm



#### Flat Top LED

L-1394  
2mm



L-1394  
2mm



L-1034  
2mm



L-13  
2mm



#### Rectangular LED

L-2774  
1.75mm x 3.9mm



L-292X  
1.9mm x 3.1mm



L-144  
1.9mm x 3.9mm



L-2914  
2mm x 3mm



L-914  
2mm x 3mm



L-91A7  
2mm x 3mm



L-169X  
2mm x 3mm



L-103  
2mm x 5mm



L-113  
2mm x 5mm



L-383  
2.5mm x 5mm



L-1553  
5mm x 5mm



#### Multi-Color LED

L-937  
T-1 (3mm)



L-115V  
T-1 (3mm)



L-115W  
T-1 (3mm)



L-3V  
T-1 (3mm)



L-7113SRSG  
T-1 3/4 (5mm)



L-57  
T-1 3/4 (5mm)



L-59  
T-1 3/4 (5mm)



L-154A4  
T-1 3/4 (5mm)



L-119  
2mm x 5mm



L-483SRSG  
T-1 3/4 (5mm)



#### Super Flux LED

L-7676C  
7.6mm x 7.6mm



L-76765C  
7.6mm x 7.6mm



L-7679C1  
7.62mm x 7.62mm



#### Cylindrical LED

L-424  
T-1 (3mm)



L-483  
T-1 3/4 (5mm)

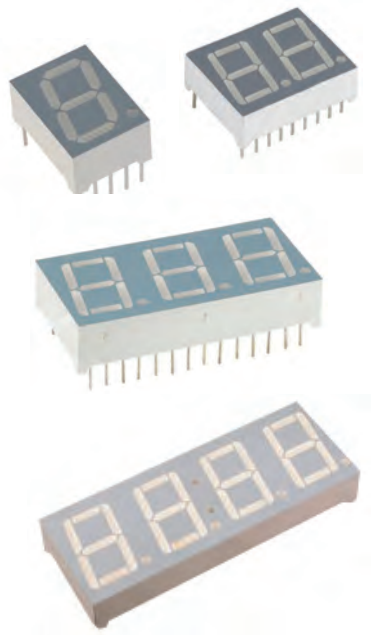


#### Soldering Instructions

Types	DIP SOLDERING / * WAVE SOLDERING			IRON SOLDERING (WITH 1.5mm IRON TIP)		
	Temperature of the soldering bath	Maximum soldering time	Distance from solder joint to package	Temperature of soldering iron	Maximum soldering time	Distance from solder joint to package
LEDS	<=260°C	3s	>=2mm	<=350°C	3s	>2mm
	<=260°C	5s	>=5mm	<=350°C	5s	>5mm
SMDS [1]	/	/	/	<=350°C	3s	/
DISPLAYS	* <=260°C	* 3s	* >2mm	<=350°C	3s	>2mm
PHOTOCOUPLER	<=260°C	3s	>2mm	<=310°C	3s	/
	/	/	/	<=260°C	10s	/

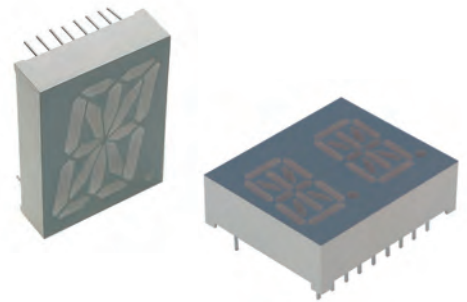
7 segments LED Displays

- 10 mm/0,4"
- 13 mm/0,52"
- 14 mm/0,56"
- 20 mm/0,8"
- 25 mm/10"
- 57 mm/2,3"
- 100 mm/4,0"



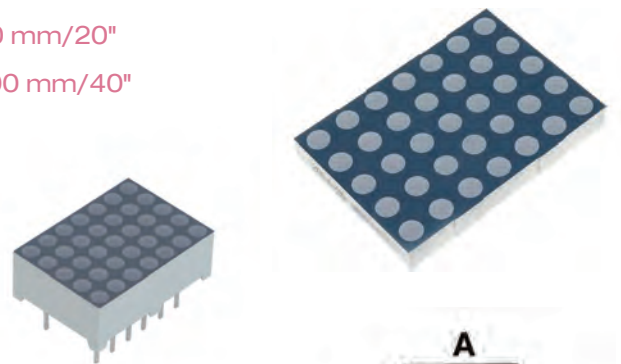
Alphanumeric LED Displays

- 13 mm/0,5"
- 14 mm/0,54"
- 20 mm/0,8"



Dot Matrix LED Displays

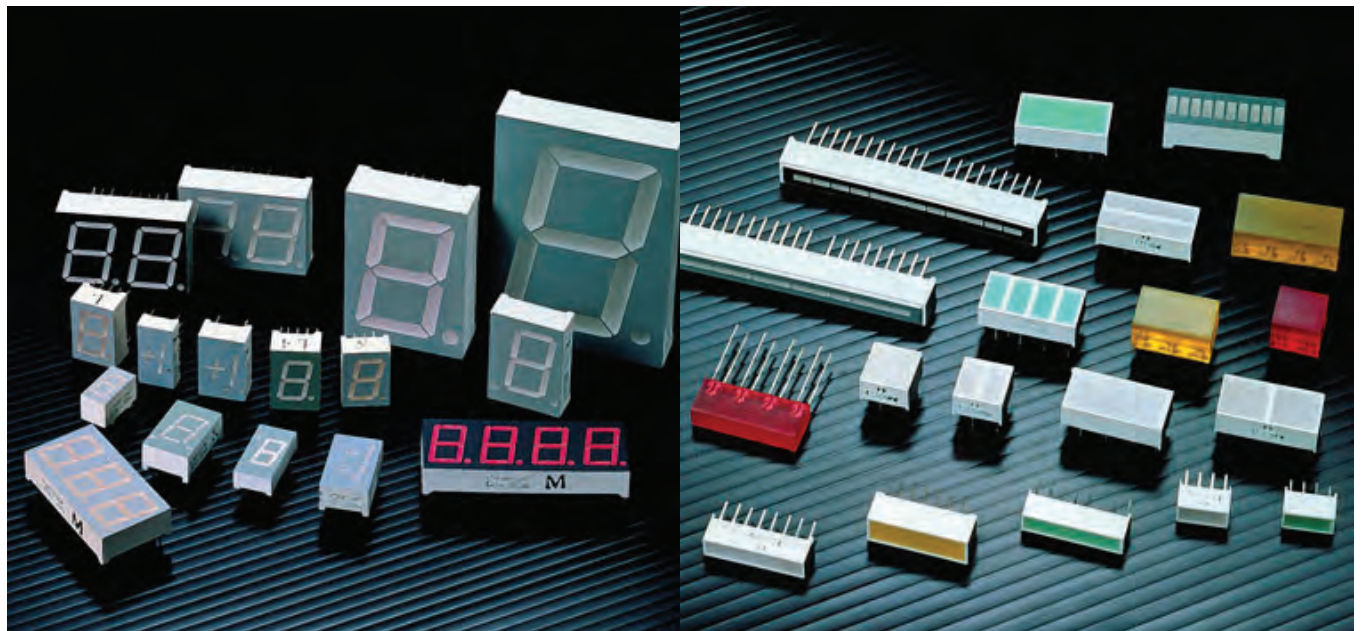
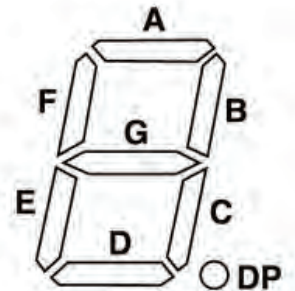
- 18 mm/0,7"
- 50 mm/20"
- 100 mm/40"



Code example

**P S A 05 - 11 GWA**  
**1 2 3 4 5 6**

1. Not Used - 7 Segments
- P - Alphanumeric
2. D - Dual
- S - Single
- B - Tripple
- C - Quad
3. A - Common Anode
- C - Common Cathode
4. Size 0.5"
5. Internal Connection
6. Chip Type/Color



Optocouplers and Optosensors  
LED Diodes and Displays  
LCD, TFT, OLED Displays and Modules  
Electroacoustic Components



OSRAM Opto Semiconductors is one of the world's leading manufacturers of optoelectronic semiconductors and is considered an authority setting the highest international standards on innovative light technologies. Its products range from high-performance LEDs and infrared diodes to semiconductors and detectors.

**OSRAM Opto Semiconductors** je jedním z předních světových výrobců optoelektronických polovodičů a je považován za odborníka, který stanoví nejvyšší mezinárodní standardy pro inovativní světelné technologie. Osram nabízí od vysoce výkonných LED diod a infračervených diod až po polovodiče a detektory.

**OSRAM Opto Semiconductors** ist einer der weltweit führenden Hersteller von optoelektronischen Halbleiterbauelementen und wird als Spezialist angesehen, der höchste internationale Standards für innovative Beleuchtungstechnologien setzt. Das Angebot reicht von leistungsstarken LEDs und Infrarot-LEDs bis hin zu Halbleitern und Detektoren.

Az OSRAM Opto Semiconductors a világ opto elektronikai félvezetőinek egyik vezető gyártója. Az innovatív fénytechnológiák legmagasabb normáinak hivatalos beszállítójaként is számon tartják. Termékköre a nagyteljesítményű LED-ektől és infravörös diódtáktól a félvezetőkig és detektorokig terjed.

OSRAM Opto Semiconductors jest jednym z światowych liderów w produkcji półprzewodników optoelektronicznych i uważany jest za instytucję ustanawiającą najwyższe standardy międzynarodowe w innowacyjnych technologiach świetlnych. Zakres produktów obejmuje od wysoko wydajnych LED oraz diod na podczerwień poprzez półprzewodniki aż po detektory.

OSRAM Opto Semiconductors este unul din producătorii cei mai importanți din lume de semiconductoare optoelectronice și este considerat o adevărată autoritate în stabilirea celor mai înalte standarde internaționale în materie de tehnologii inovatoare de lumină. Gamma sa de produse cuprinde atât LED-uri de o înaltă performanță și diode cu infraroșu cât și semiconductoare și detectoare.

OSRAM Opto Semiconductors je jedným z popredných svetových výrobcov optoelektronických polovodičov a je považovaný za odborníka, ktorý stanovuje najvyššie mezinárodné štandardy na inovatívne svetelné technológie. Osram ponúka od vysoko výkonných LED diód a infračervených diód až po polovodiče a detektory.

More than 30 years of experience in the development and manufacture of optoelectronic semiconductor components have made Osram Opto Semiconductors one of the most significant innovation and technology drivers. With its solid platform of experience and know-how, Osram Opto Semiconductors is not only a manufacturer of optoelectronic semiconductor components but also as a reliable partner for semiconductor technologies in a wide range of lighting applications. The extensive product portfolio of Osram Opto Semiconductors includes above all high-brightness high-power LEDs in the visible range. Osram produces high performance LED solutions. Osram Opto Semiconductors' LEDs, up to now well known only from automobile industry, are already available at commercial market too, in various performance classes such as standard, mid and high power packages, in various brightness levels and package sizes and in the complete color range including all shades of white, RGB, and color.

## Why OSRAM?

- company specializing over 30 years on opto-semiconductors
- top quality products for a convenient price
- LEDs with highest levels of luminosity and CRI
- extremely compact sizes for high power clusters

## Golden DRAGON Plus: Maximum Efficiency for Urban Lighting

### Throwing Light on The Night

The lighting used in urban areas, such as roads, tunnels, bridges or squares, already often goes beyond the general function of illumination. After all, it has the ability to guide road traffic, present buildings and advertisements in the right light, or give pedestrians a safer feeling at night. However, efficiency and economy also play an increasingly important role when it comes to urban lighting.

### Efficiency and High Intensity

OSRAM Opto Semiconductors offers a new version of the Golden DRAGON Plus specifically for outdoor applications. From now on, roads, car parks, underground car parks and public parks can be illuminated even more effectively and energy-efficiently by light with a neutral-white colour appearance. Colour temperatures of 4,000 K, 4,500 K and 5,000 K are available. The new Golden DRAGON Plus combines maximum efficiency with slightly reduced colour rendering properties – i.e. typically 90 lm/W at 4,000 K and a CRI of 70.

With the new Golden DRAGON Plus, efficiency can hence be increased by more than 15 percent. Its colour appearance is very similar to that of conventional lighting technologies (e.g. HID, high-pressure discharge lamps), meaning that the light is perceived as comparable. The new LED also boasts a very long service life in excess of 50,000 hours (depending on the operating conditions) and contains no materials harmful to the environment. The radiation characteristics and footprint are compatible with the previous Golden DRAGON Plus LEDs, enabling the customer to switch to the required version easily at any time, without having to redesign the optical system.

The new LED supplements the established Golden DRAGON Plus with a CRI of 82 and a typical value of 75 lm/W.





### Golden Dragon Plus



In praxis proved LEDs, which are used at street lighting all over the world. Except a high reliability they offer also wide possibilities of luminous flux concentration according to requirements of application.

Series	Max. Current (mA)	Luminous Flux (lm) @350mA	Color (°K)	Viewing Angle
LCW W5AM		90	2500-4800	
LW W5AM	1000	107	5600	170°
LUW W5AM		116	6500	

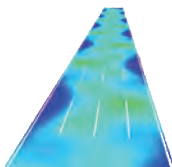
Series	Max. Current (mA)	Luminous Flux (lm) @400mA	Color (nm)	Viewing Angle
LD W5AM		453 mW	● 455	
LB W5AM		28*	● 467	
LV W5AM		62*	● 505	
LT W5AM		93*	● 528	
LH W5AM	1000	320 mW	● 565	170°
LY W5AM		53	● 590	
LA W5AM		68	● 617	
LR W5AM		55	● 625	

\* @350mA

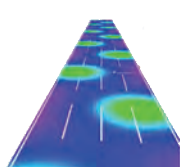
### Golden Dragon Oval Plus



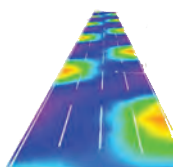
Represents an innovation in a street lighting segment. LEDs have an integrated optics lens, which concentrates luminous flux into a specially adapted oval shape for a homogenous lighting of flat surfaces, for example paths, streets, stocks and similar areas.



Osram LED Oval Plus



LED without optics



HPS with a reflector

Series	Max. Current (mA)	Luminous Flux (lm) @350mA	Color (°K)	Viewing Angle
LCW W5PM		74-79	2700-4500	
LW W5PM	1000	95	5000	120°h, 80°v
LUW W5PM		106	6500	

### Advanced Power TOP LED Plus

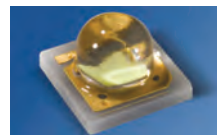


Innovated LED series, which has a very wide and homogenous radiation pattern. LEDs are intended to use in advertising (displays backlighting, panels, shop windows) and position lighting (steps, exit routes). They are suitable also there, where a heat emission is unwanted, like in freezers.

Series	Max. Current (mA)	Luminous Flux (lm) @100mA	Color (°K)	Viewing Angle
LUW G5GP	200	26	6500	135°
LCW G5GP		19	2500 - 4800	

Series	Max. Current (mA)	Luminous Flux (lm) @100mA	Color (nm)	Viewing Angle
LD G5AP		24,2	● 457	
LT G5AP	200	24,2	● 527	135°
LR G5AP		13,8	● 623	

### OSLON® SSL 80 a SSL 150



Extremely small LEDs with a1W power. Their dimensions are only 3x3mm! They will find application in portable lightings but they are also suitable for composing into LED modules, LED panels and habitable areas lighting. We supply them in versions with a radiation angle 80° and 150°.

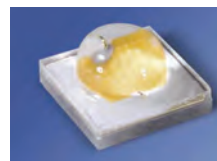
Series	Max. Current (mA)	Luminous Flux (lm) @350mA	Color (°K)	Viewing Angle
LCW CQxP.CC		76 - 81	2700 - 4000	
LCW CQxP.EC	800	91 - 96	2700 - 5000	80°
LCW CQxP.PC		110 - 117	4000 - 5000	150°
LUW CQxP	1000	119	6000	

Series	Max. Current (mA)	Luminous Flux (lm) @350mA	Color (nm)	Viewing Angle
LD CQxP		515 mW	● 449 - 461	
LB CPxP		28	● 446 - 476	
LT CPxP		92	● 513 - 537	
LY CPxP	1000	55**	● 583 - 595	80° 150°
LA CPxP		74**	● 612 - 624	
LR CPxP		53**	● 620 - 632	
LH CPxP		332 mW**	● 644 - 666	

x: SSL80 - 7, SSL150 - D

\*\* @400mA

### OSLON® Square

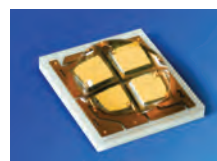


With the OSLON® Square, OSRAM Opto Semiconductors provides the most compact, high-power LED in its class. With a maximum driving current of 1.5 A and a broad range of color temperatures and color rendering indexes, the OSLON® Square product family is perfect for a large variety of indoor and outdoor applications. The exceptionally sturdy design makes the OSLON® Square resistant even under harshest conditions. The package doesn't contain any silver and maintains its reflectivity even in the most humid environment.

- Ultra-compact footprint for high-density arrays to save space and simplify circuit designs (only 3 mm x 3 mm)
- Full color temperature range
- Suitable for driving currents up to 1.5 A
- Highly reflective package
- Lifetime of more than 50,000 hours, depending on application conditions

Series	Min. CRI	CCT/Wavelength	Typ. Brightness at 700 mA
LCW CQAR.EC	80	2700 K - 5000 K	200 lm @ 3000 K
LCW CQAR.PC	70	4000 K - 5000 K	240 lm @ 4000 K
LUW CQAR	65	5300 K - 6500 K	260 lm @ 6000 K
LD CQAR		449 nm - 461 nm	1100 mW

### OSTAR Lighting Plus

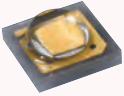








Technologically most advanced LEDs, which have on a carrying substrate integrated 4 LED chips with dimensions 1x1mm per chip. Result is a LED with extremely high luminous flux, which replaces 4 stand-alone LEDs. It significantly spares place and also solves a problem in applications, where extremely high luminous flux from 1 point is necessary.

Series	Max. Current (mA)	Luminous Flux (lm) @350mA	Color (°K)	Viewing Angle
LE CW S2LN	700	355 - 375	2700 - 4000	140°
LE UW S2LN		425	6500	

Family (L x W x H)	CCT Range (ANSI)	White Color Grouping	Typical CRI	Typical Luminous Flux (lm)	Typical Efficacy (lm/W)	Current (mA)	Viewing Angle (deg)	Part Number L[Color]F[Family]-[Flux]-[Color]	
 <b>SOLERIQ E 45</b> (36mm x 36mm x 1.7mm)	6500K	ANSI	84	4620	100	880	120	GW KALRB3.EM-TUUQ-65H4	
	5700K	ANSI	84	4640	100	880	120	GW KALRB3.EM-TUUQ-57H4	
	5000K	ANSI	85	4560	100	880	120	GW KALRB3.EM-TUUQ-50H4	
	4000K	ANSI	85	4500	100	880	120	GW KALRB3.EM-TUUQ-40H4	
	3000K	ANSI	84	4160	100	880	120	GW KALRB3.EM-TSTU-30H4	
	2700K	ANSI	82	3870	100	880	120	GW KALRB3.EM-TSTU-27H4	
 <b>SOLERIQ E 30</b> (30mm x 30mm x 1.7mm)	6500K	ANSI	84	3080	100	600	120	GW KAJRB2.EM-TPTR-65H4	
	5700K	ANSI	84	3090	100	600	120	GW KAJRB2.EM-TPTR-57H4	
	5000K	ANSI	85	3040	100	600	120	GW KAJRB2.EM-TPTR-50H4	
	4000K	ANSI	85	3000	100	600	120	GW KAJRB2.EM-TPTR-40H4	
	3000K	ANSI	84	2770	100	600	120	GW KAJRB2.EM-SUTQ-30H4	
	2700K	ANSI	82	2580	100	600	120	GW KAJRB2.EM-STTQ-27H4	
 <b>OSRAM OSTAR Lighting Plus</b> (5.4mm x 5.1mm x 2.34mm)	6500K	ANSI	70	425	95	350	140	LE UW S2LN-NTPP-5C8E	
	5700K	ANSI	70	425	95	350	140	LE UW S2LN-NTPP-5E8G	
	5000K	ANSI	80	380	85	350	140	LE CW S2LN.EC-NRNT-5H7I	
	4000K	ANSI	80	375	84	350	140	LE CW S2LN.EC-NRNT-5L7N	
	3000K	ANSI	80	365	81	350	140	LE CW S2LN.EC-NQNS-5R8T	
	2700K	ANSI	80	355	79	350	140	LE CW S2LN.EC-NPNR-5U8X	
 <b>OSLON Square</b> (3.0mm x 3.0mm x 1.88mm)	6500K		65	270	125	700	120	LUW CQAR-MUNQ-HPJR	
	5700K		65	270	125	700	120	LUW CQAR-MTNP-JPJR	
	5300K		65	265	123	700	120	LUW CQAR-MSMU-KPLP	
	5000K (PC)	ANSI	70	256	116	700	120	LCW CQAR.PC-MTNP-5H7I	
	4500K (PC)	ANSI	70	240	110	700	120	LCW CQAR.PC-MSMU-5J7K	
	4000K (PC)	ANSI	70	240	110	700	120	LCW CQAR.PC-MSMU-5L7N	
	5000K (EC)	ANSI	82	255	117	700	120	LCW CQAR.EC-MRMT-5H7I	
	4500K (EC)	ANSI	82	230	110	700	120	LCW CQAR.EC-MRMT-5J7K	
	4000K (EC)	ANSI	82	210	110	700	120	LCW CQAR.EC-MRMT-5L7N	
	3500K (EC)	ANSI	82	208	96	700	120	LCW CQAR.EC-MQMS-5O8Q	
	3000K (EC)	ANSI	82	205	94	700	120	LCW CQAR.EC-MPMR-5R8T	
	2700K (EC)	ANSI	82	188	86	700	120	LCW CQAR.EC-MPMR-5U8X	
 <b>OSLON SSL 80</b> (3.0mm x 3.0mm x 2.35mm)	6000K		70	140	130	350	80	LUW CR7P-LQLS-HPJR	
	5000K (PC)	ANSI	70	136	126	350	80	LCW CR7P.PC-LRLT-5H7I	
	4500K (PC)	ANSI	70	132	122	350	80	LCW CR7P.PC-LQLS-5J7K	
	4000K (PC)	ANSI	70	130	121	350	80	LCW CR7P.PC-LQLS-5L7N	
	5000K (EC)	ANSI	82	120	112	350	80	LCW CR7P.EC-LPLR-5H7I	
	4500K (EC)	ANSI	82	120	112	350	80	LCW CR7P.EC-LPLR-5J7K	
	4000K (EC)	ANSI	82	115	107	350	80	LCW CR7P.EC-KULQ-5L7N	
	3500K (EC)	ANSI	82	115	107	350	80	LCW CR7P.EC-KULQ-5O8Q	
	3000K (EC)	ANSI	82	109	101	350	80	LCW CR7P.EC-KULQ-5R8T	
	2700K (EC)	ANSI	82	104	97	350	80	LCW CR7P.EC-KTLP-5U8X	
	 <b>OSLON SSL 150</b> (3.0mm x 3.0mm x 1.58mm)	6000K		70	140	130	350	150	LUW CRDP-LQLS-HPJR
		5000K (PC)	ANSI	70	136	126	350	150	LCW CRDP.PC-LRLT-5H7I
4500K (PC)		ANSI	70	132	122	350	150	LCW CRDP.PC-LQLS-5J7K	
4000K (PC)		ANSI	70	130	121	350	150	LCW CRDP.PC-LPLR-5L7N	
5000K (EC)		ANSI	82	120	112	350	150	LCW CRDP.EC-LPLR-5H7I	
4500K (EC)		ANSI	82	120	112	350	150	LCW CRDP.EC-LPLR-5J7K	
4000K (EC)		ANSI	82	115	107	350	150	LCW CRDP.EC-KULP-5L7N	
3500K (EC)		ANSI	82	111	103	350	150	LCW CRDP.EC-KULQ-5O8Q	
3000K (EC)		ANSI	82	109	101	350	150	LCW CRDP.EC-KULQ-5R8T	
2700K (EC)		ANSI	82	104	97	350	150	LCW CRDP.EC-KTLP-5U8X	
 <b>OSLON SSL 80</b> (3.0mm x 3.0mm x 2.35mm)		6500K	ANSI	70	120	107	350	80	LUW CQ7P-LPLR-5C8E
		6000K	ANSI	70	120	107	350	80	LUW CQ7P-LPLR-5D8F
	5700K	ANSI	70	120	107	350	80	LUW CQ7P-LPLR-5E8G	
	5000K (PC)	ANSI	70	120	107	350	80	LCW CQ7P.PC-KULQ-5H7I	
	4500K (PC)	ANSI	70	120	107	350	80	LCW CQ7P.PC-KULQ-5J7K	
	4000K (PC)	ANSI	70	120	107	350	80	LCW CQ7P.PC-KULQ-5L7N	
	5000K (EC)	ANSI	82	105	94	350	80	LCW CQ7P.EC-KTLP-5H7I	
	4500K (EC)	ANSI	82	100	89	350	80	LCW CQ7P.EC-KTLP-5J7K	
	4000K (EC)	ANSI	82	97	87	350	80	LCW CQ7P.EC-KSKU-5L7N	
	3500K (EC)	ANSI	82	95	85	350	80	LCW CQ7P.EC-KSKU-5O8Q	
	3000K (EC)	ANSI	82	95	85	350	80	LCW CQ7P.EC-KSKU-5R8T	
	2700K (EC)	ANSI	82	90	80	350	80	LCW CQ7P.EC-KRKT-5U8X	
	4000K (CC)	ANSI	95	82	76	350	80	LCW CQ7P.CC-KQKS-5L7N	
	3500K (CC)	ANSI	95	76	68	350	80	LCW CQ7P.CC-KQKS-5O8Q	
	3000K (CC)	ANSI	95	76	68	350	80	LCW CQ7P.CC-KPKR-5R8T	
	2700K (CC)	ANSI	95	72	64	350	80	LCW CQ7P.CC-JUQK-5U8X	

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Family (L x W x H)	CCT Range (ANSI)	White Color Grouping	Typical CRI	Typical Luminous Flux (lm)	Typical Efficacy (lm/W)	Current (mA)	Viewing Angle (deg)	Part Number L[Color][Family]-[Flux]-[Color]
 <b>OSLON SSL 150</b> (3.0mm x 3.0mm x 1.58mm)	6500K	ANSI	70	120	107	350	150	LUW CQDP-LPLR-5C8E
	6000K	ANSI	70	120	107	350	150	LUW CQDP-LPLR-5D8F
	5700K	ANSI	70	120	107	350	150	LUW CQDP-LPLR-5E8G
	5000K (PC)	ANSI	70	120	107	350	150	LCW CQDP.PC-KULQ-5H7I
	4500K (PC)	ANSI	70	120	107	350	150	LCW CQDP.PC-KULQ-5J7K
	4000K (PC)	ANSI	70	120	107	350	150	LCW CQDP.PC-KULQ-5L7N
	5000K (EC)	ANSI	82	105	94	350	150	LCW CQDP.EC-KTLP-5H7I
	4500K (EC)	ANSI	82	100	89	350	150	LCW CQDP.EC-KTLP-5J7K
	4000K (EC)	ANSI	82	97	87	350	150	LCW CQDP.EC-KSKU-5L7N
	3500K (EC)	ANSI	82	95	85	350	150	LCW CQDP.EC-KSKU-5O8Q
	3000K (EC)	ANSI	82	95	85	350	150	LCW CQDP.EC-KSKU-5R8T
	2700K (EC)	ANSI	82	90	80	350	150	LCW CQDP.EC-KRKT-5U8X
	4000K (CC)	ANSI	95	82	76	350	150	LCW CQDP.CC-KQKS-5L7N
	3500K (CC)	ANSI	95	76	68	350	150	LCW CQDP.CC-KQKS-5O8Q
3000K (CC)	ANSI	95	76	68	350	150	LCW CQDP.CC-KPKR-5R8T	
2700K (CC)	ANSI	95	72	64	350	150	LCW CQDP.CC-JUKQ-5U8X	
 <b>Golden DRAGON Plus</b> (6.2mm x 11.2mm x 3.1mm)	5300K - 7000K		70	118	105	350	170	LUW W5AM-LXLY-6P7R
	5300K - 7000K		70	112	100	350	170	LUW W5AM-KZLY-6P7R
	4500K - 5700K		80	95	85	350	170	LW W5AM-KYLX-7K8L
	6500K	ANSI	70	112	100	350	170	LUW W5AM-KYLX-4C8E
	5700K	ANSI	70	112	100	350	170	LUW W5AM-KYLX-5F8G
	4500K	ANSI	80	90	80	350	170	LCW W5AM-KYKZ-5J7K
	4000K	ANSI	80	90	80	350	170	LCW W5AM-KYKZ-5L7N
	3500K	ANSI	80	85	76	350	170	LCW W5AM-KXKZ-5O8Q
	3000K	ANSI	80	80	71	350	170	LCW W5AM-KXKY-5R8T
2700K	ANSI	80	75	67	350	170	LCW W5AM-JZKY-5U8X	
 <b>DURIS E 5</b> (5.6mm x 3.0mm x 0.87mm)	6500K(EC)	ANSI	85	45	118	120	120	LUW JDSH.EC-FRFT-5C8E
	5700K (EC)	ANSI	85	45	118	120	120	LUW JDSH.EC-FRFT-5E8G
	5000K (EC)	ANSI	85	45	118	120	120	LCW JDSH.EC-FRFT-5H7I
	4000K (EC)	ANSI	85	44	116	120	120	LCW JDSH.EC-FRFT-5L7N
	3500K (EC)	ANSI	85	41	108	120	120	LCW JDSH.EC-FPFR-5O8Q
	3000K (EC)	ANSI	85	41	108	120	120	LCW JDSH.EC-FQFS-5R8T
	2700K (EC)	ANSI	85	38	100	120	120	LCW JDSH.EC-FPFR-5U8X
 <b>DURIS P 5</b> (2.6mm x 2.2mm x 1.25mm)	5000K (EC)	ANSI	80	34	109	100	130	GW DASPA1.EC-HQHS-5H7I
	4000K (EC)	ANSI	80	33	105	100	130	GW DASPA1.EC-HPHR-5L7N
	3000K (EC)	ANSI	80	31	100	100	130	GW DASPA1.EC-HPHR-5R8T
 <b>Advanced Power TOPLED Plus</b> (6.0mm x 3.6mm x 2.27mm)	6500K	ANSI	70	26	81	100	135	LUW G5GP-GXHY-5C8E
	5700K	ANSI	70	26	81	100	135	LUW G5GP-GXHY-5E8G
	4500K	ANSI	80	22	69	100	135	LCW G5GP-FZHX-5J8K
	4000K	ANSI	80	22	69	100	135	LCW G5GP-FZHX-5L8N
	3500K	ANSI	80	19	59	100	135	LCW G5GP-FYHX-5O8Q
	3000K	ANSI	80	19	59	100	135	LCW G5GP-FYGY-5R8T
	2700K	ANSI	80	17	53	100	135	LCW G5GP-FYGY-5U8X
 <b>DURIS E 3</b> (3.0mm x 1.4mm x 0.825mm)	6500K (EC)	ANSI	85	7	115	20	120	LUW JNSH.EC-BRBT-5C8E
	5700K (EC)	ANSI	85	7	110	20	120	LUW JNSH.EC-BRBT-5E8G
	5000K (PC)	ANSI	72	7,4	121	20	120	LCW JNSH.PC-BRBT-5H7I
	4000K (PC)	ANSI	72	7,3	120	20	120	LCW JNSH.PC-BRBT-5L7N
	3000K (PC)	ANSI	72	6,8	112	20	120	LCW JNSH.PC-BQBT-5R8T
	5000K (EC)	ANSI	85	6,9	108	20	120	LCW JNSH.EC-BRBT-5H7I
	4000K (EC)	ANSI	85	6,5	107	20	120	LCW JNSH.EC-BRBT-5L7N
	3000K (EC)	ANSI	85	6,4	104	20	120	LCW JNSH.EC-BQBS-5R8T
	2700K (EC)	ANSI	85	6,2	101	20	120	LCW JNSH.EC-BQBS-5U8X
 <b>Power TOPLED</b> (3.7mm x 3.0mm x 2.1mm)	5300K - 14000K		70	6,7	70	30	120	LUW E6SG-BACA-4N7Q
	5300K - 14000K		70	6,7	70	30	120	LUW E6SG-BACA-4N7Q
	4700K - 10000K		80	5	50	30	120	LW E6SG-AABA-JKPL
	4500K	ANSI	80	4,2	38	30	120	LCW E6SG-V2BA-4J8K
	4000K	ANSI	80	4,1	38	30	120	LCW E6SG-V2BA-4L8N
	3500K	ANSI	80	3,8	38	30	120	LCW E6SG-V2BA-4O9Q
	3000K	ANSI	80	3,5	38	30	120	LCW E6SG-V1AB-4R9T
	2700K	ANSI	80	3,2	38	30	120	LCW E6SG-V1AB-4U9X



Family (L x W x H)	Color	Wavelength (nm)	Technology	Typical Luminous Flux (lm)/(mW)	Typical Efficacy (lm/W)	Current (mA)	Viewing Angle (deg)	Part Number [Color][Family]-[Flux]- -[Color]
 <b>OSLON SSL 80</b> (3.0mm x 3.0mm x 2.35mm)	Hyper Red	645	InGaAlP	355mW	48	350	80	LH CP7P-3T4T-1
	Red	625	InGaAlP	58	77	350	80	LR CP7P-JRJT-1
	Amber	617	InGaAlP	80	104	350	80	LA CP7P-KQKS-1
	Yellow	590	InGaAlP	56	71	350	80	LY CP7P-JSJU-1
	True Green	528	InGaN	95	85	350	80	LT CP7P-JYKZ-26
	Blue	470	InGaN	28	25	350	80	LB CP7P-GYHY-35
 <b>OSLON SSL 150</b> (3.0mm x 3.0mm x 1.58mm)	Hyper Red	645	InGaAlP	355mW	48	350	150	LH CPDP-3T4T-1
	Red	625	InGaAlP	58	77	350	150	LR CPDP-JRJT-1
	Amber	617	InGaAlP	80	104	350	150	LA CPDP-KQKS-W3
	Yellow	590	InGaAlP	56	71	350	150	LY CPDP-JSJU-1
	True Green	528	InGaN	95	85	350	150	LT CPDP-KXKZ-26
	Blue	470	InGaN	28	25	350	150	LB CPDP-GYHY-35
 <b>Golden DRAGON Plus</b> (6.2mm x 11.2mm x 3.1mm)	Hyper Red	645	InGaAlP	320mW	38	400	170	LH W5AM-1T3T-1
	Red	625	InGaAlP	55	61	400	170	LR W5AM-JXJZ-1
	Amber	617	InGaAlP	65	73	400	170	LA W5AM-JYKX-23
	Yellow	590	InGaAlP	50	55	400	170	LY W5AM-HZJY-36
	Verde Green	505	InGaN	72	64	350	170	LV W5AM-JYKY-25
	True Green	528	InGaN	90	80	350	170	LT W5AM-KXKY-26
	Blue	470	InGaN	27	23	350	170	LB W5AM-GYHY-25
	Deep Blue	455	InGaN	450 mW	40	350	170	LD W5AM-3T3U-35
 <b>Advanced Power TOPLED Plus</b> (6.0mm x 3.6mm x 2.27mm)	Red	623	InGaAlP	13	60	100	145	LR G5AP-BZCZ-1-1
	True Green	527	InGaN	21	62	100	145	LT G5AP-CZEX-36-1
	Deep Blue	457	InGaN	120 mW	40	100	145	LD G5AP-2M2N-35-1
 <b>Power TOPLED</b> (3.7mm x 3.0mm x 2.1mm)	Super-red	633	InGaAlP	4,6	38	50	120	LS E6SF-V2BA-1-1
	Red	625	InGaAlP	5,8	49	50	120	LR E6SF-AABB-1-1
	Amber	617	InGaAlP	8	69	50	120	LA E6SF-BACA-24-1
	Orange	606	InGaAlP	8,8	69	50	120	LO E6SF-ABCB-24-1
	Yellow	590	InGaAlP	5	44	50	120	LY E6SF-AABA-46-1
	True Green	525	InGaN	5	51	30	120	LT E6SG-AABA-36-1
	Blue	469	InGaN	1,5	20	30	120	LB E6SG-T1U2-35-1
 <b>MultiLED</b> (3.6mm x 3.5mm x 2.0mm)	R / T / B (white binned)	625 / 528 / 465	InGaAlP / InGaN	600 / 980 / 250	33	20	120	LRTB G6SF-V2BA-3E7F
	R / T / B	625/528/458	InGaAlP/InGaN	600/925/335	43/36/11	20	120	LRTB G6SG-T1V1-1+ U1AA-25+R1U1-68
	R / T / B	625/528/470	InGaAlP/InGaN	1078/1570/378	45/50/11	20	120	LRTB GFTG-T7AW-1+ V7A7-29+R5T9-49-S





CREE – a market-leading innovator of lighting-class LEDs and LED lighting. Cree's leadership begins with innovative materials, primarily silicon carbide (SiC), that provide high-efficiency performance for numerous semiconductor applications. Cree's XLamp® LEDs have continually exceeded industry standards for brightness and efficiency.

**CREE - přední společnost na trhu LED diod pro osvětlení.** Vedoucí postavení společnosti Cree začíná u inovativních materiálů jako silikonkarbid (SiC), které poskytují vysoký výkon a efektivitu pro mnohé polovodičové aplikace. XLamp® LED Cree soustavně posouvají průmyslové standardy ve svítivosti a účinnosti.

**CREE – führen-der Innovator auf dem LED-Markt für Beleuchtungen.** Die Führungsposition des Unternehmens Cree basiert auf innovativen Materialien wie Siliziumkarbid (SiC), welche eine hohe Leistung und Effizienz für zahlreiche Halbleiteranwendungen bieten. XLamp® LED Cree verschieben systematisch die Standards hinsichtlich Leuchtkraft und Wirkungsgrad.

**A CREE vezető fejlesztő a világítástechnikában** használt LED-ek piacán. A cég vezető szerepe az olyan innovatív anyagokban rejlik, mint a szilikonkarbid (SiC), mely nagy teljesítményt és hatásfokot biztosít számos félvezető alkalmazásban. Az XLamp® LED Cree folyamatosan emeli az ipari normák szintjét a fénykibocsátás és hatásfok területén.

**CREE – lider i innowator na rynku diod LED do oświetlenia.** Wiodąca pozycja spółki Cree zaczyna przy innowacyjnych materiałach jak silikonkarbid (SiC), które umożliwiają wysoką moc i efektywność. Dla wielu aplikacji półprzewodnikowych. XLamp® LED Cree nieustannie posuwają standardy przemysłowe w mocy świetlnej i wydajności.

**CREE – un lider de piață inovator în domeniul iluminării cu LED-uri.** Succesul companiei se datorează utilizării unor materiale revoluționare, în principal carbid de silicium (SiC) care cresc randamentul și eficiența numeroaselor aplicații de semiconductoare. LED-urile Cree XLamp® au întrecut standardele industriale în materie de strălucire și eficiență.

**CREE – vedúci innovátor na trhu LED diód pre osvetlenie.** Vedúce postavenie spoločnosti Cree začína u inovatívnych materiálov ako silikónkarbid (SiC), ktoré poskytujú vysoký výkon a efektivnosť, pre mnohé polovodičové aplikácie. XLamp® LED Cree sústavne posúvajú priemyselné štandardy v svietivosti a účinnosti.

XLamp LEDs were the first "lighting-class" LEDs – LEDs bright enough to be used in general-illumination applications, such as desk lamps, ceiling fixtures and street lights. Using SiC as a platform material, Cree has spent over 20 years developing an array of new technologies that far surpass traditional ones. Cree leads the LED lighting revolution and is making energy-wasting traditional lighting technologies obsolete through the use of energy-efficient, environmentally friendly LED lighting. In addition, Cree's extensive line of high-brightness LEDs are also introducing new performance levels to outdoor video displays and decorative lighting.

### Why CREE?

- market-leading innovator of lighting-class LEDs and LED lighting
- top quality products with highest luminosity/Watt

### Did You Know?

Cree first brought the blue LED to market in 1989.

### Features

- Complete portfolio of ANSI-compatible white
- Smallest warm-white chromaticity bins
- High energy efficiency and luminous flux
- Proven white point stability
- Complying with ISO standards
- RoHS and REACH-compliant
- Energy Star
- EPA

### Applications

- Outdoor lighting  
Parking area, roadway, pedestrian
- Portable and personal lighting
- Indoor lighting  
Downlights, wall washers, flush-mount
- LED light bulbs
- Retail display lighting  
Display case, refrigerated display
- Architectural lighting
- Solar-powered lighting
- Security lighting
- Automotive industry

### Advantages of LED Light

- **High energy efficiency**  
- luminous flux up to 110lm/W
- **High-quality light**  
- no compromise between efficiency and CRI
- **Directional** - no wasted light; any pattern possible
- **Extremely long lifetime**  
- life of more than 50,000 hours of operation
- **Mechanically resistant**  
- no easy damage of components
- **Instant on** - reaches full brightness in nanoseconds
- **Environmentally friendly**  
- contains no mercury, lead or other heavy metals
- **Infinitely controllable**  
- allows easy energy saving
- **Frost resistant** - working at low temperatures





### XLamp CXA2011

High lumen output in a single, easy-to-use package.

- 22.00 x 22.00 (mm) 120°



### XLamp MC-E

High-Lumen Output in a Small Form Factor

- 7.00 x 9.00 (mm) 110°



### XLamp ML-B

Lighting-Class Performance for Linear & Distributed Illumination Applications

- 3.50 x 3.50 (mm) 120°



### XLamp ML-C

Versatile, Mid-Power, Lighting-Class LED

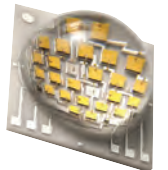
- 3.50 x 3.50 (mm) 120°



### XLamp ML-E

Versatile, Mid-Power, Lighting-Class LED

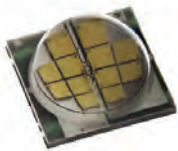
- 3.50 x 3.50 (mm) 120° | 125°



### XLamp MP-L EasyWhite

Unprecedented Performance, Color Consistency and Lumen Density

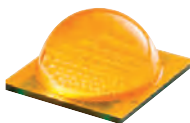
- 12.15 x 13.15 (mm) 125°



### XLamp MT-G EasyWhite

Optimized for Small-Form-Factor Directional Lighting

- 8.90 x 8.90 (mm) 120°



### XLamp MT-G2

Industry's best color consistency and superior optical control

- 8.90 x 8.90 (mm) 115°



### XLamp MX-3

Industry's tightest color consistency and uniform angular chromaticity

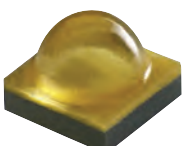
- 6.50 x 5.00 (mm) 125°



### XLamp MX-6

80 CRI-minimum, higher flux and high-voltage options

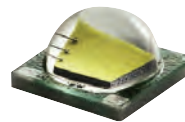
- 6.50 x 5.00 (mm) 120°



### XLamp XB-D

Smallest lighting-class LED enables dramatically lower system cost

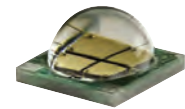
- 2.45 x 2.45 (mm) 115°



### XLamp XM-L

Shatters Single-Die Performance Standards

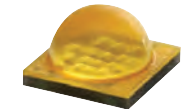
- 5.00 x 5.00 (mm) 125°



### XLamp XM-L EasyWhite

Optimized for 20-25W Halogen Replacement Products

- 5.00 x 5.00 (mm) 115°



### XLamp XM-L High-Voltage White

High efficacy and lower system cost for the smallest LED systems

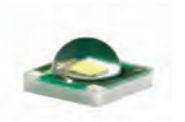
- 5.00 x 5.00 (mm) 115°



### XLamp XP-C

Proven lighting-class performance and reliability

- 3.45 x 3.45 (mm) 115° | 125°



### XLamp XP-E

Lighting-Class Performance

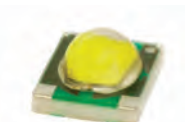
- 3.45 x 3.45 (mm) 115° | 130°



### XLamp XP-E High-Efficiency White

High efficiency, lower system cost

- 3.45 x 3.45 (mm) 120°



### XLamp XP-G

Optimized for high lumen directional lighting applications

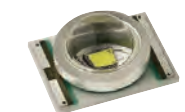
- 3.45 x 3.45 (mm) 120° | 125°



### XLamp XR-C

Cree High-Power LEDs

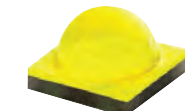
- 7.00 x 9.00 (mm) 90° | 100°



### XLamp XR-E

Cree's Lighting-Class Power LEDs

- 7.00 x 9.00 (mm) 90° | 100°



### XLamp XT-E High-Voltage White

High efficacy and lower system cost for the smallest LED systems

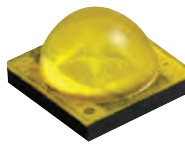
- 3.45 x 3.45 (mm) 115°



### XLamp XT-E Royal Blue

High-performing royal-blue LED for remote-phosphor applications

- 3.45 x 3.45 (mm) 140°




### XLamp XT-E White


Highest-performing lighting-class LED


- 3.45 x 3.45 (mm) 115°





Most often displays in presence are based on an LCD technology. A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals (LCs).


 *Současné displeje jsou nejčastěji založeny na technologii LCD. Displej z tekutých krystalů (LCD) je plochý panelový displej, který využívá ke zobrazení modulační vlastnosti tekutých krystalů.*

 *Heutzutage basieren die meisten Displays auf der LCD-Technologie. Ein Flüssigkristalldisplayschirm (LCD) ist ein Flachbildschirm, eine elektronische Sichtanzeige oder Video-Display, welches die lichtmodulierenden Eigenschaften von Flüssigkristallen (LCs) nutzt.*

 *A mai kijelzők többsége LCD technológián alapul. A folyékony kristályos kijelző (LCD) egy vékony panel, elektronikus vizuális megjelenítő, vagy videó kijelző, mely a folyékony kristályok tény modulációs tulajdonságait használja ki.*

 *Współczesne wyświetlacze oparte są zazwyczaj na technologii LCD. Ekran z kryształów ciekłych (LCD), to płaski panelowy wyświetlacz dotykowy, który wykorzystuje właściwości kryształów ciekłych do modulowania światła.*

 *Cel mai adesea, monitoarele din prezent se bazează pe o tehnologie LCD. Un monitor pe cristale lichide (LCD) este un ecran plat, cu afișaj electronic vizual, sau afișaj video care utilizează proprietățile de modulație a luminii pe care le au cristalele lichide (LCs).*

 *Súčasné displeje sú najčastejšie založené na technológii LCD. Displej z tekutých kryštálov (LCD) je plochý panelový displej, ktorý využíva svetlo-modulačné vlastnosti tekutých kryštálov.*

LCD is an electronically modulated optical device made up of any number of segments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce color or monochrome images. Low electrical power consumption of LCDs enables them to be used in battery-powered electronic equipment. LCD displays are being continuously improved thanks to technologies enhancing viewing angle, contrast ratio, response time, power consumption and other properties. As a source of a backlight it was most often a CCFL tube used. In presence still more displays utilizes LEDs as a backlight, reaching a very good colour rendition, lower power consumption, longer lifetime and also it is more environmentally friendly, because CCFLs contain a small amount of mercury.

OLED displays are attracting still more attention. They are based on an organic LED technology, where the light is emitted by a current flowing through a layer of organic semiconductor. To benefits of OLED technology belong a wide viewing angle, fast response, very thin design and even possibility to be flexible. OLED display generates light that's why it doesn't need any additional backlight.

### Classification

We can divide the displays to few main groups according to their ability to display numbers, characters and graphics.

#### Alphanumeric LCD Modules



are intelligent displays containing a controller. A user interface is done via some of standard protocols. An alphanumeric display is created by rectangular fields, which are usually created by a 5x7 dot matrix. That's why all symbols which can be displayed are created by switching "on" or "off" an appropriate dot in 1 character field. According to number of lines and characters in a line, we then refer to 1x16, 2x20, 2x40 characters displays. A controller contains a memory with a character set stored from production. Most of modern displays enable to add also some user-defined symbols, which can be created by a 4x8 or 5x10 dot matrix.

#### Graphic LCD Modules



are partially similar to alphanumeric displays, but the LCD itself is not divide to characters, but all the surface is created by dots (pixels) in some of standard sizes like 128x64, 320x24, 640x480 dots etc. A special case of graphic displays are intelligent displays which contain a processor controlling all the displayed content and the user communicates with the display on the level of commands (not on a level of pixels). This feature greatly decreases development time of an application.

#### TFT Modules



are usually complete embedded modules with some of standard interfaces (e.g. VGA or analog composite video), that's why they can be connected to the device by a similar way like standard PC monitors.

#### Electromagnetic Displays



are a special case of 7-segment displays, where every segment is controlled by a bistable electromagnet. That's why they only need an energy for a change of statement and have a zero power consumption in a rest. They are intended to be used for example to display prices at fuel stations, industrial scales and many other. From this reason they usually have relatively big digits – tens of centimeters.

### Terms

#### STN

- a super-twisted nematic display is a type of monochrome passive matrix LCD. STN displays provide more contrast than twisted nematic (TN) displays by twisting the molecules from 180 to 270 degrees. STN LCDs require less power and are less expensive to manufacture than TFT LCDs. However, STN displays typically suffer from lower image quality and slower response time than TFT displays. STN displays are used in some inexpensive mobile phones and informational screens of some digital products and especially in LCD modules.

#### FSTN

Film compensated STN, Formulated STN or Filtered STN. A passive matrix LCD technology that uses a film compensating layer between the STN display and rear polarizer for added sharpness and contrast. It was used in laptops before the DSTN method became popular.

#### TFT

Thin film transistor liquid crystal display (TFT-LCD) is a variant of LCD, which uses thin-film transistor technology to improve image quality (e.g., addressability, contrast). TFT LCD is one type of Active matrix LCD, though all LCD-screens are based on TFT active matrix addressing. TFT LCDs are used in television sets, computer monitors, mobile phones, handheld video game systems, personal digital assistants, navigation systems, projectors, etc.

#### Transflective LCD

- a display that reflects and transmits light (transflective = transmissive + reflective). Under bright illumination (e.g. when exposed to daylight) the display acts mainly as a reflective display with the contrast being constant with illuminance. Only in dim and dark ambient situations an auxiliary transmissive backlight should be provided. When an illuminance sensor is added for control of the backlight, such a transflective LCD can be read over a wide range of illuminance levels.

#### Negative LCD

- a liquid crystal display employing a dark backfield with lit elements. This results in a primarily dark display, which improves cosmetic integration with a dark colored head unit. Always requires a backlight.

#### Touchscreen

There are more touchscreen technologies that have different methods of sensing touch. In praxis, resistive and capacitive types are the most often used.

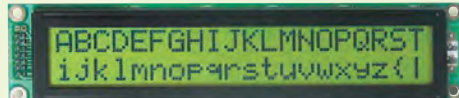
## LCD/OLED modules



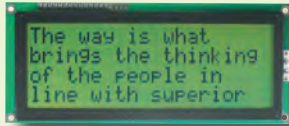
BC0802B



BC1602L



BC2002A



BC2004B



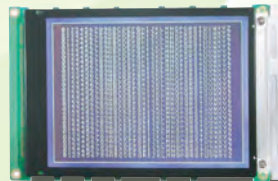
B012832A



B09864B



BG12864A



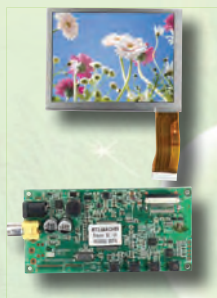
BG320240F



BL12864G

Model	Format	Outline Size [mm]	View Area [mm]	Dot/Char size [mm]	Controller	Back Light	Touch Panel
BC0802B	8*2	40*20	36.3*13.9	3.12*5.01	KS0066	LED	-
BC1602L	16*2	68*26.8	61*19	2.96*6.68	KS0066	LED	-
BC2002A	20*2	116*37	85*18.6	3.20*5.55	KS0066	LED	-
BC2004B	20*4	146*62.5	123.5*43	4.84*9.22	KS0066	LED	-
B012832A	128*32	82*34	79*24.2	0.53*0.59	P C F 8 5 3 1	LED/EL	-
B09864B	98*64	34*34	31*22.5	0.26*0.31	ST7548i (I2C)	LED/EL	-
BG12864A	128*64	93*70	72*40	0.48*0.48	KS0107/0108	LED	NO
BG320240F	320*240	166.8*109	122*92	0.34*0.34	RA8835	CCFL	YES
BL12864G	128*64	76.65*52.7	60.0*32.5	0.40*0.40	5501303	OLED	-

## TFT/ Embedded modules



BT3.5BACHB

Format: 480\*234 (3.5")  
 Outline Size: 83\*60.5mm  
 View Area: 72\*50.6mm  
 Back Light: LED  
 Inputs: CVBS/S (NTSC/PAL)



BT104BBBACH352e

Format: 800\*600 (10.4")  
 Outline Size: 236\*174.3mm  
 View Area: 211.2\*158.4mm  
 Back Light: CCFL  
 Inputs: CVBS (NTSC/PAL/SECAM),  
 VGA



BEGA220

400MHz 32 bit RISC architecture  
 ARM926EJ CPU core  
 2GB NAND Flash / 64MB DDRII memory  
 WINCE 5.0 OS  
 Maximum 16M color at 24bpp  
 On board 10 / 100Mbps Ethernet with RJ45  
 1 x Host USB / 1 x Device USB  
 1 x isolated RS485 / 422  
 3 x RS232 / 1 x SPI  
 Audio codec with dual channels amplifiers  
 6 x Channels ADC, one 4-wired touch panel  
 12 programmable IO  
 Dimension(WxHxD):195x110x25.7 mm

### BOLYMIN INC.

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 Taichung County, Taiwan 42878, R.O.C.

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Displays for your applications





**BOLYMIN delivers Embedded System and Display products to markets all over the world. With more than 15 years dedication in professional manufacturing of display related products. Bolymin is now a well-established company in terms of design, manufacturing and quality assurance.**

**CZ** *BOLYMIN je celosvětový dodávateľ Embedded systémů a displejů. Již více než 15 let s profesionálním nasazením vyrábí produkty, související s displeji. Bolymin je zárukou vysoké kvality.*

**DE** *BOLYMIN ist ein globaler Lieferant von Embedded-Systemen und Displays. Seit mehr als 15 Jahren produziert er mit professionellem Einsatz displaybezogene Produkte. Bolymin ist ein Garant für die Einhaltung der Herstellungs- und Designqualität.*

**HU** *A BOLYMIN a beágyazott rendszerek és kijelzők világszerte ismert gyártója. Már több mint 15 éve gyárt szakemberen kijelzőkkel összefüggő termékeket. A Bolymin garancia a jó minőségre és dizájnr.*

**PL** *BOLYMIN to globalny dostawca systemów embedded oraz wyświetlaczy. Już od ponad 15 lat produkuje profesjonalnie produkty związane z wyświetlaczami. Bolymin to gwarancja jakości produkcji i rozwoju.*

**RO** *BOLYMIN furnizează la nivel global produse incorporate de sistem și afișaj. Având peste 15 ani de experiență în producția profesională de produse de afișaj, Bolymin este în prezent o societate cu tradiție în proiectarea, producția și asigurarea calității.*

**SK** *BOLYMIN je celosvetový dodávateľ Embedded systémov a displejov. Už viac ako 15 rokov vyrába s profesionálnym nasadením produkty súvisiace s displejmi. Bolymin je zárukou vysokej kvality.*

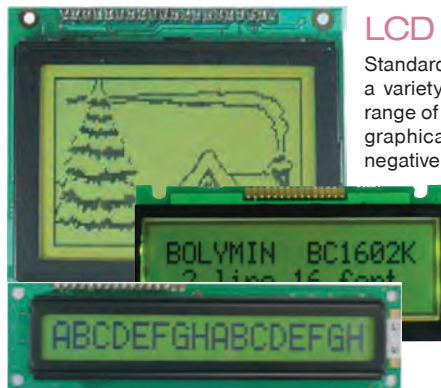
Bolymin's product offering spans across various application fields such as automotive electronics, medical instrument, security control, and industrial automation. Bolymin regards technology/business model innovation and customer-oriented service as two pillar stones to its sustainable growth. Bolymin displays feature an excellent price/performance ratio.

### Why BOLYMIN?

- excellent price/performance ratio
- wide portfolio
- stable and reliable delivery terms

We can divide Bolymin displays in our offer into three main groups: character, graphic and graphic TFT modules.

- Character displays represent standard industrial line with 1-4 lines and 8-20 rows. Every character consists of a 4x8 or 5x10 dot matrix. Displays contain a standard serial interface and a character set memory, that's why a communication with them is very simple.
- Graphic displays are mainly specified by their resolution, e.g. 240x128 pixels. They contain a controller with a serial interface, thus the communication with a host microcontroller is easy. Graphic displays, as already their name says, enable to display any kind of graphic. This is possible thanks to an individual control of every pixel of the display.
- TFT modules are complete display modules ("monitors"). With the target device they can be connected by some of standard interfaces like CVBS, S-VHS, VGA.



### LCD

Standardized LCD modules for a variety of applications. Wide range of sizes, backlight colors, graphical/character, positive/negative etc.

#### Available formats:

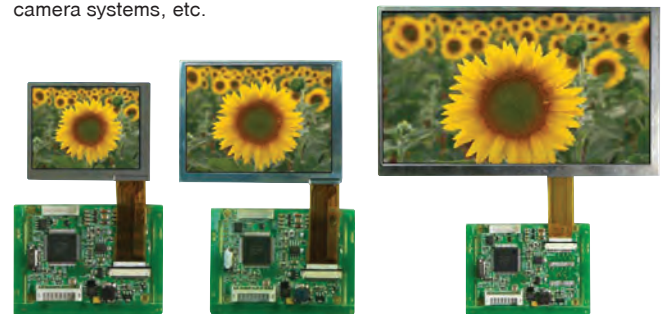
- 2x8, 1x16, 2x16, 4x16, 2x20, 4x20
- 128x64, 240x64, 320x240, 240x128
- many backlight types

#### Character sets:

- English/European
- English/Cyrillic
- English/Japanese

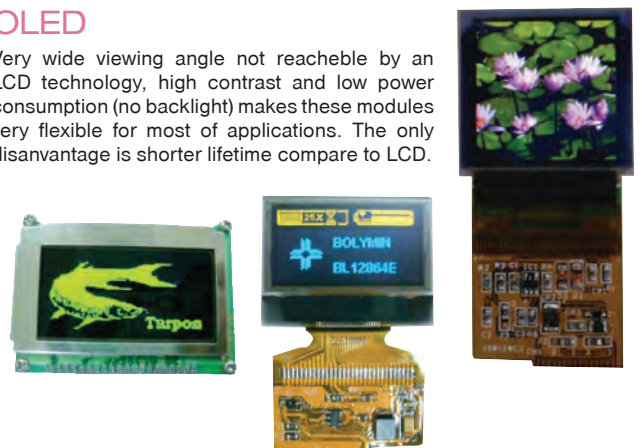
### TFT

Full color modules with analog video input in different sizes 2.5", 3.5", 5.7" and 7.0". suitable for advertising purposes, as medical equipment, camera systems, etc.



### OLED

Very wide viewing angle not reachable by an LCD technology, high contrast and low power consumption (no backlight) makes these modules very flexible for most of applications. The only disadvantage is shorter lifetime compare to LCD.





### Numbering System for Bolymin LCD Modules

B	C	2004	A	Y	P	L	E	H	xxx
0	1	2	3	4	5	6	7	8	9

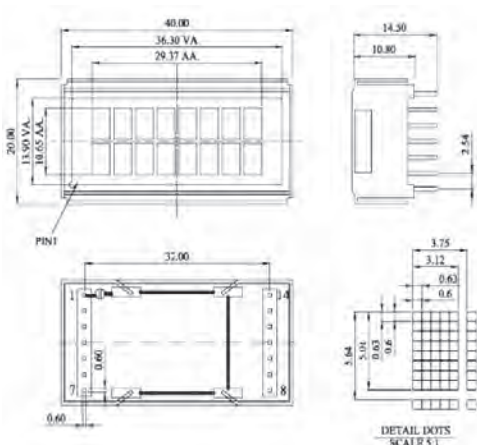
0	<b>Brand</b>	Bolymin	
1	<b>Module Type</b>	C= character type G= graphic type P= TAB/TCP type	O= COG type F= COF type L=OLED
2	<b>Format</b>	2002=20 characters, 2lines 12232= 122 x 32 dots	
3	<b>Version No.</b>	A type	
4	<b>LCD Color</b>	G=STN/gray Y=STN/yellow-green C=color STN	B=STN/blue F=FSTN T=TN
5	<b>LCD Type</b>	R=positive/reflective P=positive/transfective	M=positive/transmissive N=negative/transmissive
6	<b>Backlight type/color</b>	L=LED array/ yellow-green H=LED edge/white R=LED array/red G=LEDedge/yellow-green F=RGB K=LED edge/green	D=LED edge/blue E=EL/white B=EL/blue C=CCFL/white Y=LED Bottom/yellow O=LED array/orangr
7	<b>CGRAM Font (applied only on character type)</b>	J=English/Japanese Font E=English/European Font	C=English/Cyrillic Font H=English/Hebrew Font
8	<b>View Angle/ Operating Temperature</b>	B=Bottom/Normal Temperature H=Bottom/Wide Temperature	T=Top/Normal Temperature W=Top/Wide Temperature C=9H/Normal Temperature U=Bottom/Ultra wide Temperature
9	<b>Special Code</b>	3=3 volt logic power supply n=negative voltage for LCD xxx=to be assigned on data sheet	t=temperature compensation for LCD p=touch panel c=cable/connector

### 2x8 Characters



- alphanumeric LCD modules
- 2x8 characters
- yellow - green LED backlight
- BC 0802B YRNEH - without backlight
- - temperature range: -20°C to +70°C.

BC 0802B



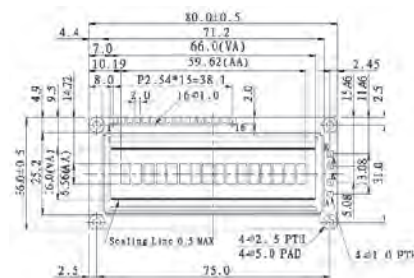
Module	Module Size (mm)	View Area (mm)	Character Size (mm)	Fonts
BC 0802B YPLEH	40x20	36,3x13,9	5,01x3,12	eng/european
BC 0802B YRNEH	40x20	36,3x13,9	5,01x3,12	eng/european

### 1x16 Characters

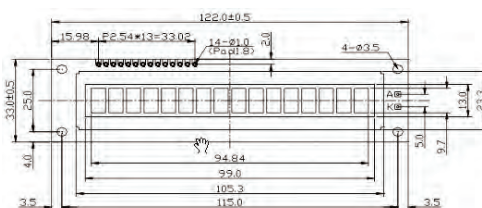


- alphanumeric LCD modules
- 1x16 characters
- green LED backlight
- temperature range -20°C to +70°C.

BC1601A



BC1601D

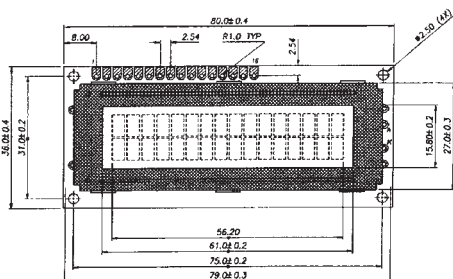


Module	Module Size (mm)	View Area (mm)	Character Size (mm)	Fonts
BC 1601A YPLEH	80x36	66x16	3,07x6,56	eng/european
BC 1601D YPLEH	122x33	99x13	4,84x9,7	eng/european

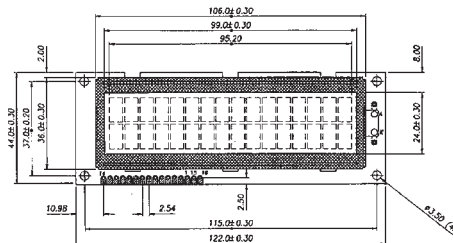
### 2x16 Characters

- alphanumeric LCD modules
- 2x16 characters
- BNHEH blue colour with white backlight (negative)
- FNHEH is black/white. Other models are with yellow/green LED backlight.
- Temperature range -20°C to +70°C.

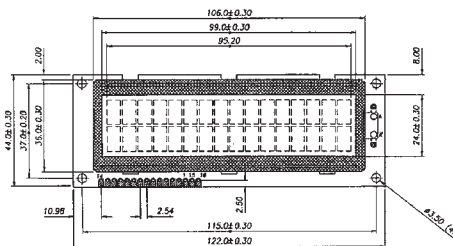
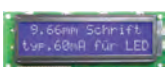
#### BC 1602A



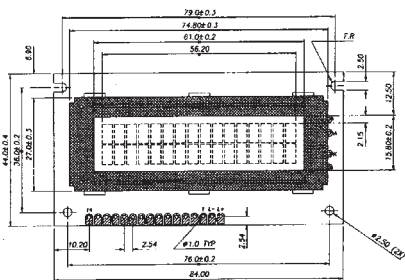
#### BC 1602E



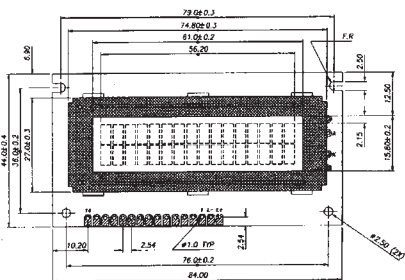
#### BC 1602E



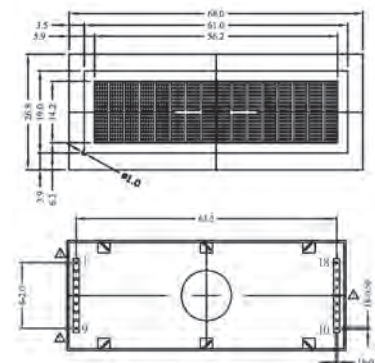
#### BC 1602H



#### BC1602H



### BC1602L



with pin headers

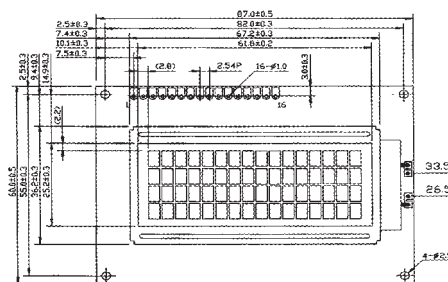
Module	Module Size (mm)	View. Area (mm)	Character Size (mm)	Fonts
BC 1602A BNHEH	80x36	66x16	2,96x5,56	eng/european
BC 1602A FNHEH	80x36	66x16	2,96x5,56	eng/european
BC 1602A YPLEH	80x36	66x16	2,96x5,56	eng/european
BC 1602A YPLCH	80x36	66x16	2,96x5,56	eng/cyrillic
BC 1602A YPLJH	80x36	66x16	2,96x5,56	eng/japan
BC 1602E BNHEH	122x44	99x24	4,84x9,66	eng/european
BC 1602E YPLEH	122x44	99x24	4,84x9,66	eng/european
BC 1602E YPLCH	122x44	99x24	4,84x9,66	eng/cyrillic
BC 1602H BNHEH	84x44	66x16	2,96x5,56	eng/european
BC 1602H FNHEH	84x44	66x16	2,96x5,56	eng/european
BC 1602H YPLEH	84x44	66x16	2,96x5,56	eng/european
BC 1602K YPGEH	59x29,3	52x15	2,54x4,67	eng/european
BC 1602L BNHEH	68x27	61x19	2,96x6,68	eng/european
BC 1602L YPLEH	68x27	61x19	2,96x6,68	eng/european

### 4x16 Characters



Alphanumeric LCD modules with 4x16 characters with yellow - green LED backlight. BC 1604A BNHEH is blue colour with white backlight (negative). Other models are with yellow - green LED backlight. Temperature range: -20°C to +70°C.

#### BC 1604A



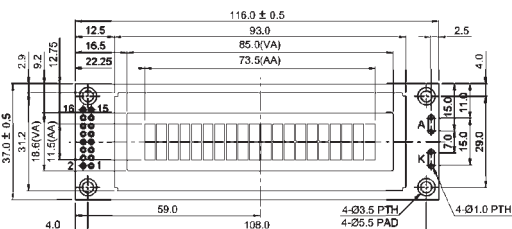
Type	Module Size (mm)	Viewing Area (mm)	Character Size (mm)	Fonts
BC 1604A BNHEH	87x60	62x26	4,75x2,95	eng/european
BC 1604A YPLEH	87x60	62x26	4,75x2,95	eng/european

### 2x20 Characters

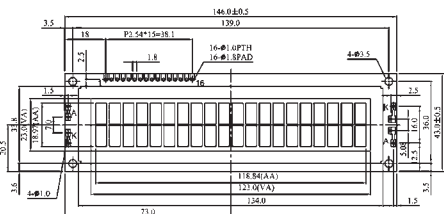


Alphanumeric LCD modules with 2x20 characters. BNHEH is blue colour with white backlight (negative, BC 2002B FNHEH is black / white (negative). Other models are with yellow - green LED backlight. Temperature range: -20°C to +70°C.

BC 2002A



BC 2002C



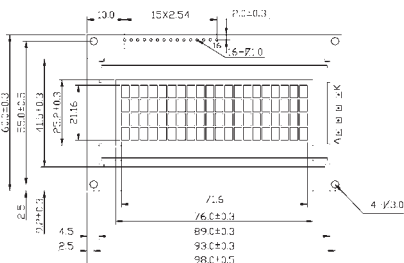
Type	Module Size (mm)	Viewing Area (mm)	Character Size (mm)	Fonts
BC 2002A BNHEH	116x37	85x19	5,55x3,2	eng/european
BC 2002A YPLEH	116x37	85x19	5,55x3,2	eng/european
BC 2002C BNHEH	146x43	123x23	9,22x4,84	eng/european
BC 2002C YPLEH	146x43	123x23	9,22x4,84	eng/european

### 4x20 Characters

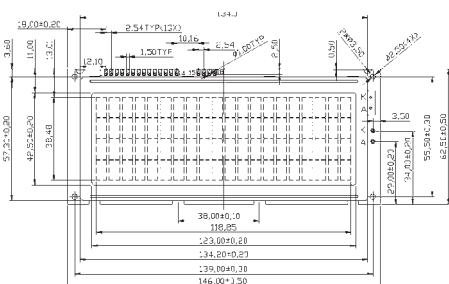


Alphanumeric LCD Modules with 4x20 characters. BNHEH is blue colour with white backlight (negative), BC 2004A FNHEH is black / white (negative). Other models are with yellow - green LED backlight. Temperature range: -20°C to +70°C.

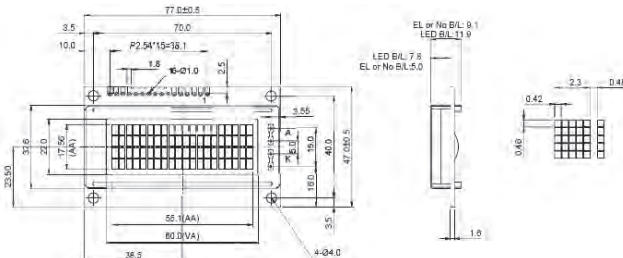
BC 2004A



BC 2004B



BC 2004D

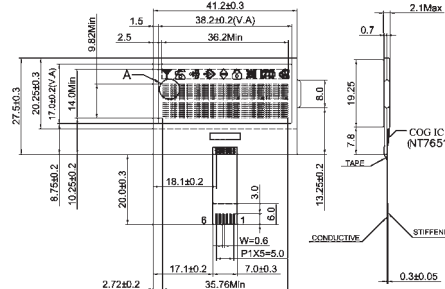


Type	Module Size (mm)	Viewing Area (mm)	Character Size (mm)	Fonts
BC 2004A BNHEH	98x60	77x25	4,75x2,95	eng/european
BC 2004A FNHEH	98x60	77x25	4,75x2,95	eng/european
BC 2004A YPLEH	98x60	77x25	4,75x2,95	eng/european
BC 2004B BNHEH	146x63	124x43	9,22x4,84	eng/european
BC 2004B YPLEH	146x63	124x43	9,22x4,84	eng/european
BC 2004D BNHEH	77x47	60x22	4,03x2,3	eng/european

### Alphanumeric LCD Modules with FFC

#### 2x16 Characters

BO 1602D



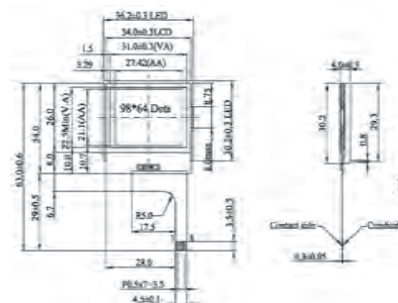
Alphanumeric LCD module with flex wire, 2x16 characters, fonts: eng/eur without backlight, COG package, 5x7 dots with cursor, icons. Built-in controller ST7032i + 3.3V single power supply, 1/16 duty cycle I2C Serial interface.

Type	Module Size (mm)	Viewing Area (mm)	Character Size (mm)	Temperature Range
BO 1602D GPNEB	41,2x27,5	38,2x17,0	4,56x1,86	0°C to +50°C

### Graphic LCD Modules with FC

#### 98x64 Dots

BO 9864B



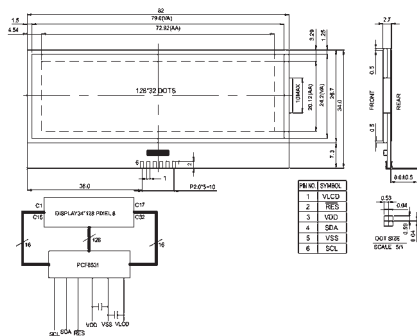
FTN Transflective LCD, COG package. Built-in driver ST7548i, serial I2C data bus, 1/64 duty cycle, +3V power supply. With FPC and ZIF connector

Type	Module Size (mm)	Viewing Area (mm)	Dot Size (mm)	Temperature Range
BO 9864B FPNH	34x34	31,0x22,5	0,31x0,26	0°C to +50°C



### 128x32 Dots

BO 12832A

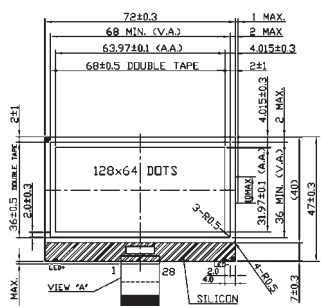


STN/gray positive/transflective without backlight  
COG package  
Built-in controller PCF8531  
+5V power supply  
1/32 duty cycle  
I2C series interface

Type	Module Size (mm)	Viewing Area (mm)	Dot size (mm)	Temperature Range
BO 12832A GPNB	82x34	79x24	0,53x0,59	0°C to +50°C

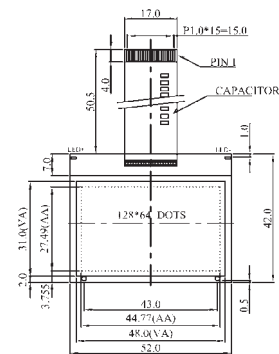
### 128x64 Dots

BO 12864B



COG package  
Built-in controller SED1565  
+5V power supply  
1/64 duty cycle  
+3V+5V single power supply  
On chip LCD booster

BO 12864D



COG package  
Built-in controller ST7541  
+3V single power supply  
1/64 duty cycle  
On chip LCD booster  
4-Gray scale

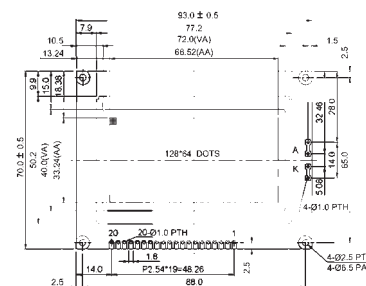
Type	Module Size (mm)	Viewing Area (mm)	Dot Size (mm)	Temperature Range
BO 12864B GPNB	72x47	68x36	0,47x0,47	0°C to +50°C
BO 12864D FPGH	52x42	48x31	0,4x0,32	-20°C to +70°C

### Graphic LCD Modules

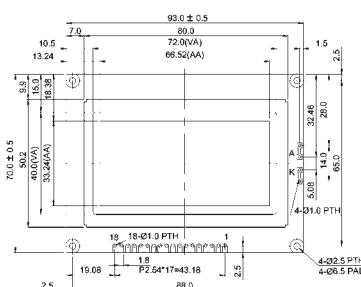
#### 128x64 Dots

BG 12864A

Modules YPLH and FPGH are with yellow-green LED backlight, BNHH are with white LED backlight. Other modules are without backlight.  
BO 12864B GPNB: I2C interface.

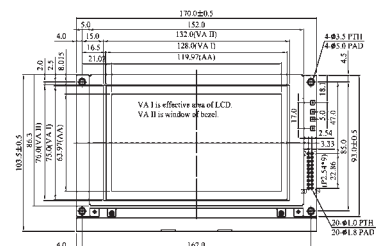


BG 12864D



Type	Module Size (mm)	Viewing Area (mm)	Dot Size (mm)	Temperature Range
BG 12864A BNHH	93x70	72x40	0,48x0,48	-20°C to +70°C
BG 12864A YPLH3n	93x70	72x40	0,48x0,48	-20°C to +70°C
BG 12864A YPLHn	93x70	72x40	0,48x0,48	-20°C to +70°C
BG 12864D BNHH	78x70	62x44	0,4x0,56	-20°C to +70°C
BG 12864D YPLHn	78x70	62x44	0,4x0,56	-20°C to +70°C

#### 240x128 Dots



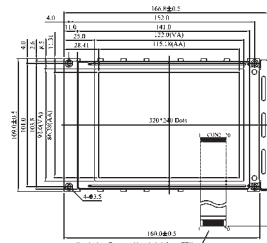
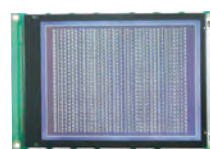
With CCFL white backlight, negative.

Type	Module Size (mm)	Viewing Area (mm)	Dot Size (mm)	Temperature Range
BG 240128A FNCHnt	170x104	132x76	0,47x0,47	-20°C to +70°C

#### 320x240 Dots

CCFL white backlight, negative, touch panel.

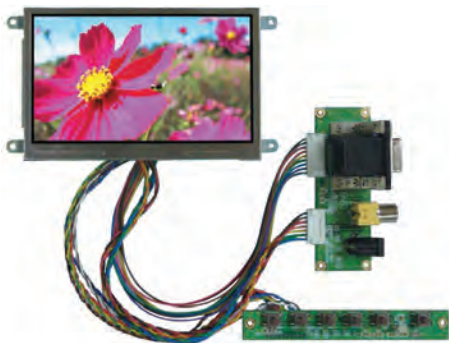
BG 320240F



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[www.sosoelectronic.com](http://www.sosoelectronic.com)

### TFT Modules

#### 4.3" BT043DCEAHH352a\$

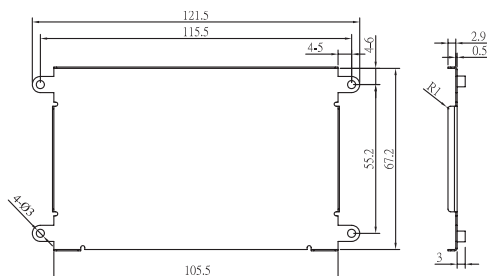


#### TFT-LCD

- 4.3 inch TFT LCD panel BT043DCNNHHS.
- View angle (U/D/L/R): 50/70/70/70
- Resolution: 480\*(RGB)\*272 (pixels), 0.066 (h) x 0.198 (v) mm dot pitch.
- Brightness (cd/m2): 400cd/m2 Typical.
- Contrast Ratio: 500:1.
- Active area: 95.04\*53.856 mm.
- Dimension (W x H x T): 105.5\*67.2\*4.05 mm.

#### Video Board:

- Power Requirements: 12.0V DC±10%.
- Operating Temperature Range: -20 +70°C.
- Storage Temperature Range: -30 +80°C.
- Dimension (W x H x T): 76.9\*63.9\*14 mm.
- Keyboard: 6 Keys with OSD menu for image quality tuning supported.
- Multi-input: CVBS input, VGA input.
- Input impedance: 75Ω.
- Video system: NTSC/PAL/SECAM auto detection.



#### 5" BT050BADAHH352e\$

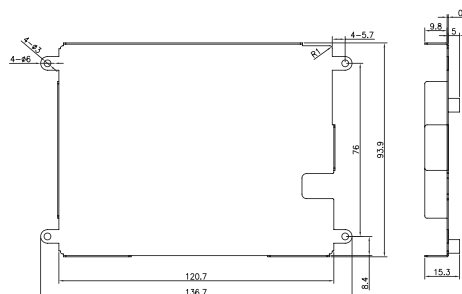


#### TFT-LCD

- 5.0 inch TFT LCD panel BT050BANNHHS.
- View angle (U/D/L/R): 40/55/60/60
- Resolution: 640\*(RGB)\*480 (pixels), 0.159 (h) x 0.156 (v) mm dot pitch.
- Brightness (cd/m2): 450cd/m2 Typical.
- Contrast Ratio: 400:1.
- Active area: 101.76\*74.88 mm.
- Dimension (W x H x T): 102.7\*92.8\*12.5 mm.

#### Video Board:

- Power Requirements: 12.0V DC±10%.
- Operating Temperature Range: -20 +70°C.
- Storage Temperature Range: -30 +80°C.
- Dimension (W x H x T): 100.0\*70.0\*15 mm.
- Keyboard: 6 Keys with OSD menu for image quality tuning supported.
- Signal input: VGA input.
- Input impedance: 75Ω.



#### 7" BT070DHBAAHH352e\$

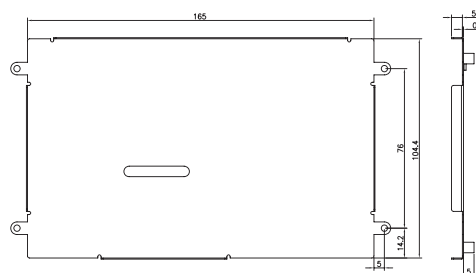


#### TFT-LCD

- 7.0 inch TFT LCD panel BT070DHNNHHS.
- View angle (U/D/L/R): 60/70/70/70
- Resolution: 800\*(RGB)\*480 (pixels), 0.1905 (h) x 0.1905 (v) mm dot pitch.
- Brightness (cd/m2): 350cd/m2 Typical.
- Contrast Ratio: 400:1.
- Active area: 152.4\*91.44 mm.
- Dimension (W x H x T): 165\*104.44\*5.2 mm.

#### Video Board:

- Power Requirements: 12.0V DC±10%.
- Operating Temperature Range: -20~ +70°C.
- Storage Temperature Range: -30~ +80°C.
- Dimension (W x H x T): 162\*100\*14 mm.
- Keyboard: 6 Keys with OSD menu for image quality tuning supported.
- Multi-input: CVBS input, VGA input.
- Input impedance: 75Ω.
- Video system: NTSC/PAL/SECAM auto detection.





**ELECTRONIC ASSEMBLY** is the Germany based company focusing on development and production of displays with built-in intelligence. All displays from Electronic Assembly have a serial interface and are in general very user-friendly, according to their slogan – “Displays designed to make things easy”.

**ELECTRONIC ASSEMBLY** je německá společnost, která se zaměřuje na vývoj a výrobu displejů s vestavěnými inteligentními technologiemi. Všechny displeje od Electronic Assembly mají sériové rozhraní a jsou obecně velmi uživatelsky přívětivé, podle sloganu společnosti - "Displeje, které jsou navrženy pro usnadnění věci".

**ELECTRONIC ASSEMBLY** ist ein deutsches Unternehmen, welches sich auf die Entwicklung und Produktion von Displays mit integrierten intelligenten Technologien spezialisiert. Sämtliche Displays von Electronic Assembly verfügen über eine serielle Schnittstelle und sind generell sehr benutzerfreundlich, gemäß dem Unternehmensmotto – „Displays, die dazu entworfen sind, um die Dinge einfacher zu machen“.

Az német **ELECTRONIC ASSEMBLY** cég beépített intelligenciával rendelkező kijelzők fejlesztésével és gyártásával foglalkozik. Az Electronic Assembly minden kijelzője rendelkezik soros interfésszel és általában nagyon felhasználóbarát, mint ahogyan azt jelmondatuk is sugallja – "Kijelzők egyszerűsége tervezve".

**ELECTRONIC ASSEMBLY** to spółka niemiecka, koncentrująca się na rozwoju i produkcji wyświetlaczy z wbudowaną inteligencją. Wszystkie wyświetlacze od Electronic Assembly posiadają złącze szeregowe i są ogólnie bardzo przyjazne dla użytkownika, zgodnie z ich hasłem – "Wyświetlacze zaprojektowane by robić rzeczy prostymi".

**ELECTRONIC ASSEMBLY** este o societate cu sediul în Germania specializată în dezvoltarea și producția de afișaje cu inteligență integrată. Toate afișajele de la Electronic Assembly sunt echipate cu o interfață serială și extrem de familiară utilizatorului – conform sloganului lor „Afișaje făcute să simplifice lucrurile”.

**ELECTRONIC ASSEMBLY** je nemecká spoločnosť, ktorá sa zameriava na vývoj a výrobu displejov so vstavanými inteligentnými technológiami. Všetky displeje od Electronic Assembly majú sériové rozhranie a sú všeobecne veľmi užívateľsky prívětivé, podľa sloganu spoločnosti - "Displeje, ktoré sú navrhnuté pre uľahčenie vecí".

Electronic Assembly markets a broad spectrum of top-quality industrial displays to customers in a number of industries ranging from process automation and machinery manufacturing to IT. Because Electronic Assembly offers all the familiar advantages of a mid size company, it has the flexibility to accommodate the wide-ranging needs of its customers. Electronic assembly provides free-to-download SW development tools. In a production range we can find world unique real 3,3V displays, modules with user-selectable backlight as well as intelligent graphic displays with powerful drawing and other graphic functions.

### eDIP

The first intelligent graphic displays:

- 128x64, 160x104, 240x128, 320x240 dots monochrome

no time-consuming graphics programming, powerful commands and a variety of interfaces (RS-232, I<sup>2</sup>C, SPI), extremely compact construction, clear price advantage compared to individualized solutions



### eDIP TFT

TFT display with 7", 4.3" and 3.2", which are immediately running and it provides from the first minute the full functionality. The display does require a single supply 5V= and an interface RS-232, I<sup>2</sup>C or SPI only.

All character sets and control /graphic functions for the display and the touch panel are immediately available.



### DIP

Because of their design, DIP modules are extremely compact: there is no PCB overhang, no drilled holes for assembly and no contact pads for connectors or cables. The viewing area is optimally sized and the large font makes reading easier.

DIP modules are simply inserted in the PCB and soldered in place. No screws, distance sleeves or cables are required

Series are compatible both in terms of pins and dimensions. It is therefore a simple matter to use both a text display (e.g. 2 x 16) and a graphics display (e.g. 122 x 32) within a series without the need for any mechanical or hardware modifications.



## Why ELECTRONIC ASSEMBLY?

- no time-consuming graphics programming at a low level
- drastically reduced time-to-market
- high flexibility thanks to powerful commands and a variety of interfaces (RS-232, I<sup>2</sup>C, SPI)
- extremely compact design
- price advantage compared to customized solutions

### KIT

The EA KITfamily graphics kits are a fully assembled control and operating units with a variety of integrated functions. As well as offering excellent super-twist contrast, the compact display can be put into operation immediately. It is controlled via the standard RS-232 or RS-422 interface. In addition to complete graphics routines for display output, the graphics kit also contains a wide variety of fonts.



### DOG

This new display series was specially developed for low-power hand-held applications. For the first time it is possible to operate a standard display at 3.3V

- 128x64 large 3.0..3.3V, SPI
- 132x32 large 2.4..3.3V, SPI
- 102x64 dots running from 2.5V with SPI
- 160x104 dots with SPI and I<sup>2</sup>C bus
- flat at 2.0(2.8) mm without backlighting and 5.8(6.4) mm with backlighting
- can be soldered directly into the PCB without any further assembly
- 4-bit, 8-bit and SPI interface
- many different designs which can be implemented as of 1 unit

Six different colors are available as backlighting.



### OLED

In our offer we have alphanumerical displays series EAW from Electronic Assembly. They provide a contrast ratio of minimum 2000:1, thanks to their real black background and active technology.





**EA DIP Alphanumeric Modules**

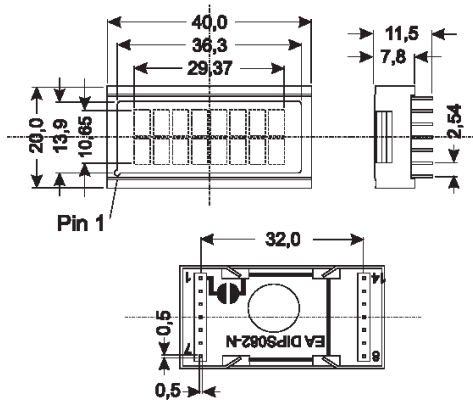
Because of their unique design, DIP modules are extremely compact: there is no PCB overhang, no drilled holes for assembly and no contact pads for connectors or cables. The viewing area is optimally sized and the large font makes reading easier. DIP modules are simply inserted in the PCB and soldered in place. No screws, distance sleeves or cables are required.

The displays forming and series are compatible both in terms of pins and dimensions. It is therefore and simple matter to use both and text display (e.g. 2 x 16) and and graphics display (e.g. 122 x 32) within and series without the need for any mechanical or hardware modifications.

**2x8 Characters**



Alphanumeric LCD Modules  
2x8 characters  
yellow-green LED backlight (besides EA DIPS082-HN)

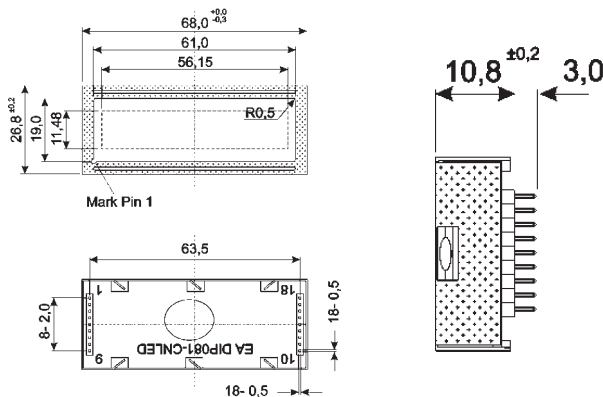


Type	Module Size (mm)	Viewing Area (mm)	Character or Dot size (mm)	Temperature Range
EA DIPS082-HN	40x20x8	36x14	5,55x2,95	-20°C to +70°C
EA DIPS082-HNLED	40x20x11	36x14	5,55x2,95	-20°C to +70°C

**4x20 Characters**



Alphanumeric LCD Modules  
4x20 characters DIP204B4NLW is blue with white backlight, other models are with yellow-green LED backlight.



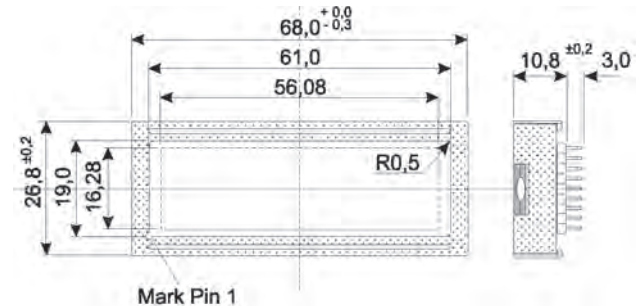
Type	Module Size (mm)	Viewing Area (mm)	Character or Dot Size (mm)	Temperature Range
EA DIP204-4NLED	68x27x11	61x19	3,72x2,31	0°C to +50°C
EA DIP204B-4NLW	75x27x11	61x19	3,72x2,31	-20°C to +70°C

**EA DIP Graphic Modules**

**122x32 Dots**



LCD Graphic Modules with 122x32 dots. Model EA DIPB-5NLW is with blue-white backlight, other models are with yellow-green or amber LED backlight.

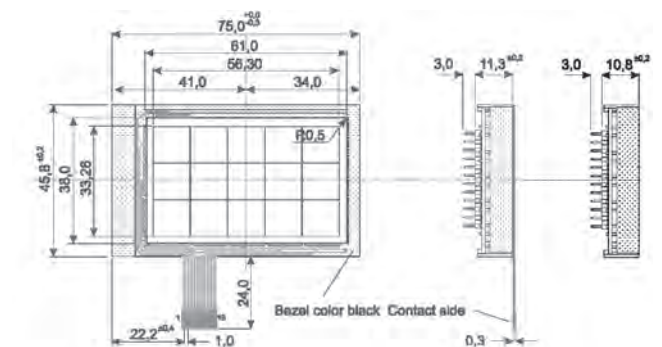


Type	Module Size (mm)	Viewing Area (mm)	Character or Dot Size (mm)	Temperature Range
EA DIP122-5HNLED	68x27	61x19	0,47x0,42	-20°C to +70°
EA DIP122B-5NLW	75x27	61x19	0,47x0,42	-20°C to +70°
EA DIP122J-5NLA	75x27	61x19	0,47x0,42	-20°C to +70°

**128x64 Dots**



LCD Graphic Modules with 128x64 dots. Model EA DIP128J-6N5LWTP is with black-white backlight, other models are with blue-white LED backlight. Temperature range: -20°C to 70°C Note: Touch panel, 5x3 buttons for TP models.

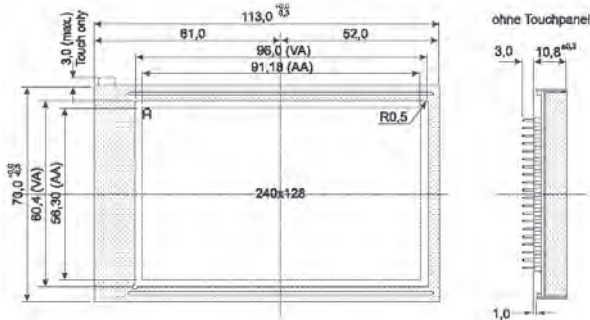


Type	Module Size (mm)	Viewing Area (mm)	Character or Dot Size (mm)
EA DIP128-6N5LWTP	75,0x45,8x11,3	61x36	0,50x0,42
EA DIP128J-6N5LWTP	75,0x45,8x11,3	61x36	0,50x0,42
EA DIP128J-6N5LETP	75,0x45,8x11,3	61x36	0,50x0,42
EA DIP128J-6N5LATP	75,0x45,8x11,3	61x36	0,50x0,42

### EA eDIP Modules



Serial graphic displays with built-in Intelligence. Efficient operation with extensive drawing functions and fonts.

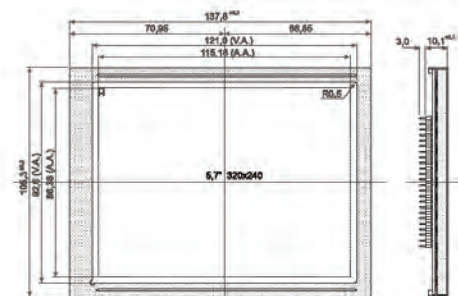


Type	Module Size (mm)	Colour	Backlight	Temperature range
EAeDIP240J-7LWTP	113x70	FSTN, positive	LED, white	-20°C to +70°
EA eDIP240B-7LW	113x70	blue, negative	LED, white	-20°C to +70°
EA eDIP240J-7LW	113x70	FSTN, positive	LED, white	-20°C to +70°
EA eDIP240J-7LA	113x70	FSTN, positive	LED, orange	-20°C to +70°
EA eDIP240J-7LATP	113x70	FSTN, positive	LED, orange	-20°C to +70°

Development kits are available for every display module.



### 320x240 Dots



Type	Module Size (mm)	Colour	Backlight	Temperature Range
EA eDIP320B-8LW	138x105	blue, negative	LED, white	-20°C to +70°
EA eDIP320B-8LWTP	138x105	blue, negative	LED, white	-20°C to +70°

### EA eDIP TFT Modules



Serial TFT graphic displays with built-in Intelligence. Efficient operation with extensive drawing functions and fonts. RS232, I2C, SPI interfaces.

Type	Module Size (mm)	Backlight	Temperature Range	Note
EA eDIP232-A	82x61x12	LED, white	-20°C to +70°	
EA eDIP243-ATP	107x71	LED, white	-20°C to +70°	touch panel
EA eDIP270-A	170x112x14	LED, white	-20°C to +70°	

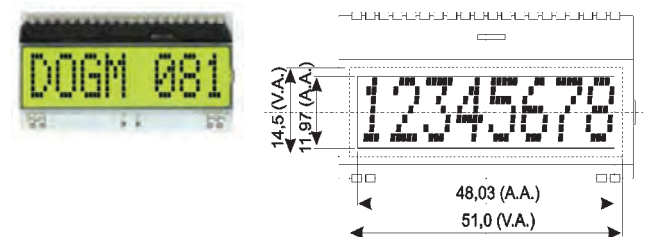
Also available black anodized aluminium bezels.

### EA DOG Alphanumerical Modules

With its EA DOG series, ELECTRONIC ASSEMBLY presents the world's first display series which will run on 3.3 V systems without auxiliary power. They can, of course be used on traditional 5 V systems. Unlike normal LCD modules, you order the display and the corresponding backlight separately. This gives you a wealth of possible combinations. Designed for compact hand-held devices, this modern LCD range provides a number of real benefits with or without backlight:

- extremely compact at 55 x 31 mm at the standard font size of 5.57 mm (2 x 16)
- ultra-flat at 2.0 mm without backlight or 5.8 mm including LED backlight
- 4-bit, 8-bit and SPI interface (4-wire)
- typical power consumption of only 250µA in full operation (LED white backlight as of 3mA)
- easy installation by simply soldering into the board
- A whole range of design variants (63) can be supplied as of single units
- Changing background color

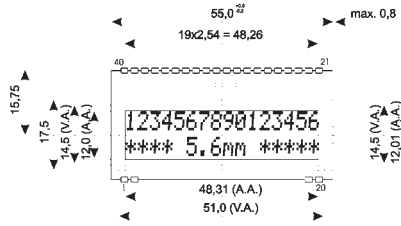
### 1x8 Characters



Type	Module Size (mm)	Viewing Area (mm)	Character or Dot size (mm)	Temperature Range
EA DIPS082-HN	40x20x8	36x14	5,55x2,95	-20°C to +70°C
EA DIPS082-HNLED	40x20x11	36x14	5,55x2,95	-20°C to +70°C

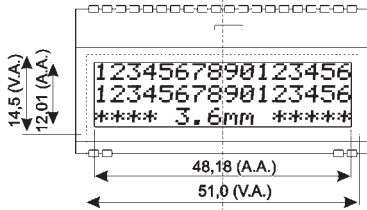


**2x16 Characters**



Type	Technology
EA DOGM162B-A	STN negative blue transmissive
EA DOGM162E-A	STN positive yellow/green transmissive
EA DOGM162L-A	STN positive yellow/green reflective
EA DOGM162S-A	FSTN negative black transmissive
EA DOGM162W-A	FSTN positive transfective

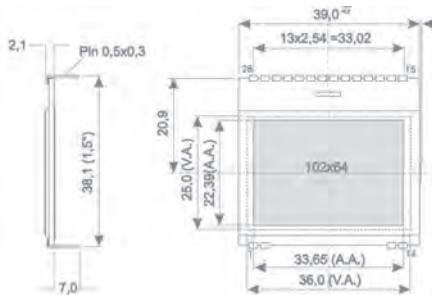
**3x16 Characters**



Type	Technology
EA DOGM163B-A	STN negative blue transmissive
EA DOGM163E-A	STN positive yellow/green transmissive
EA DOGM163L-A	STN positive yellow/green reflective
EA DOGM163S-A	FSTN negative black transmissive
EA DOGM163W-A	FSTN positive transfective

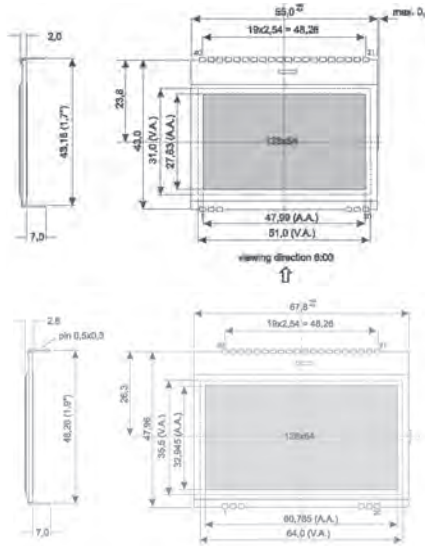
**EA DOG Graphic Modules**

**102x64 Dots**



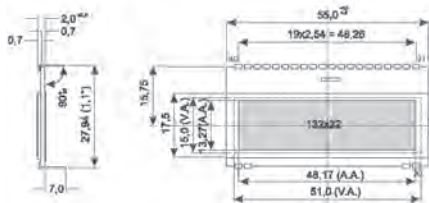
Type	Module Size (mm)	Type and colour
EA DOGS102B-6	39x38	Blue Negative Transmissive
EADOGS102N-6	39x38	White Possitive Reflective
EADOGS102W-6	39x38	White Possitive Transmissive

**128x64 Dots**



Type	Module Size (mm)	Type and colour
EA DOGM128B-6	55x46	STN negative transmissive, blue
EA DOGM128E-6	55x46	STN positive transmissive, green-yellow
EA DOGM128L-6	55x46	STN positive reflective, green-yellow
EA DOGM128S-6	55x46	FSTN negative transmissive, black
EA DOGM128W-6	55x46	FSTN positive transfective, white
EA DOGL128B-6	68x51	STN negative transmissive, blue
EA DOGL128E-6	68x51	STN positive transmissive, green-yellow
EA DOGL128L-6	68x51	STN positive reflective, green-yellow
EA DOGL128S-6	68x51	FSTN negative transmissive, black
EA DOGL128W-6	68x51	FSTN positive transfective, white

**132x32 Dots**



Type	Module Size (mm)	Type and colour
EA DOGM132W-5	55x31	FSTN positive transfective
EA DOGM132E-5	55x31	STN positive transmissive, green-yellow
EA DOGM132B-5	55x31	STN negative transmissive, blue
EA DOGM132S-5	55x31	FSTN negative transmissive
EA DOGM132L-5	55x31	STN positive reflective, green-yellow

**ELECTRONIC ASSEMBLY**  
making things easy

**DISPLAYS AND TOUCH-DISPLAYS**



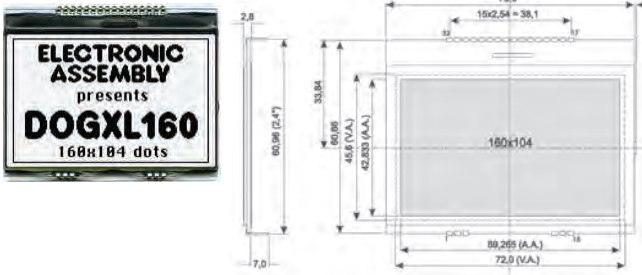
- Intelligent Displays
- TFT-Displays
- Chip-on-Glass Displays
- RS 232/SPI/I<sup>2</sup>C
- USB Starterkits

ELECTRONIC ASSEMBLY GmbH

Phone.: +49 (0)8105/778090  
vertrieb@lcd-module.de  
www.lcd-module.de



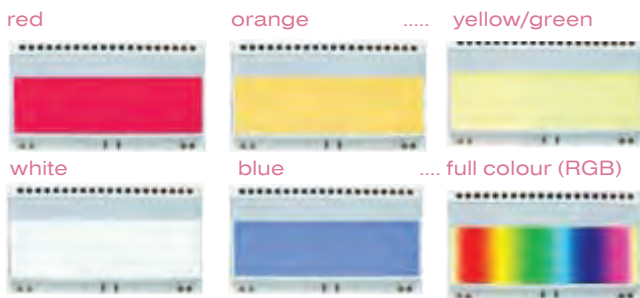
### 160x104 Dots



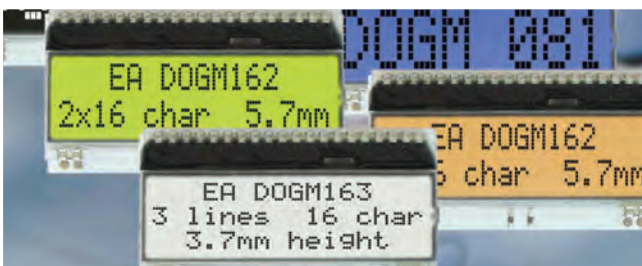
Type	Module Size (mm)	Type and colour
EADOGXL160L-7	78x90,96	Yellow/Green Positive Reflective
EADOGXL160W-7	78x90,96	White Positive Transflective
EADOGXL160B-7	78x90,96	Blue Negative Transflective

### Backlight Panels for EA DOG (ordered separately)

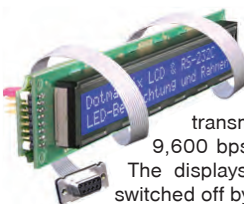
Simply clip the display and the backlighting unit together and you have up to 23 possible combinations. There are 2 separate LED paths available for each monochrome backlight that can be switched in parallel or in series to suit the system voltage. This means that most backlights can be run at either 3.3 V or 5 V.



Type	Colour backlight
EA LED 39x41-W	LED B/L for DOGS, white
EA LED 39x41-A	LED B/L for DOGS, orange
EA LED55x31-A	LED B/L for DOGM, orange
EA LED55x31-B	LED B/L for DOGM, blue
EA LED55x31-G	LED B/L for DOGM, green/yellow
EA LED55x31-R	LED B/L for DOGM, red
EA LED55x31-W	LED B/L for DOGM, white



### Displays with RS-232/RS-422 interface



Dot-matrix LCD series that are ready for operation with a driver and a bezel or a snap-in housing. They are connected to a standard RS-232C interface (or, optionally, an RS-422). The data transmission rate can be set to 300, 1,200, 2,400 or 9,600 bps. All cursor control (line feed etc.) is automatic. The displays are equipped with LED lighting that can be switched off by software means.

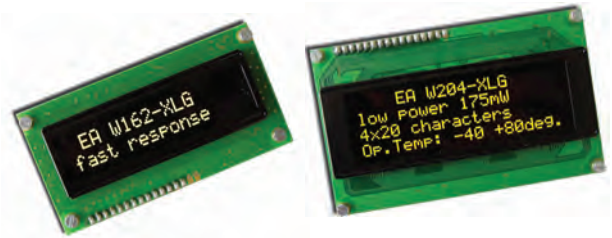
All displays except for 8- and 16-line displays are available for a 5V or 9-35V supply.

For full offer, please visit our website [www.soselectronic.com](http://www.soselectronic.com)

### OLED Modules

Series EAW have an extremely fast 10us response time, which stays fast even at icy temperatures. Great advantage over standard LCD modules is their ability to provide a full contrast even at -40°C.

No limitation in viewing angle and no need for contrast adjustment belong to another advantages in comparison to LCD displays. EAW displays have an integrated controller (HD44780-like) and already as a standard, they provide all important characters sets: English, Japanese, European and Cyrillic. Further, up to 8 characters can be defined by user. Displays can work with 5V or 3.3V without modification. Some types are available in two versions – light green and icewhite.



Type	Module Size (mm)	Viewing Area (mm)	Char height (mm)	Hints
EAW082-XLG	58x32x10	38x10	5.5	yellow/green
EAW162-X3LW	80x36x10	66x16	5.5	icewhite
EAW162-X3LG	80x36x10	66x16	5.5	yellow/green
EAW162-X9LG	85x36x10	66x16	5.5	yellow/green
EAW162-XLG	84x44x10	66x16	5.5	yellow/green
EAW162-XBLW	122x55x10	99x24	8.9	icewhite
EAW162-XBLG	122x55x10	99x24	8.9	yellow/green
EAW202-XLG	116x37x9.8	85x18.6	5.5	yellow/green
EAW204-XLG	98x60x10	70x25.2	5.5	yellow/green

### Bezels



#### EA 017-xxU series

The bezels of the EA 017-xxU series are made of black ABS material to UL 94 V0 (up to 100°C, self-extinguishing, non-combustible) with a scratch-resistant, structured surface. They contain a snap-in mechanism for mounting a wide range of plates with a thickness of 1mm. The plates can thus be easily replaced, as required. A front plate can also be delivered with the specified bezels (clear plexiglass, anti-glare plexiglass or glass).

#### EA 017-xx series

The bezels of the EA 017-xx series have a matt black, coated surface and an undercut at the back for sticking on plexiglass plates with a thickness of 1-2mm. The specified bezels can be delivered optionally with or without a fitted plexiglass plate.

#### EA 027-xxKE series

The bezels of the EA 027-xxKE series are made of anthracite-colored ABS material. They are delivered exclusively with a replaceable, anti-glare plexiglass plate. They are delivered in packs of 10.



Australian company 4D SYSTEMS specializes in graphic solutions for universal usage, as well as in special customized solutions. A common feature of 4D Systems graphic solutions is their versatility, easy programming and in a respectable rate also a mutual compatibility.

**Australská společnost 4D SYSTEMS se specializuje na grafická řešení pro univerzální použití, jakož i na speciální řešení na míru. Společným rysem 4D Systems grafických řešení je jejich univerzálnost, jednoduché programování a také vzájemná kompatibilita.**

**Das australische Unternehmen 4D SYSTEMS spezialisiert sich auf grafische Lösungen zur universellen Nutzung sowie auf spezielle maßgeschneiderte Lösungen. Ein gemeinsames Merkmal der grafischen Lösungen von 4D Systems ist deren Vielseitigkeit, einfache Programmierung und gegenseitige Kompatibilität.**

**Az ausztrál 4D SYSTEMS univerzális használatra szánt és az egyedileg testreszabott grafikai megoldásokra specializálódott. A 4D Systems grafikai megoldásainak közös tulajdonsága a sokoldalúság, könnyű programozhatóság és nem elhanyagolhatóan a kölcsönös kompatibilitás.**

**Australijska spólka 4D SYSTEMS specializuje się w rozwiązaniach graficznych dla zastosowania ogólnego, jak również w specjalnych rozwiązaniach klienckich. Wspólną cechą rozwiązań graficznych 4D Systems jest ich uniwersalność, łatwe programowanie oraz w znacznym stopniu również wzajemna kompatybilność.**

**Societatea austrialiană 4D SYSTEMS este specializată în soluții grafice de uz general precum și în variante personalizate. O caracteristică comună a soluțiilor grafice a 4D Systems este versatilitatea, programarea ușoară și compatibilitatea mutuală, în limite rezonabile.**

**Austrálska spoločnosť 4D SYSTEMS sa špecializuje na grafické riešenie pre univerzálne použitie, ako aj na špeciálne riešenie na mieru. Spoločným rysom 4D Systems grafického riešenia je ich univerzálnosť, jednoduché programovanie a aj vzájomná kompatibilita.**

Among main products of company 4D Systems belong two graphic chips and complete graphic LCD and OLED modules based on these chips. Further in the range of products you can find programming adapters, graphic interfaces, displays, development kits, USB to serial programming converters, serial interface cameras, GPS module and other. A big advantage is, that a software, which you will develop for a certain display module type, is practically without modification usable for any other type of module. Such a solution eliminates risk of frequent allocation or unavailability of various displays from other producers. 4D Systems products ensure, that if the given module is discontinued after some time, you can use the same program into a new module, without expensive development. Company 4D Systems provides a large development support in the form of programming adapters, development kits, development software as well as sample applications.

## Why 4D SYSTEMS?

- complete powerful graphic modules with LCD or OLED
- usable as stand-alone or as slave modules
- user-friendly 4DGL programming language
- the same program can be used on various modules
- large development support
- excellent price/ performance ratio

### uLCD14 (SGC/GFX)

The uLCD-144(GFX) is a compact and cost effective display module using the latest state of the art LCD (TFT) technology with an embedded GOLDELOX-GFX2 graphics processor that delivers 'stand-alone' functionality to any project. Powerful graphics, text, image, animation and countless more features are built inside the GOLDELOX-GFX2 chip.

- 128xRGBx128 resolution, 65K true to life colours, LCD-TFT screen.
- 1.44" diagonal size, 43 x 31 x 6.4mm. Active Area: 25.5mm x 26.5mm.
- LED back lighting with greater than 150° viewing angle.
- 2 x GPIO ports supports: Digital I/O, A/D converter with 8/10 bit resolution, Complex sound generation, Dedicated RTTTL tune engine, Multi-Switch Joystick, Dallas 1-Wire
- Serial TTL interface with auto-baud feature (300 to 600K baud).
- On-board micro-SD memory card adaptor for storing of icons, images, animations, etc. Supports 64MB to 2GGB micro-SD as well as micro-SDHC memory cards starting from 4GB and above.
- 4.0V to 5.5V range operation (single supply).



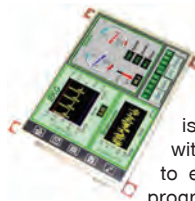
16x General Purpose I/O pins. Upper 8 bits can be used as an I/O Bus for fast 8-bit parallel data transfers.

- On-board micro-SD memory card adaptor for multimedia storage and data logging purposes. HC memory card support is also available for cards larger than 4GB.
- Dedicated PWM Audio pin supports FAT16 audio WAV files and complex sound generation.
- On-board audio amplifier with a tiny 8 Ohms speaker for sound generation and WAV file playback.
- 4.0V to 5.5V range operation (single supply).

### uLCD-32PT(SGC/GFX)

The PICASO-GFX2 belongs to a family of processors powered by a highly optimised soft core virtual engine, E.V.E. (Extensible Virtual Engine). EVE is a proprietary, high performance virtual processor with an extensive byte-code instruction set optimised to execute compiled 4DGL (4D Graphics Language) programs.

- 240 x 320 QVGA resolution, RGB 65K true to life colours, TFT screen.
- Integrated 4-Wire resistive Touch Panel.
- 2x Asynchronous hardware serial ports (COM0, COM1), TTL interface, with 300 baud to 256K baud, 1x I2C interface (Master), 8x 16 bit timers with 1 millisecond resolution, 16x General Purpose I/O pins. Upper 8 bits can be used as an I/O Bus for fast 8-bit parallel data transfers.
- On-board micro-SD memory card adaptor for multimedia storage and data logging purposes. HC memory card support is also available for cards larger than 4Gb
- On-board audio amplifier with a tiny 8 Ohms speaker for sound generation and WAV file playback.
- 4.0V to 5.5V range operation (single supply).



### uLCD-28PT(SGC/GFX)

The uLCD-28PT(GFX) showcases a 2.8" LCD Touch screen, which packs a dense number of pixels in a small area making it one of the most attractive products in the micro-LCD (uLCD) range.

- 240 x 320 QVGA resolution, RGB 65K true to life colours, TFT screen.
- Integrated 4-Wire resistive Touch Panel.
- 2x Asynchronous hardware serial ports (COM0, COM1), TTL interface, with 300 baud to 256K baud, 1x I2C interface (Master), 8x 16 bit timers with 1 millisecond resolution,







### µLCD-43P(SGC/GFX)

The µLCD43(GFX) is an intelligent graphics display that harnesses the power to deliver a diverse range of features in a single, compact cost effective unit. Embedded at the heart of the design is the PICASO-GFX2 processor, which is driven by a highly optimised virtual core engine; EVE (Extensible Virtual Engine).



- 480 x 272 QVGA resolution, RGB 65K true to life colours, TFT screen.
- Optional Integrated Touch Panel: Non-Touch, Resistive Touch, Capacitive Touch
- 2x Asynchronous hardware serial ports (COM0, COM1), TTL interface, with 300 baud to 256K baud, 1x I2C interface (Master), 8x 16 bit timers with 1 millisecond resolution, 16x General Purpose I/O pins. Upper 8 bits can be used as an I/O Bus for fast 8-bit parallel data transfers.
- On-board micro-SD memory card adaptor for multimedia storage and data logging purposes. HC memory card support is also available for cards larger than 4GB.
- Dedicated PWM Audio pin supports FAT16 audio WAV files and complex sound generation.
- On-board audio amplifier with a tiny 8Ω speaker for sound generation and WAV file playback.
- 4.0V to 5.5V range operation (single supply).

### Goldelox

#### Embedded Graphics Controller

The architecture of the base GOLDELOX device is such that it can be reconfigured either as the GOLDELOX-SGC or the GOLDELOX-GFX2. This chip-level configuration is easily achieved by re-programming the chip with the appropriate PmmC file.



- GOLDELOX-SGC : for Serial Platform (slave graphics controller)
- GOLDELOX-GFX2: for 4DGL Platform (stand alone host graphics controller)
- Low-cost OLED/LCD display graphics user interface solution
- Connect to any colour display that supports an 80-Series 8 bit wide CPU interface
- Built in high performance virtual processor engine (EVE) with an extensive byte-code instruction set optimised for 4DGL, the high level 4D Graphics Language
- Comprehensive set of built in high level graphics functions and algorithms
- Asynchronous hardware Serial port with auto-baud feature (300 to 256K baud).
- Hardware SPI port interface for SD memory cards or Serial Flash memory chips for storing of icons, images, animations, etc.
- Dedicated sound pin with complex sound generation
- Tiny 6mm x 6mm 28pin QFN package

### Picasso

#### Embedded Graphics Controller

The architecture of the base PICASSO device is such that it can be reconfigured either as the PICASSO-SGC or the PICASSO-GFX. This chip-level configuration is easily achieved by re-programming the chip with the appropriate PmmC file.



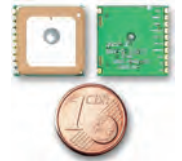
- PICASSO-SGC : for Serial Platform (slave graphics controller)
- PICASSO-GFX : for 4DGL Platform (stand alone host graphics controller)
- Low-cost OLED/LCD and TFT display graphics user interface solution.
- Connect to any colour display that supports an 80-Series 16 bit wide CPU interface. All data and control signals are provided.
- Built in high performance virtual processor core (EVE) with an extensive byte-code instruction set optimised for 4DGL, the high level 4D Graphics Language.
- Comprehensive set of built in high level graphics functions and algorithms that can draw lines, circles, text, and much more.
- Supports all available Windows fonts and characters (imported as external fonts using FONT and DISP software tools).
- Dedicated PWM Audio pin supports FAT16 audio wave files and complex sound generation.

- SPI interface support for SDHC/SD memory card for multimedia storage and data logging purposes (µSD with up to 2GB and SDHC memory cards starting from 4GB and above).
- 4-Wire resistive touch panel support.
- Available in a 64 pin TQFP 10mm x 10mm package.

### GPS-PA6B

#### Complete GPS solution

is the world's smallest (16mm x 16mm), single-chip, complete solution GPS engine module. It integrates a finely tuned, highly sensitive Patch On Top (POT) ceramic antenna utilizing the SmartAntenna technology. This tiny GPS module is an ideal solution for those who want to incorporate GPS functionality into their design without having to worry about RF noise interference or any additional antenna fine tuning adjustments. Due to its high sensitivity, it is able to excel in tracking performances under urban landscapes or other environments where GPS signals can be difficult to acquire.



- Based on MediaTek Single Chip Architecture, MT3329.
- L1 Frequency, C/A code, 66 channels.
- High Sensitivity : Up to -165dBm tracking, superior urban performance.
- Position Accuracy : < 3m CEP (50%) without SA (horizontal).
- Jammer detection and reduction.
- Low Power Consumption : 48mA during acquisition, 37mA during tracking.
- Low shut-down current consumption : 15uA, typical.
- UART interface, 4800 baud.
- USB interface.

### µCAM-TTL

#### Serial JPEG Camera Module

The uCAM (microCAM) is a highly integrated serial camera module which can be attached to any host system that requires a video camera or a JPEG compressed still camera for embedded imaging applications.



- On-board EEPROM provides a command-based interface to external host via TTL levels serial link.
- UART: up to 115.2Kbps for transferring JPEG still pictures or 160x128 preview images with 0.75fps.
- Built-in down sampling, clamping and windowing circuits for VGA, QVGA, 160x120 or 80x60 image resolutions.
- Built-in colour conversion circuits for 2-bit gray, 4-bit gray, 8-bit gray, 12-bit RGB, 16-bit RGB or standard JPEG preview images.

### µDRIVE-uSD-G1

#### Tiny Embedded "DOS micro-DRIVE" Module

The micro-DRIVE (uDRIVE-uSD-G1) is an extremely compact high performance "Embedded Disk Drive" module that can be easily added to any micro-controller design that requires a DOS compatible file and data storage system.



- General purpose data storage device with a simple serial interface that can be added to any design in a wide range of embedded applications.
- DOS compatible file access (FAT16) as well as low level access to card memory.
- On board microSD memory card interace and adaptor.
- Simple serial commands provide full read-write access to the card.
- Easy 5 pin interface to any host device: VCC, TX, RX, GND, RESET.
- 3.6V to 5.5V range operation.
- Tiny footprint: 14.9 x 18.9 x 3.5mm.



**Electroacoustic components** – as already results from their name, serve to produce a sound in response to an electrical audio signal input. Loudspeakers for a speech, full spectrum hi-fi loudspeakers, various buzzers and sirens, all these components are widely used, providing a possibility to create sound in various devices.

**ČE** Elektroakustické součástky, jak už vyplývá z jejich názvu, slouží k produkování zvuku na základě elektrického vstupního signálu. Reproduktory, různé elektronické i mechanické bzučáky a sirény, všechny tyto komponenty poskytují možnost generovat zvuk v různých zařízeních.

**DE** Elektroakustische Komponenten, wie der Name schon sagt, dienen zur Klangerzeugung auf Basis von elektrischen Audiosignalen. Lautsprecher für die gesprochene Rede, vollspektrale Hi-Fi-Lautsprecher, verschiedene Summer und Sirenen, all diese Komponenten sind weit verbreitet und bieten die Möglichkeit der Klangerzeugung in diversen Geräten.

**HU** Az elektroakusztikus alkatrészek – ahogyan a nevük is mutatja – arra szolgálnak, hogy hangot állítsanak elő egy elektromos bemeneti jelből. Beszéd reprodukálására szolgáló hangszórókat, teljes spektrumú Hi-Fi hangszórókat, különböző zűmmereket és szirénákat széles körben alkalmaznak, hogy a hang előállításának lehetőségét kölcsönözzék különböző berendezéseknek.

**PL** Elementy elektroakustyczne, jak już sama nazwa wskazuje, służą do generowania dźwięku na podstawie elektrycznego wejściowego sygnału dźwiękowego. Głośniki dla mowy, szerokopasmowe, Hi-Fi, różnego rodzaju brzęczki i sireny - wszystkie te elementy umożliwiają generowanie dźwięku w różnych urządzeniach.

**RO** Componentele electroacustice – cum reiese deja din denumirea lor – servesc la producerea unui sunet ca răspuns la intrarea unui semnal electric audio. Difuzoare pentru discursuri, difuzoare hi-fi cu spectru complet, diferite sonerii și alarme, toate aceste componente sunt utilizate pe scară largă, oferind posibilitatea de a crea sunet în diferite dispozitive.

**SK** Elektroakustické súčiastky, ako už vyplýva z ich názvu, slúžia na produkovanie zvuku na základe elektrického signálu. Reproduktory pre reč, širokopásmové, Hi-Fi, rozličné bzučáky a sirény, všetky tieto komponenty poskytujú možnosť generovať zvuk v rôznych zariadeniach.

From nowadays electroacoustic components market offer, we can choose the right component for virtually any application. Modern components feature high efficiency, small dimensions and high power handling. A big advantage of devices with a sound output is, that it doesn't require a direct attention of operating personnel, as it is at optical indicating systems. From this reason it is a very effective way to ensure higher security, for example in various technological processes.

## Classification

The most common form of loudspeaker is the electrodynamic type, which uses a paper (or other) cone supporting a voice coil electromagnet acting on a permanent magnet. The most of usually used loudspeakers for sound and voice in all industry segments are of this type. Wide range of materials usable for their production allows production of various – even saltwater resistant types.

Piezoelectric loudspeakers work on a principle of piezoelectric crystal coupled to a mechanical diaphragm. An audio signal is applied to the crystal, which responds by flexing in proportion to the voltage applied across the crystal's surfaces, thus converting electrical energy into mechanical. Piezoelectric speakers are in general very efficient, very thin and resistant to overloads. Their frequency response is usually worse than that of other technologies, but even this aspect was substantially improved during last years.

There are many other special types of loudspeakers, which however aren't very much used in industry.

## Terms

### Frequency response

– range of frequencies in which a loudspeaker is able to produce sound within a certain acoustic level tolerance (usually 6 or 12 dB). A very important parameter saying how “exactly” can a loudspeaker reproduce sound and for what frequencies it is usable.

### Maximum power handling

– maximum allowed power of electric acoustic signal, which a given loudspeaker can handle. As loudspeakers are in general low efficiency devices, most of power is dissipated inside a loudspeaker (voice coil). When a too high power is applied to a loudspeaker, it can be easily permanently damaged. Power handling of high-frequency tweeters is usually specified for connection through a specified crossover type and frequency.

### Efficiency

– parameter representing level of acoustic pressure measured at a certain distance (1m) from a loudspeaker driven with a 1Watt signal. Together with power handling it is a very important parameter saying what acoustic level we can reach from a loudspeaker without its damage.

### Nominal impedance (Z)

– impedance of a loudspeaker in a frequency range for which it is intended. Usual values are 4 and 8 Ohms. A real impedance is frequency dependent and is never flat in all frequency range. Impedance of speakers often rises severalfold at and near their resonance frequency.





VISATON is nowadays a specialised and world wide successfully operating German loudspeaker manufacturer with 30 years of experience. With solid know-how and high-tech laboratories, equipped with the latest measurement equipment, Visaton is able to solve any problem in the field of electro acoustics.

**CZ** VISATON je v současnosti specializovaný a celosvětově působící německý výrobce reproduktorů s třicetiletými zkušenostmi. Díky know-how a high-tech laboratorům, které jsou vybaveny nejnovějšími měřicími zařízeními, je Visaton schopen vyřešit jakýkoliv problém v oblasti elektroakustiky.

**DE** VISATON ist heutzutage ein spezialisierter und weltweit agierender deutscher Lautsprecherhersteller mit über 30-jähriger Erfahrung. Dank Know-how und den Hightech-Labors, die mit modernsten Messvorrichtungen ausgestattet sind, kann sich Visaton mit jedem beliebigen Problem im Bereich der Elektroakustik auseinandersetzen.

**HU** A 30 éves tapasztalattal rendelkező német VISATON világszerte sikeresen működő hangszóró gyártó. Szilárd tudásanyagával és csúcstechnikai laboratóriumaiban, melyek a legmodernebb mérőeszközökkel vannak felszerelve, a Visaton minden problémát képes megoldani az elektroakusztika területén.

**PL** VISATON to obecnie wyspecjalizowany i pomyślnie działający na całym świecie niemiecki producent głośników z 30-letnimi doświadczeniami. Ze solidnym know-how oraz high-tech laboratoriami, wyposażonymi w najnowocześniejsze urządzenia pomiarowe, Visaton jest zdolny rozwiązać jakikolwiek problem w zakresie elektroakustyki.

**RO** VISATON este în prezent o societate specializată și un producător german renumit la nivel global de mai bine de 30 de ani. Grație know-how-ului solid și a laboratoarelor extrem de performante, dotate cu echipamente de măsurare de ultimă generație, Visaton este în măsură să rezolve orice problemă în domeniul acusticii electronice.

**SK** VISATON je v súčasnosti špecializovaný a celosvetovo pôsobiaci nemecký výrobca reproduktorov s 30-ročnými skúsenosťami. Vďaka know-how a high-tech laboratóriám, ktoré sú vybavené najnovšími meracími zariadeniami, je Visaton schopný vyriešiť akýkoľvek problém v oblasti elektroakustiky.

The spectrum of applications for VISATON speakers is very wide and ranges from the fields of Home HiFi and Car HiFi to special fields such as space-craft technology, medical electronic equipment and computer systems. Practical examples for applications in the computer industry are Multi-Media-Systems, Home-Cinema speakers and Point of sale-systems.

### Why VISATON?

- top quality loudspeakers
- products made of quality durable materials
- very good price/performance ratio
- wide portfolio for all kinds of applications
- detailed datasheets
- extensive customer service

### Did You Know?

Visaton has an anechoic chamber, which is with its dimensions of 7x7x7 meters one of the largest in the international loudspeaker scene.

### Industry Components, Single Drivers Kits

- Fullrange Systems
- Woofers, Midranges, Tweeters
- Coaxial Speakers, Miniature Speakers
- Magnetically Shielded Speakers
- Waterproof Speakers
- Ceiling Speakers
- Re-Entrant Horn Speakers
- Slim Column Systems
- Cabinet-housed speakers
- PA Speakers
- Crossovers/High End Drivers
- Bass Midranges
- Miniature Speakers
- Structure-borne drivers



- IP65
- 40...+120°C
- 3D DOWNLOAD
- .txt DOWNLOAD
- EASE DOWNLOAD



**Industry speakers from VISATON**

**Fullrange Systems**



- |                         |                         |                       |
|-------------------------|-------------------------|-----------------------|
| BF 32 8 OHM             | FR 8 WP 4 OHM (white)   | K 50 WP 50 OHM        |
| BF 45 4 OHM             | FR 8 WP 8 OHM (black)   | K 50 WP 8 OHM         |
| F 8 SC 8 OHM            | FR 8 WP 8 OHM (white)   | K 57 C 8 OHM          |
| FR 10 4 OHM             | FR 9.15 4 OHM           | K 64 WP 50 OHM        |
| FR 10 8 OHM             | FRS 10 WP 4 OHM (black) | K 64 WP 8 OHM         |
| FR 10 F 4 OHM           | FRS 10 WP 4 OHM (white) | K 64 WPT 8 OHM        |
| FR 10 HM 4 OHM          | FRS 10 WP 8 OHM (black) | R 10 S 4 OHM          |
| FR 10 HM 8 OHM          | FRS 10 WP 8 OHM (white) | R 10 S 8 OHM          |
| FR 10 HMP 4 OHM         | FRS 5 8 OHM             | R 10 SC 4 OHM         |
| FR 10 WP 4 OHM (black)  | FRS 5 X 8 OHM           | R 10 SC 8 OHM         |
| FR 10 WP 4 OHM (white)  | FRS 5 XTS 8 OHM         | R 10 SC SPEZIAL 8 OHM |
| FR 10 WPX 4 OHM (black) | FRS 7 4 OHM             | R 10 STE 8 OHM        |
| FR 10 WPX 4 OHM (white) | FRS 7 8 OHM             | SC 13 8 OHM           |
| FR 12 4 OHM             | FRS 7 S 8 OHM           | SC 4.7 ND 4 OHM       |
| FR 12 8 OHM             | FRS 7 W 8 OHM           | SC 4.7 ND 8 OHM       |
| FR 13 4 OHM             | FRS 8 4 OHM             | SC 5.9 8 OHM          |
| FR 13 WP 4 OHM (black)  | FRS 8 8 OHM             | SC 5.9 ND 4 OHM       |
| FR 13 WP 4 OHM (white)  | FRS 8 M 8 OHM           | SC 5.9 ND 8 OHM       |
| FR 16 WP 4 OHM (black)  | FRS 8 8 OHM             | SC 8 N 8 OHM          |
| FR 16 WP 4 OHM (white)  | FRS 8 M 8 OHM           | SL 713 4 OHM          |
| FR 6,5" 8 OHM           | FRWS 5 4 OHM            | SL 87 ND 8 OHM        |
| FR 7 4 OHM              | FRWS 5 8 OHM            | SL 87 WPM 4 OHM       |
| FR 8 4 OHM              | FRWS 5 R 8 OHM          | SL 87 WPM 8 OHM       |
| FR 8 4 OHM              | FRWS 5 SC 8 OHM         | SL 87 XA 8 OHM        |
| FR 8 8 OHM              | K 50 8 OHM              | WS 13 E 8 OHM         |
| FR 8 JS 8 OHM           | K 50 SQ 8 OHM           |                       |
| FR 8 WP 4 OHM (black)   | K 50 WP 16 OHM          |                       |

**Bass Midranges**



SC 13 8 OHM

WS 13 E 8 OHM

**Miniature Speakers**



- |               |                |                |
|---------------|----------------|----------------|
| BF 32 8 OHM   | K 23 SQ 8 OHM  | K 40 50 Ohm    |
| BF 45 4 OHM   | K 28 WP 50 OHM | K 40 8 Ohm     |
| K 16 50 OHM   | K 28 WP 8 OHM  | K 50 FL 16 OHM |
| K 20.40 8 OHM | K 36 WP 50 OHM | K 50 FL 8 OHM  |
| K 23 PC 8 OHM | K 36 WP 8 OHM  |                |

**Magnetically Shielded Speakers**



- |                       |                 |                 |
|-----------------------|-----------------|-----------------|
| F 8 SC 8 OHM          | SC 13 8 OHM     | SC 5.9 ND 8 OHM |
| FRWS 5 SC 8 OHM       | SC 4.7 ND 4 OHM | SC 8 N 8 OHM    |
| R 10 SC 4 OHM         | SC 4.7 ND 8 OHM | SL 87 ND 8 OHM  |
| R 10 SC 8 OHM         | SC 5.9 8 OHM    |                 |
| R 10 SC SPEZIAL 8 OHM | SC 5.9 ND 4 OHM |                 |

**Waterproof Speakers**



- |                         |                         |
|-------------------------|-------------------------|
| FR 10 WP 4 OHM (black)  | FRS 10 WP 8 OHM (black) |
| FR 10 WP 4 OHM (white)  | FRS 10 WP 8 OHM (white) |
| FR 10 WPX 4 OHM (black) | K 50 SQ 8 OHM           |
| FR 10 WPX 4 OHM (white) | K 50 WP 16 OHM          |
| FR 13 WP 4 OHM (black)  | K 50 WP 50 OHM          |
| FR 13 WP 4 OHM (white)  | K 50 WP 8 OHM           |
| FR 16 WP 4 OHM (black)  | K 57 C 8 OHM            |
| FR 16 WP 4 OHM (white)  | K 64 WP 50 OHM          |
| FR 8 WP 4 OHM (black)   | K 64 WP 8 OHM           |
| FR 8 WP 4 OHM (white)   | K 64 WPT 8 OHM          |
| FR 8 WP 8 OHM (black)   | SL 87 WPM 4 OHM         |
| FR 8 WP 8 OHM (white)   | SL 87 WPM 8 OHM         |
| FRS 10 WP 4 OHM (black) | SL 87 XA 8 OHM          |
| FRS 10 WP 4 OHM (white) |                         |

**Re-Entrant Horn Speakers**



DK 121 100 V  
DK 121 8 OHM

DK 133 100 V  
DK 133 8 OHM

**Cabinet-housed speakers**



PL 5 8 OHM

**Structure-borne drivers**



EX 45 S 8 OHM

EX 60 S 8 OHM





SONITRON, based in Belgium, has become the European leader in piezo-ceramic acoustic components with over 30 years experience and several patents. With an extensive know-how Sonitron produces a wide range of high quality and reliable products from the smallest and most cost effective buzzers to the most highly sophisticated components.

**CZ** SONITRON, se sídlem v Belgii, se stal evropskou jedničkou v produkci piezo-keramických akustických prvků. Sonitron má více než 30 let zkušeností v této oblasti a několik patentů. S rozsáhlým know-how Sonitron vyrábí širokou škálu vysoce kvalitních a spolehlivých produktů od nejmenších a cenově nejhodnějších bzučáků po nejvíce sofistikované komponenty.

**DE** SONITRON mit Sitz in Belgien wurde zum europaweit führenden Unternehmen in der Herstellung von piezokeramischen akustischen Komponenten. Sonitron verfügt über mehr als 30 Jahre Erfahrung in diesem Bereich und ist Inhaber einiger Patente. Mit umfangreichem Know-how produziert Sonitron eine breite Palette hochwertiger und zuverlässiger Produkte angefangen bei kleinsten und kostengünstigsten Summern bis hin zu den anspruchsvollsten Bauteilen.

**HU** A belgiumi SONITRON piezo-kerámias akusztikai alkatrészek területén több mint 30 éves tapasztalattal és számos szabadalmával Európában vezető szerepet rendelkezik. Széleskörű tudásbázisával a Sonitron kiváló minőségű és megbízható termékek széles skálájával rendelkezik a legkisebb és legköltséghatékonyabb zűmmerektől a legkifinomultabb alkatrészekig.

**PL** SONITRON, z siedzibą w Belgii, stał się europejskim liderem w produkcji akustycznych elementów piezoceramicznych, z ponad 30-letnimi doświadczeniami i kilkoma patentami. Z bogatym know-how Sonitron produkuje szeroki zakres niezawodnych produktów wysokiej jakości, od najmniejszych i najtańszych brzęczyków, po najbardziej zaawansowane elementy.

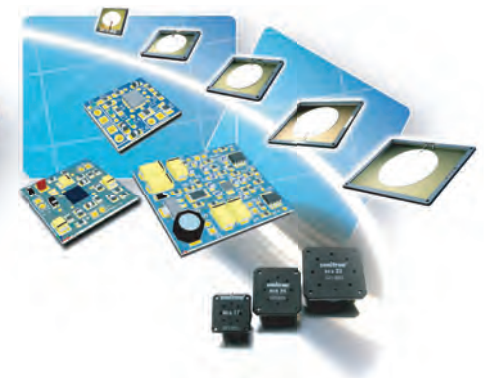
**RO** SONITRON, cu sediul în Belgia, a devenit un lider european în componente piezoceramice acustice, având peste 30 de ani de experiență și un număr considerabil de brevete. Datorită cunoștințelor sale tehnice dezvoltate, Sonitron produce o gamă variată de produse fiabile de înaltă calitate de la buzere rentabile și de mici dimensiuni la cele mai sofisticate componente.

**SK** SONITRON, so sídlom v Belgicku, sa stal európskou jednotkou v produkcii piezo-keramických akustických prvkov. Sonitron má viac ako 30 rokov skúseností v tejto oblasti a niekoľko patentov. S rozsiahlym know-how Sonitron vyrába širokú škálu vysoko kvalitných a spoľahlivých produktov od najmenších a cenovo najvýhodnejších bzučiacok po najviac sofistikované komponenty.

In Sonitron portfolio we can find buzzers, transducers, piezoceramic speakers and amplifiers, as well as alarms and sirens. Sonitron products meet the needs of many different applications, such as industrial, consumer and military applications. Furthermore Sonitron is the prime source for the NATO alarms.

### Why SONITRON?

- top quality piezoceramic acoustic components
- EU made products – in Belgium
- very good price/performance ratio



### Buzzers and Transducers

- STANDARD - Series
- SMA - Series
- SMAT - Series
- SMB - Series

### Alarms and Sirens

- SAP Series
- SAS Series
- SMAC Series
- SXL Series

### Piezoceramic Speakers Piezo Audio Amplifiers

- SCS - Series
- SPS - Series
- PAA - Series

Also available

- PRODUCT MOVIE
- 3D MODELS



## Buzzers and Transducers

They have unlimited applications, and are panel and PCB mountable. The standard series operate in harsh weather conditions and are waterproof, shockproof and gasproof. They are very reliable in critical applications. The SMA series are low cost commercial grade components PCB mountable, available in buzzer and transducer version. Top quality materials and elaborated working principals guarantees high quality products at economic cost.

**STANDARD SERIES >**



**Dimensions overview**  
(in mm)

$\varnothing \times H$

**Round**  
 $\varnothing 36.5 \times 26$

**Square**  
 $\varnothing 38 \times 26$

**SMA-SERIES >**



**SMA-13**  
 $\varnothing 14 \times 6.5$

**SMA-17**  
 $\varnothing 17.5 \times 8.5$

**SMA-21**  
 $\varnothing 21 \times 9.5$

**SMA-24**  
 $\varnothing 24 \times 15.5$

**SMA-30**  
 $\varnothing 30 \times 10.5$

**SMAT-SERIES >**



**SMAT-13**  
 $\varnothing 14 \times 6.5$

**SMAT-17**  
 $\varnothing 17.5 \times 8.5$

**SMAT-21**  
 $\varnothing 21 \times 9.5$

**SMAT-24**  
 $\varnothing 24 \times 15.5$

**SMAT-30**  
 $\varnothing 30 \times 10.5$

**SMB-SERIES >**



**SMB-17**  
 $\varnothing 18.6 \times 9.7$

**SMB-32**  
 $\varnothing 33.5 \times 9.7$

## Alarms and Sirens

A range of waterproof and IP67 rating sirens and alarms generates an acoustic warning signal in critical environmental situations. They are especially designed to function from  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  offering an high life time in continuous operation. A new series of automotive car horns are available for advanced applications.

**SAP-SERIES**

**SAP-1302-C**



**Dimensions overview**  
(in mm)

$\varnothing \times H$

$118.5 \times 89 \times 34.5$

**SAS-SERIES >**

**SAS-2155**



$\varnothing 54 \times 19.6$

**SMAC-SERIES >**



**SMAC-25**  
 $\varnothing 26.5 \times 18$

**SMACI-25**  
 $\varnothing 26.5 \times 18$

**STANDARD XL SERIES >**



**Round**  
 $\varnothing 36.5 \times 26$

**Square**  
 $\varnothing 38 \times 26$

**SXLC 515 C**  
**SXLI 515 C1**  
**SXLW 515 C**  
**SXLP 515 C**

**SDS-SERIES >**



## Speakers and Amplifiers

These brand new flat piezo speakers and amplifiers are low weight, solid-state, low distortion with extremely small current drain. This new generation of piezo speakers can be driven by several audio amplifiers recently introduced on the integrated circuits market.

**SCS-SERIES >**



**Dimensions overview**  
(in mm)

$\varnothing \times H$

**SCS-17**  
 $\varnothing 18.6 \times 9.7$

**SCS-24**  
 $\varnothing 25 \times 9.7$

**SCS-32**  
 $\varnothing 33.5 \times 9.7$

**SPS-SERIES >**



**SPS-2220-03**  
20x22x1

**SPS-3530-03**  
43.5x39x2

**SPS-4640-03**  
50x43.6x2

**SPS-6555-03**  
65x55x2

**SPS-8770-03**  
87x70x2

**AMPLIFIERS**

**PAA-SERIES >**



**PAA-MAX9788-01**  
14x16.5

**PAA-LM4960SQ-02**  
25x25

**PAA-StepUpBTL-01**  
40x35





### Buzzers SC

The standard series are considered as most robust series for industrial applications. The standard buzzers use a special shaped membrane (curved edge), which is fixed and glued into the housing. They are shock proof, as well as dust and waterproof (IP67).



### Buzzers SMA, SMAT

The SMA buzzers have a built-in oscillator generating their working frequency. They produce a highly reliable tone signal giving either an extremely clear and penetrating tone or a soft sound for non-aggressive signals. The SMAT transducers do not have a built-in oscillator.



### Transducers SMB

The SMB-series (multi-frequency buzzers) offer the possibility to program several different frequencies. The choice of the frequencies is simply done by changing the capacitor value in a C-MOS driven circuit.



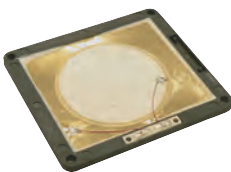
### Transducers SMAC

Very high reliability in the most difficult circumstances, such as extreme and varying temperatures, vibrations, shocks, dust conditions, humid environment, etc.



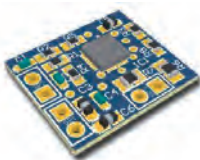
### Piezoceramic Speakers SCS

Good sound quality guarantee a clear reproduction of multiple tones, speech and music. These loudspeakers are extremely reliable, have a robust design and can be used in difficult environmental conditions and applications.



### Piezoceramic Speakers SPS

The polymer/metal speakers are released for applications such as mobile phone, PDA, car audio, instrumentation, portable devices... The extremely flat frequency characteristic gives an excellent audio experience.



### Piezo Amplifiers PAA

To drive these piezo speakers Sonitron also has developed a complete range of piezo audio amplifiers to increase the audio voltage.



### Sirens SAS

The Sonitron SAS-series exists of loud, small and low weight piezoceramic and electromagnetic models. The different models are developed for use in fire alarms, ambulance sirens, security devices etc.

**ELECTRONIC ASSEMBLY**  
making things easy

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- Chip-on-Glass Displays
- RS 232/SPI/I<sup>2</sup>C
- USB Starterkits

ELECTRONIC ASSEMBLY GmbH

Phone.: +49 (0)8105/778090  
vertrieb@lcd-module.de  
www.lcd-module.de

Please see page 132.



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## Audio-Video Connectors 146



## HF Coaxial Connectors 149

## Signal, Data & PC Connectors 150



## Wire To Board Connectors, Terminals, Headers & Sockets 155



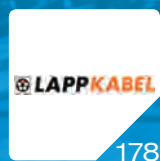
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## Heatsinks and Thermal Management 217









NEUTRIK AG with headquarter in Liechtenstein, is an international corporation with more than 35 years of know-how and experience in the manufacture of innovative electrical and electronic interconnection products and systems. Neutrik is the world leader in the design and manufacture of audio, coaxial, power and circular connectors.

**CZ** NEUTRIK AG se sídlem v Lichtenštejnsku, je mezinárodní společnost s více než 35 letým know-how a zkušenostmi ve výrobě inovativních elektrických a elektronických propojovacích produktů a systémů. Neutrik je světovým lídrem v oblasti designu a výroby audio, koaxiálních a výkonových konektorů.

**DE** NEUTRIK AG mit Sitz in Liechtenstein ist ein internationales Unternehmen mit mehr als 35-jährigem Know-how und Erfahrungen in der Herstellung von innovativen elektrischen und elektronischen Verbindungsprodukten und -systemen. Neutrik ist ein weltweit führendes Unternehmen in der Konstruktion und Herstellung von Audio-, Koaxial-, Strom- und Rundsteckverbindern.

**HU** A NEUTRIK AG lichtensteini székhelyű nemzetközi cég több mint 35 éves szakértelemmel és tapasztalattal az innovatív elektronikus összekötőelemek és rendszerek területén. A Neutrik a világ audio, koaxiális, nagyteljesítményű és kerek csatlakozóinak vezető tervezője és gyártója.

**PL** NEUTRIK AG z siedzibą w Lichtensteinie, jest międzynarodową spółką z ponad 35-letnim know-how i doświadczeniami w produkcji innowacyjnych elektrycznych i elektronicznych produktów i systemów łączących. Neutrik to światowy lider w dziedzinie rozwoju i produkcji konektorów audio, koncentrycznych, mocy i okrągłych.

**RO** NEUTRIK AG cu sediul în Liechtenstein, este o corporație internațională cu peste 35 de ani de know-how și experiență în fabricarea produselor și sistemelor inovatoare de interconexiune electrică și electronică. Neutrik este lider mondial în proiectarea și fabricarea conectorilor audio, coaxiali, de alimentare și circulari.

**SK** NEUTRIK AG so sídlom v Lichtenštajnsku, je medzinárodná spoločnosť s viac ako 35-ročným know-how a skúsenosťami vo výrobe inovatívnych elektrických a elektronických prepájacích produktov a systémov. Neutrik je svetový líder v oblasti dizajnu a výroby audio, koaxiálnych, výkonových a kruhových konektorov.

From the beginning Neutrik has concentrated on the development of innovative audio connector products. Today Neutrik leads the way in the professional audio market. Production portfolio in audio range includes XLR connectors, plugs, jacks, speaker connectors, patch bays and fiber optic connection systems.

Neutrik AG, the world's leading supplier of professional audio and video connectors, offers with the brand REAN another interesting product range.

## Why NEUTRIK?

- top quality producer
- company with over 35 years of experience in connectors
- wide portfolio of high quality connectors

## JACK Type Plugs

NYS226



NYS231



NYS203



## JM63-MGS (NP2C-AU-SILENT)

2 pole 1/4" professional phone plug, gold plated contacts, red coating, silent switch

Special version of 2 pole plug with integrated switch which automatically mutes (shorts) a guitar cable to avoid annoying pops and squeals when hot swapping guitars. The integrated silent switch is based on the REED technology and guarantees a lifetime beyond 10'000 mating cycles.



6,3mm

### Features & Benefits

- Hermetically sealed and magnetically operated switch
- No wear, constant contact resistance
- No corrosion or pollution of switch, durable and long-lasting
- Lifetime beyond 10'000 mating cycles

## "Profi" JACK Type Sockets

NYS240



NYS2203



NYS21x



## CINCH (RCA) Connectors

NYS367



NYS373



NYS352



## XLR Connectors

Neutrik XLR connectors are the standard worldwide. They are available in 3 - 7 pin configurations including 6 pin Switchcraft® configuration, assembly is quick and easy - no screws or special tools are required, unique Neutrik chuck type internal strain relief, female shell has rubber ring for secure mating to male XLR or microphone, sleek profile and compact design, rugged diecast shell, UL recognized components.

### XLR Sockets

NC3F



NC5F



NC5F



NC3F



### XLR Plugs

NC3M



NC5M



NC3M



NC5M





### Combo Series

"2 in 1" - first **XLR /JACK** hybrid panel mount connector combining a 3 pole XLR receptacle and mono or stereo 1/4" phone jack in one XLR housing. Space saving combination of 2 connectors in one plastic housing. Available in nonswitching and normal versions with horizontal or vertical pcb mount or soldering termination.

Many equipments have two input connectors (balanced XLR and unbalanced jack). But in almost all cases only one input is used at a time, so the Combo reduces panel space, costs and simplifies pcb design.

NJC



### SpeakON Connectors

The speakON® cable connectors are the industry-standard connectors for amplifier / loudspeaker connections. The entire family of 2, 4 and 8 pole cable connectors has been designed to operate in high current, inductive load environment of loudspeakers.

The cable connectors feature a robust plastic housing, the traditional Neutrik chuck type cable clamp, a unique locking principle and touch proof contacts. The 2 and 8 pole versions offer 30 Amp current rating while the new 4 pole SPX type features up to 50 Amp current carrying capacity for the operation of high power speakers and amplifiers carrying more than 1000 Watts.

NL2F

NL4F

NL2M



### Power Supply Connectors

The powerCON® is a locking 3 conductor equipment AC connector with contacts for line, neutral and pre-mating ground contact. It replaces appliance couplers wherever a very rugged solution in combination with a locking device is needed in order to guarantee a safe power connection.

**Attention:** The powerCON® is a connector without breaking capacity, i.e. the powerCON® should not be connected or disconnected under load or live!

They can be exactly and easily identified by the colour - grey B(out) / blue A(in).

NAC3F

NAC3M



### EtherCon Connectors

The etherCON® series is a ruggedized and lockable RJ45 connector system, optimized for proaudio, video and lightning network applications.

NE8FAV

NE8FBH-LED

NE8FDP



NE8MC

NE8MC-1




### Neutrik® PartNumber Guide


NC3FAH1-B-0-D


Packaging:	D	Cable connector: bulk packed
Assembly:	D	Chassis connector: disassembled push latch
Retention:	w/o	Latch lock
	-0	Retention spring
Shell:	B	Black shell, gold contacts
	BAG	Black shell, silver contacts
Grounding:	0	Separate ground contact connected to shell, male only
	1	Pin 1 & panel & shell connected, no separate ground contact
	2	Separate ground contact connected to shell & panel, separate Pin 1
	E	Additional ground contacts
	w/o number	No ground / shell contact (except 4 / 5 pole), female only
Termination:	H	Horizontal PCB mount
	HL	Lateral left PCB mount
	HR	Lateral right PCB mount
	L	Solder cups
	V	Verticale PCB mount
	Y	IDC for wires (no ground)
	M3	Mounting holes with M3 thread
	M25	Mounting holes with M2.5 thread
	-	Not applicable
Series:	A, AA, B, BA, D, DL, DLX, MPR, P, PX, RX, X, XX	
Gender:	F	Female
	M	Male
Number of Contacts:	3, 4, 5, 6, 7, 8, 12	
Connector Type:	A	Adapter
	AC	powerCON
	B	BNC
	C	XLR
	D	dummyPLUG
	E	RJ45
	F	RCA / CINCH
	J (M1, RJ, SJ)	Jack
	K	Cable Assemblies
	L	Loudspeaker
	M	Modules
	O	Fiber Optic Connector
	P	Plugs
	PP	Patch Panel
	R	Circular Connector
	T	Transformer


These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).


High frequency or radio frequency connectors are the most often used connectors for interconnection of coaxial cables carrying HF signals from various antennas, between HF devices or in some kinds of networks.


 Vysokofrekvenční konektory jsou nejčastěji používanými konektory k propojení koaxiálních kabelů nesoucích VF signály z různých antén, mezi VF zařízeními a v některých druzích sítí.

 Hochfrequenz- oder Radiofrequenz-Steckverbinder sind die meistverwendeten Steckverbinder für die Verbindung von Koaxialkabeln, die HF-Signale aus verschiedenen Antennen, zwischen HF-Geräten oder in bestimmten Netzwerktypen übertragen.

 A magas frekvenciás csatlakozók a leggyakrabban használt csatlakozók a magas frekvenciás jeleket továbbító koaxiális kábelek összeköttetésére a különböző antennák és berendezések vagy egyes hálózati elemek között.

 Konektory dla wysokich częstotliwości, to najczęściej stosowane konektory do łączenia kabli koncentrycznych, przewodzących sygnały HF z różnych anten, między urządzeniami HF oraz w niektórych typach sieci.

 Conectorii de înaltă frecvență sau frecvență radio sunt conectorii cel mai adesea utilizați pentru interconectarea cablurilor coaxiale ce poartă semnale HF de la diferite antene, între dispozitivele HF sau în unele tipuri de rețele.

 Vysokofrekvenčné konektory sú najčastejšie používanými konektormi pre spojenie koaxiálnych káblov nesúcich VF signály z rôznych antén, medzi VF zariadeniami a v niektorých druhoch sietí.

HF connectors provide a possibility to connect coaxial cables to target devices without additional losses and they also provide a convenience to easily and quickly change interconnections, for example at measuring equipment.

HF connectors are almost exclusively made in a coaxial shape, optimized for a low loss transmission of HF signals. They must provide a stable connection with a matching of a cable characteristic impedance. It can be said, that an ideal HF connector should electrically act as if it wasn't in the signal path, i.e. it shouldn't cause increase of reflections - SWR (standing waves ratio). A well designed coaxial connection provides very good low loss transmission of HF signals even to relatively long distances, and provides a high immunity to disturbances. At the same time such connection features a low radiation.

### Classification

Every HF connector is designed for a certain type of a coaxial cable, with its characteristic impedance. The most often used cables have 50 and 75 Ohm impedance. 50 Ohm characteristic impedance is the most often used in laboratory devices, HF equipment and computer networks, while 75 Ohm is the most often used in TV equipment. Dur-

ing decades, some main types of HF connectors profiled, for example: BNC, F, SMA, SMB, SMC, N, IEC TV and other. When choosing HF connectors for outdoor use, you should in general choose types made of more quality materials, as they must withstand a much more demanding conditions.

### BNC Connectors

UG88



UG1094



UG274



### N Connectors

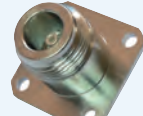
N501



N505



N512

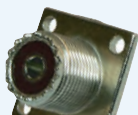


### UHF Connectors

PL259



SO239



PL258



### F - Connectors

FST70



F94FL/o



FSFK5(F04)



### FME Connectors

1-1337554-0



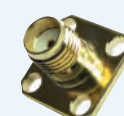
### SMA, SMB, MCX Connectors

SMA (SubMiniature version A) connectors are designed to wide range signal transmission - from DC up to 18 GHz. Applications: WLAN networks for antennas connection, access points, PC card connection etc. All SMA connectors we offer are gold-plated and with teflon insulation (PTFE). Impedance: 50 Ohm.

SMAC58G



SMA90



SMAREVERSE



SMB



SMC




MCX





In this category can be found connectors from various producers - Telegärtner, TE Connectivity, RADIAL and others.


These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).


In this group of connectors you can find connectors used for data and signal transfer, as well as various types used in computers and computer peripherals, like USB and FireWire, telephone, modular-network, memory card slots and other.


 V této skupině konektorů můžete najít konektory, používané pro přenos dat a signálů, jakož i různé typy používané v počítačích a počítačových perifériích, jako jsou USB a FireWire, telefonní, modulární síťové, sloty paměťových karet a jiné.

 In dieser Gruppe von Anschlüssen finden Sie Steckverbinder für die Daten- und Signalübertragung sowie verschiedene Typen für Rechner und Rechnerperipherien wie etwa USB und FireWire, Telefon-, modulare Netzwerk-Steckverbinder, Speicherkartensteckplätze und Andere.

 Ebben a csatlakozó csoportban adat- és jelátvitelre szolgáló csatlakozókat találhat, valamint különböző típusokat, melyeket a számítógépekben és számítógépes perifériákban is használnak, mint az USB és FireWire, telefon, moduláris hálózati csatlakozók, memóriakártya foglalatok, stb..

 W tej grupie konektorów znajdujemy konektory stosowane do transmisji danych i sygnałów, jak również różne typy stosowane w komputerach i ich periferych, jak np. USB i FireWire, telefoniczne, modułarne sieciowe, gniazda kart pamięciowych i inne.

 In acest grup de conectori puteți găsi conectorii folosiți pentru transferarea de date și semnal, precum și diferite tipuri folosite la calculatoare și periferice de calculatoare, cum ar fi USB și FireWire, telefon, rețea-modulară, sloturile cardului de memorie și altele.

 V tejto skupine konektorov môžete nájsť konektory používané pre prenos dát a signálov, ako aj rôzne typy používané v počítačoch a počítačových perifériách, ako USB a FireWire, telefónne, modulárne sieťové, sloty pamäťových kariet a iné.

As a development steps forward, new types of connectors appear. However industrial segment has a special feature, that still a lot of legacy connector types are used for many reasons, mainly because of maintaining of backward compatibility. That's why D-SUB or Centronics connectors are still used in industry, though you would hardly find them on the latest personal computers.

### Classification

These connectors are generally well known types. Choice of a right type or a right version of a connector for your application depends for example on the supposed insertion cycles of a connector in a given device, required mechanical lock, resistance to water and dust, as well as possibility to allow further enhancements of the device.





### Modular (RJ) Connectors

Western Modular plugs for wire crimping, transparent

TZB40 Series

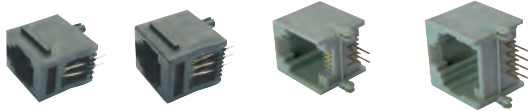


TZB507 - Plastic Covers



### Modular PCB Jacks

TZB46 Series



MagJack connectors can be found on page 153.

### Industrial RJ45 Connectors



Designed for wet and aggressive industrial environment. They are characterized by high protection class - IP67.

A-RJ45M

A-RJ45DFR

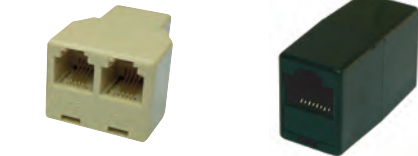
A-WP-COVER1



### Adapters

TZB411

TZB4141



### Modular Sockets

CAT5eWPC, CAT6eWPC



### CENTRONICS Connectors

SE5736M

SE5736F

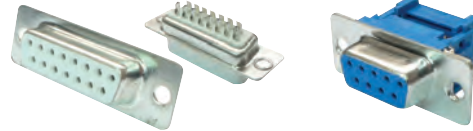
SE5724FRKL



### D-SUB (CANNON) Connectors

DF1 Series

DFF Series



DMR Series

GP1 Series

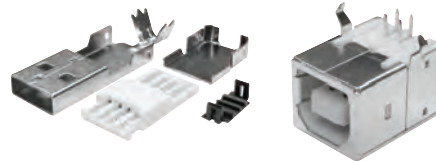
COM 938



### USB, mini USB, micro USB Connectors

USB/ST1A

USB/BU1B



USB/HB

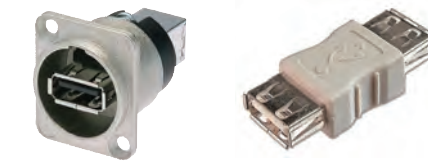
USB/ST1A/PCB/SMD

USB/BU2A



NAUSB

USBADAPAF/AF



USB MINI CM

USB3/BU1A

USB/BUM5 MINI



### USB Industrial Connectors

The USB Buccaneer is designed to confirm the latest USB version 2 specifications and provide an environmental seal to IP68. This dust and waterproof USB connector is suitable for industrial or hostile environments where a high speed computer interface is required

PX0842/A

PX0843/A


PX0733




These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).




ATTEND Technology Inc. Taiwan is a fast growing company founded in 2002, specialized in development and production of connectivity solutions.


 ATTEND Technology Inc. / Taiwan je rychle rostoucí společnost, založena v r. 2002, specializující se na vývoj a výrobu konektorových řešení.

 ATTEND Technology Inc. / Taiwan ist ein schnell wachsendes Unternehmen, das 2002 gegründet wurde und sich auf die Entwicklung und Produktion von Steckverbinderlösungen spezialisiert.

 A 2002-ben alapított ATTEND Technology Inc. egy gyorsan növekvő taiwani székhelyű cég, mely csatlakozási megoldások fejlesztésére és gyártására szakosodott.

 ATTEND Technology Inc. / Tajwan to szybko rosnąca spółka założona w r. 2002, specjalizująca się w rozwoju i produkcji rozwiązań konektorowych.

 ATTEND Technology Inc. / Taiwan este o companie în plină expansiune, înființată în 2002, specializată în dezvoltarea și producția de soluții de conectare.

 ATTEND Technology Inc. / Taiwan je rýchlo rastúca spoločnosť založená v r. 2002, špecializujúca sa na vývoj a výrobu konektorových riešení.

Attend portfolio consists of sockets, connectors and cable assemblies for industry, communication, audio-video equipment and computers. Among Attend products can be found memory cards sockets, SIM cards sockets, FPC connectors, HDMI, E-SAT, RJ45, USB and many other types of connectors.

## Why ATTEND TECHNOLOGY?

- wide portfolio of quality products
- excellent price/ performance ratio

### Memory Card Connectors

#### 104G-TAA0-R

Secure Digital card connector push-push, SMD



#### 112I-TDAR-R

Socket MicroSD, Push-Pull, Top Mount



#### 112A-TAAR-R02

MicroSD Socket, SMD, Push-Push



### SIM Card Connectors

#### 115A-ADA0-R01

SIM CARD HOLDER 6-PIN, Push-Push



#### 115A-ADA0-R02

SIM CARD HOLDER 6-PIN + 2 (Card Detect), Push-Push



#### 115A-BDA0-R01

SIM CARD HOLDER 8-PIN + 2 (Card Detect), Push-Push



#### 115B-AAA0-R

SIMLOCK connector for SIM/ SAM cards



#### 115C-AC00-R

CARD Holder SIM



#### 115F-ACA0-R

SIM Card Socket Hinge Type for 6 pin, with Card Detect



[www.soselectronic.com/bel](http://www.soselectronic.com/bel)



BEL founded in 1949 is primarily engaged in the design and manufacture of products used in networking, telecommunications, high speed data transmission and consumer electronics. Products include communication transformers, circuit protection and interconnect devices.

**CZ** BEL, založen v r. 1949, se primárně zabývá designem a výrobou produktů používaných v sítích, telekomunikacích, vysoce rychlostních přenosoch dat a spotřební elektronice. Produkty zahrnují komunikační transformátory, prvky pro ochranu obvodů a komponenty pro konektivitu a propojování.

**DE** BEL, gegründet im Jahr 1949, beschäftigt sich primär mit Entwurf und Produktion von Produkten für Netzwerke, Telekommunikation, High-Speed-Datenübertragung und Unterhaltungselektronik. Zu den Produkten zählen Kommunikationstransformatoren, Elemente zum Schutz von Schaltungen und Komponenten für die Verbindung und Vernetzung.

**HU** Az 1949-ben alapított BEL cég elsősorban a hálózati, távközlési, gyors adatátviteli és fogyasztói készülékekben használta alkatrészek fejlesztésében és gyártásában érdekelt. Termékei közt megtalálhatóak a kommunikációs leválasztó transzformátorok, alkatrész védelmek és összekötő eszközök.

**PL** BEL, założony w r. 1949, zajmuje się przede wszystkim opracowywaniem i produkcją elementów stosowanych w sieciach, telekomunikacji, wysoko prędkościowej transmisji danych oraz elektronice użytkowej. Produkty obejmują transformatory komunikacyjne, elementy ochrony obwodów oraz komponenty dla łączności i przełączania.

**RO** Societatea BEL, înființată în 1949 este în principal implicată în proiectarea și fabricarea de produse utilizate în rețelistică, telecomunicații, transmisia de mare viteză și electronice. Produsele includ transformatoarele de comunicații, protecția circuitelor și dispozitive de interconectare.

**SK** BEL, založený v r. 1949, sa primárne zaoberá dizajnom a výrobou produktov používaných v sieťach, telekomunikáciách, vysoko rýchlostných prenosoch dát a spotrebnej elektronike. Produkty zahŕňujú komunikačné transformátory, prvky pre ochranu obvodov a komponenty pre konektivitu a prepájanie.

BEL's portfolio consists of products for Circuit Protection, Custom Modules, Ethernet Connectivity, Interconnect, Magnetics and Power Conversion.

Probably the most interesting is the Stewart Connector division with products including one of the broadest ranges of Ethernet connectivity. Our interconnect products includes passive jacks, plugs and cable assemblies that provide connectivity in networking equipment. Modular plugs and cable assemblies are used within the structured cabling system, known as premise wiring. All connector products are designed to meet current performance standards including Category 6 regulations

### Why BEL?

- wide portfolio of quality products
- excellent price/ performance ratio

for Gigabit Ethernet and 10Gigabit Ethernet applications. Our Mag-Jack® products include a comprehensive line of single and multi-port RJ-45 connectors with integrated magnetic for 10/100/1000Base-T applications..

## MagJack Connector Modules

### What is MagJack?

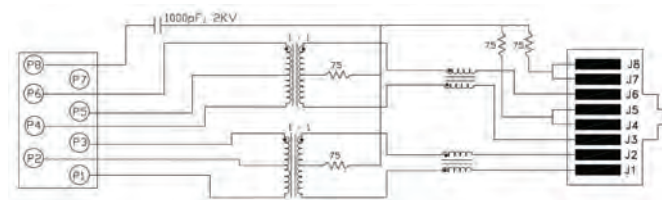
These highly integrated devices combines Bel Stewart Connectors network magnetics with combinations of RJ45 and USB connectors. In addition to connectivity, these modules provide the signal conditioning, electro-magnetic interference suppression and signal isolation previously performed by multiple, discrete magnetic components.

### 1xport 10/100Mb

SI-60002-F

SI-60062-F

SI-46001-F



Type	Description
SI-60002-F	horizontal, NO LED, tab down
SI-60062-F	horizontal, yellow/green, tab down
SI-46001-F	vertical, yellow/green

08B0-1X1T-03-F

08C2-1X1T-03



Type	Description
08B0-1X1T-03-F	horizontal, green-orange/yellow, tab up
08C2-1X1T-03	combo 2xUSB, green-orange/yellow, tab up

S811-1X1T-06-F

SI-52008-F



Type	Description
S811-1X1T-06-F	SMT, NO LED, tab down
SI-52008-F	PoE, green/yellow, tab up

### 2xport 10/100Mb

SI-60135-F

SI-60159-F



Type	Description
SI-60135-F	horizontal, NO LED, tab down
SI-60159-F	horizontal, green/yellow, tab down

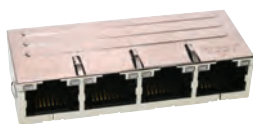


### 4xport 10/100Mb

08B1-1X4T-06-F



0810-1X4T-06-F



Type	Description
08B1-1X4T-06-F	harmonica, NO LED, tab up
0810-1X4T-06-F	harmonica, orange-green/yellow, tab up

### 8xport 10/100Mb

0810-2H4R-28-F



Type	Description
0810-2H4R-28-F	stacked, green/yellow

### 1xport 10/100/1000Mb

SI-61001-F



0826-1X1T-23-F



Type	Description
SI-61001-F	horizontal, green/yellow, tab down
0826-1X1T-23-F	horizontal, yellow/green-orange, tab up

## Passive JACK Connectors

### 1xport CAT5

SS64800-056F



SS74800-038F



SS71800-027F



Type	Description
SS64800-056F	horizontal, shielded, NO LED, tab down, 8p/8c
SS74800-038F	horizontal, shielded, yellow/green, tab down, 8p/8c
SS71800-027F	vertical, shielded, NO LED, 8p/8c

V890-1AX1-A1



L829-1J1T-43



Type	Description
V890-1AX1-A1	vertical, green/yellow
L829-1J1T-43	low profile, green-orange/yellow, tab up

### 1xport CAT6

SS60000-009



SS60000-008



Type	Description
SS60000-009	horizontal, shielded, NO LED, tab up, 8/8c
SS60000-008	vertical, shielded, NO LED, 8p/8c

### CAT6 Plugs

SS-39200-012



SS-39100-004



Type	Description
SS-39200-012	shielded, plug+load bar, 8p/8c, requires hand tool 2980070-01
SS-39100-004	unshielded, plug + manager bar, 8p/8c

## Circuit Protection

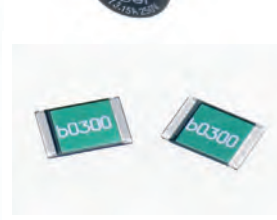
The Bel Fuse circuit protection portfolio includes one of the broadest ranges of circuit protection products on the market today. Bel Fuse has been at the forefront of the industry shift to board level, surface mount, fuse designs, including our C2Q Chip Fuses with 0603 footprint. Many of today's smaller hand held devices incorporate this newer technology and Bel Fuse is poised to help!

### Fuse Products

- Widest range of RoHS 6 compliant designs
- Worldwide approvals – UL, CSA, PSE, CCC, VDE, Semko
- Telecom surge protection – 600V (UL60950, GR1089)
- 0603/1206 fast act chip fuses; 1206 slow blow

### PTC Resettable Devices

- RoHS 6 compliant
- Radial types up to 240VAC continuous operation
- Radial telecom application to 600VAC
- SMD chip in sizes 2920 down to 0805







**HARTING Technology Group** based in Germany, is a company with over 65 years of experience. Harting develops and produces top quality components for electronic and optical connection, installation technology, device connectivity, networking and automotive solutions.

**CZ** **HARTING Technology Group** se sídlí v Německu je společnost s více než 65 letými zkušenostmi. Harting vyvíjí a vyrábí vysoce kvalitní komponenty pro elektronické a optické připojení, instalační technologie, zařízení, připojení k sítím a automobilová řešení.

**DE** **HARTING Technology Group** mit Sitz in Deutschland ist ein Unternehmen mit mehr als 65 Jahren Erfahrung. Harting entwickelt und produziert hochwertige Komponenten für elektronische und optische Verbindung, Installations-technik, Gerätekonnektivität, Netzwerke sowie Automobillösungen.

**HU** A német **HARTING Technology** több mint 65 év tapasztalattal rendelkezik. Csúcsműködésű elektronikai és optikai csatlakozókat, szerelő anyagokat, készülék összekötéseket, hálózati és autópárhely megoldásokat fejleszt és gyárt.

**PL** **HARTING Technology Group** z siedzibą w Niemczech, to spółka z ponad 65-letnimi doświadczeniami. Harting rozwija i produkuje wysokiej jakości komponenty do połączeń elektronicznych i optycznych, technologie instalacyjne, urządzenia podłączone do sieci oraz rozwiązania samochodowe.

**RO** **HARTING Technology Group** cu sediul în Germania, este o companie cu peste 65 de ani de experiență. Harting realizează și produce componente de cea mai înaltă calitate pentru conectarea electronică și optică.

**SK** **HARTING Technology Group** so sídlom v Nemecku, je spoločnosť s viac ako 65 ročnými skúsenosťami. Harting vyvíja a vyrába vysoko kvalitné komponenty pre elektronické a optické pripojenie, inštaláčne technológie, zariadenia, pripojenie k sieťam a automobilové riešenia.

Harting produces a wide range of products for connectivity & networks, micro technology, mechatronics, enclosures and automotive solutions. In our offer from Harting we focus mainly on connectors, like DIN 41612, IDC, heavy duty, computer and other connectors.

## Why HARTING?

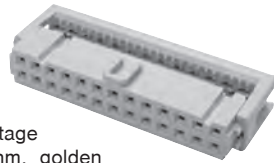
- Germany based company with over 65 years of experience
- widely used industrial standard products

## IDC Connectors

### FL (09 18) Series

Flat cable socket for cable with pitch 1,27mm, grey, precise.

Pitch=2,54mm, max.current 1A, test voltage 1000V, contact resistance < 20 mOhm, golden plated contacts and tinned outlets (IDC = Insulation Displacement Connector system)



### FLZ Series

Female strain relief for FL connectors. Secures connectors against self-disassembly.



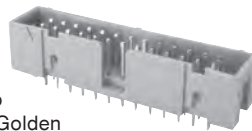
### Suitable Pliers HT-214D



### MLWxxG (09 18) Series

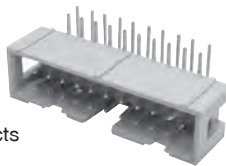
IDC male headers for PCB, straight.

Pitch=2,54mm, max.current 1A, test voltage 1000V, operating temperature -55°C to +125°C, contact resistance < 20 mOhm. Golden plated contacts and tinned outlets.



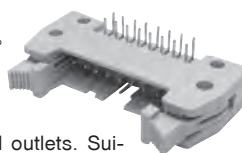
### MLWxxA (09 18) Series

IDC male headers, 90° pins, pitch=2,54mm, max.current 1A, test voltage 1000V, operating temperature -55°C to +125°C, contact resistance < 20 mOhm. Golden-plated contacts and tinned outlets



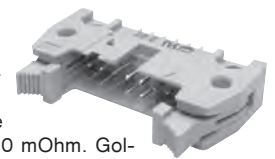
### MLxxAK (09 18) Series

IDC male headers, PCB, short latch 90° pins, pitch=2,54mm, max.current 1A, test voltage 1000V, operating temperature -55°C to +125°C, contact resistance < 20 mOhm. Golden-plated contacts and tinned outlets. Suitable mate - FL without strain relief clamp FLZ.



### MLxxGK (09 18) Series

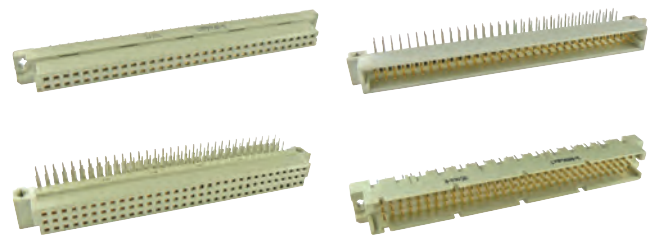
IDC male header, PCB, short latch straight pins, pitch=2,54mm, max.current 1A, test voltage 1000V, operating temperature -55°C to +125°C, contact resistance < 20 mOhm. Golden-plated contacts and tinned outlets



## DIN 41612 Connectors

### 0903, FED, MES Series

High-quality connectors designed for frequent connecting. Operating life is cca 400 mating cycles.



## Industrial Connectors Han®

Han® industrial connectors with degree of protection IP 65 / IP 67 represent the worldwide connector standard with regard to safe installation, efficient commissioning and servicing of machines and plants.







ASSMANN WSW components group with headquarter in Lüdenscheid/ Germany, specializes on connectors, components for thermal management and cable assemblies. The company with over 40 years experience offers a very wide portfolio of quality products.

**CZ** ASSMANN WSW je součástí skupiny se sídlem v Ludenscheid v Německu. Specializuje se na konektory, komponenty pro chlazení a kabelové svazky. Firma s více než čtyřicetiletými zkušenostmi nabízí velmi široké portfolio kvalitních produktů.

**DE** ASSMANN WSW ist Teil einer Gruppe mit Sitz in Lüdenscheid in Deutschland. Es spezialisiert sich auf Steckverbinder, Komponenten der Kühltchnik und Kabelkonfektionen. Die Firma mit mehr als 40-jähriger Erfahrung bietet ein sehr großes Portfolio an Qualitätsprodukten.

**HU** Az német ASSMANN WSW components csoport Lüdenscheid-i központtal, főként csatlakozókra, hőelvezetési alkatrészekre és kábelösszekötőkre specializálódott. A cég több mint 40 éves tapasztalatával minőségi termékek széles portfolióját kínálja.

**PL** ASSMANN WSW components group z siedzibą w Lüdenscheid / Niemcy, specjalizuje się w produkcji konektorów, elementów do zarządzania ciepłem oraz wiązki kablowe. Spółka z ponad 40-letnimi doświadczeniami oferuje bardzo szeroki zakres wysokiej jakości produktów.

**RO** ASSMANN WSW components group cu sediul în Lüdenscheid/ Germania este o societate specializată în producția de conectori, componente pentru management termic și montarea de cabluri. Societatea, având o experiență de peste 40 de ani, oferă un portofoliu extins de produse de înaltă calitate.

**SK** ASSMANN WSW je súčasťou skupiny so sídlom v Ludenscheid v Nemecku. Špecializuje sa na konektory, komponenty pre tepelné vedenia a káblové zväzky. Firma s viac ako 40 - ročnými skúsenosťami ponúka veľmi široké portfólio kvalitných produktov.

In Assmann WSW production range you can find for example computer and network connectors, IC sockets, jumpers and headers, terminals, heatsinks and extruded heatsink profiles, thermal management accessories, power cords, modular and USB cable assemblies, audio- & video cables, and many other.

### Why ASSMANN?

- quality products from company with over 40-year experience
- wide portfolio
- affordable prices

## IC Sockets and Pin Headers/Socket

### ECLC Series



standard

### ECPF Series



precision

### PLCC Series



### AP, AWL and AWx Series

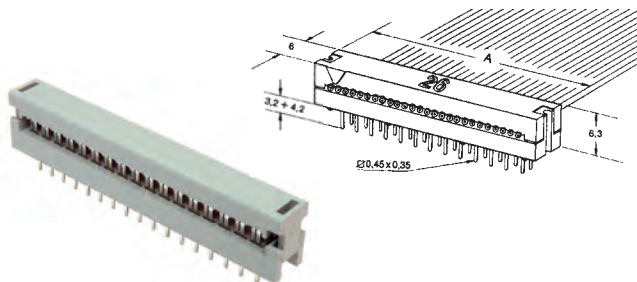


## IDC Connectors for PCBs

### AWLP Series

IDC male header, PCB, straight, suitable also for BL2. RM 2,54 x 2,54 mm.

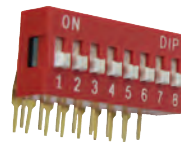
From 10 poles up to 40 poles.



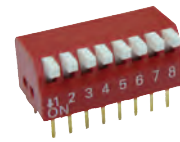
## DIP switches

Full range of DIP switches.

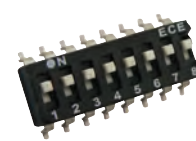
### DA Series



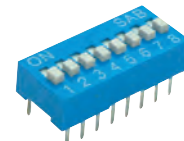
### DP Series



### A-DIL-SMD Series



### DS Series



## Industrial RJ45 Connectors

Designed for wet and aggressive industrial environment. They are characterized by high protection class - IP67.

### A-RJ45M



IP67

### A-RJ45DFR



IP67

### A-WP-COVER1



IP67

These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).



TE CONNECTIVITY is a global company that designs and manufactures over 500 000 products that connect and protect the flow of electric energy and data inside the products that touch every aspect of our lives. TE Connectivity products have gained an international reputation for an outstanding quality and reliability.

**TE CONNECTIVITY** je mezinárodní společnost, která navrhuje a vyrábí více než 500 000 produktů, které připojují a chrání tok elektrické energie a dat uvnitř produktů, které se dotýkají všech aspektů našeho života. Produkty společnosti TE Connectivity získaly mezinárodní renomé díky vynikající kvalitě a spolehlivosti.

**TE CONNECTIVITY** ist ein internationales Unternehmen, das über 500 000 Produkte entwickelt und produziert, die den Energie- und Datenfluss in Produkten aus allen unseren Lebensbereichen herstellen und schützen. Die Produkte von TE Connectivity haben sich dank erstklassiger Qualität und Zuverlässigkeit einen internationalen Ruf erworben.

A TE CONNECTIVITY nemzetközi cég, mely több mint 500 000 terméket fejleszt és gyárt, melyek összekötik az alkatrészeket és biztosítják az elektromos áram és adatátvitelt az élet minden területét behálózó készülékekben. A TE Connectivity termékei nemzetközi sikerüket kiemelkedő minőségnek és megbízhatóságuknak köszönhetik.

TE CONNECTIVITY to spółka międzynarodowa projektująca i produkująca ponad 500 000 produktów, które przylączają i chronią przepływ energii elektrycznej oraz danych wewnątrz produktów, związanych z wszystkimi aspektami naszego życia. Produkty spółki TE Connectivity zyskały swoją międzynarodową reputację dzięki wyjątkowej jakości i niezawodności.

TE CONNECTIVITY este o companie internațională care proiectează și fabrică peste 500 000 de produse ce conectează și protejează fluxul de energie electrică și datele din interiorul produselor capabile să atingă fiecare aspect al vieții noastre. Produsele TE Connectivity și-au câștigat o reputație internațională pentru calitatea și fiabilitatea remarcabile.

TE CONNECTIVITY je medzinárodná spoločnosť, ktorá navrhuje a vyrába viac ako 500 000 produktov, ktoré pripájajú a chránia tok elektrickej energie a dát vo vnútri produktov, ktoré sa dotýkajú všetkých aspektov nášho života. Produkty spoločnosti TE Connectivity získali medzinárodné renomé vďaka vynikajúcej kvalite a spoľahlivosti.

100,000 employees of TE Connectivity cooperate with customers in virtually every industry—from consumer electronics, energy and healthcare, to automotive, aerospace and communication networks—enabling smarter, faster, better technologies to connect products. TE Connectivity's rich history is based on two companies, each with impressive engineering prowess and heritage - AMP Incorporated, founded in 1941 and Raychem Corporation, established in 1957. Today you can find among TE Connectivity brands more famous ones like Schrack, Axicom, CGS etc. In the huge TE Connectivity's production portfolio you can find components for circuit protection, connectors, fiber optics and fiber management solutions, identification products, relays, switches

## Why TE CONNECTIVITY?

- company with over 50-year history
- internationally renowned components
- huge portfolio

and sensors, touch solutions, wires and cables, filters, passive components, tooling, tubing and harnessing, as well as wireless solutions.

## Mini-Universal Mate-N-Lok Series Connectors

### Housing Type - Plug



Type	Description
0-0172165-1	2P, RM 4,14mm
0-0172166-1	3P, RM 4,14mm
0-0172167-1	2x2P, RM 4,14mm
0-0172168-1	2x3P, RM 4,14mm
0-0172169-1	3x3P, RM 4,14mm
0-0350777-1	2P, RM 6,35mm
0-0350766-1	3P, RM 6,35mm

Possibility to combine male or female headers.

### Housing Type - Receptacle (Cap)



Type	Description
0-0172157-1	2P, RM 4,14mm
0-0172233-1	2P, RM 4,14mm*
0-0172158-1	3P, RM 4,14mm
0-0172234-1	3P, RM 4,14mm*
0-0172159-1	2x3P, RM 4,14mm
0-0172160-1	2x3P, RM 4,14mm
0-0172161-1	3x3P, RM 4,14mm
0-0350778-1	2P, RM 6,35mm

Possibility to combine male or female headers. Suitable also for panel mounting (except \*).

### AMP 0-0170364-1

Crimp contact pin for 0,3-0,89mm<sup>2</sup> brass/Sn



### AMP 0-0170366-1

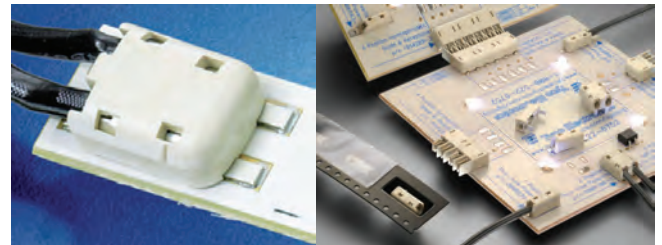
Crimp contact socket 0,3-0,89mm<sup>2</sup> brass/Sn



## LED Connectors

### 1954097-1

Connector SMT Poke-In LED Lighting 2p, pitch 4mm



## Faston and Fastin

### 2-520184-2

FASTON 6,35mm AWG22-18 Brass



### 160626-2

FASTON 2,8x0,8mm 0,5-1,0mm<sup>2</sup>



### 62898-1

FASTIN Non Insulated 1,52-2,54mm<sup>2</sup> Brass



## Heat Shrinks

### Features

- Multiple products are offered in Flame-Retardant (FR) versions
- Most products are UL recognized/CSA certified
- Meet AMS-DTL-23053 and MIL-PRF-46846 standards - Single Wall
- Compliance with AMS-DTL-23053 standards - Dual Wall, Heavy Duty, Special Purpose

### 4-2110842-2





## Connector and Connector Components



## Filters



## Passive Components



## Relays, Switches and Sensors



## Wire, Cable and Cable Assemblies

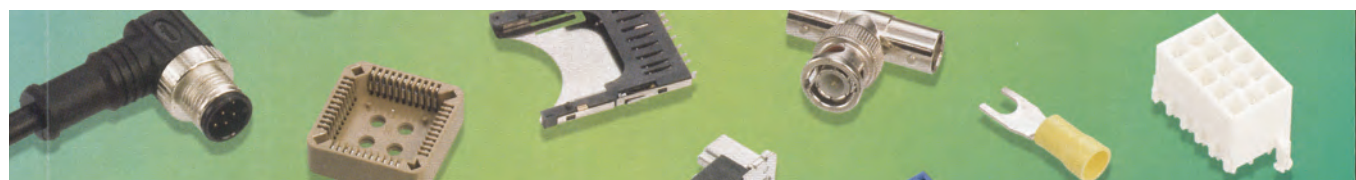


## TE Brand Overview

**AMP**  
**Augat**  
**Axicom**  
**CII**  
**Corcom**  
**Elcon**

**Elo Touchsystems**  
**Hartman**  
**HTS**  
**Kilovac**  
**Madison Cable**  
**Microdot Connectors**

**OEG**  
**Potter & Brumfield**  
**Precision Interconnect**  
**Raychem**  
**Schrack**  
**Transpower**





### Other Components

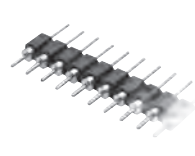
#### Pin Headers

WW-series of pin headers are made from brass with gold-plating. The pin's cross-section is square-shaped 0,635x0,635mm, they are suitable for Wire-Wrap connections. Pin strips may be easily broken into smaller sections. Max. rated current is 3A.

WWS Series



SPL Series



WWD Series



#### Sockets

Female headers were designed for connecting with Wire-Wrap pin headers with square cross-section of 0,635x0,635mm.

BL1X Series



BL2X Series

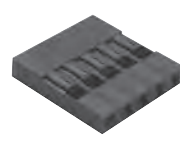


#### Wire To Board Connectors

NSL Series



CG Series



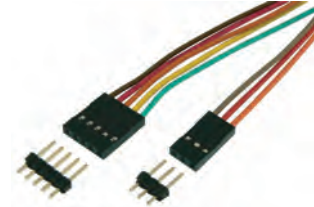
NSK Series



P3500 Series



P254 Series

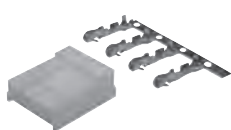


Recommended Crimp Pliers: HT-225D

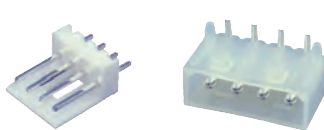


#### DC Connectors for PC

SE-LC



FK0 Series



#### XA Series Connectors



**JST**

#### Crimp Terminals

Fast-on (FON) and Fast-in (FIN) crimp terminals of 6,3mm; 4,8mm and 2,8mm width, made from brass. R - red, B - blue and Y - yellow colour of insulation. ISO - full-insulated Fast-on's, O - angled Fast-on's.

##### FAST ON

FONxx



FONxx-x ISO



FON63-xO



KON...



##### FAST IN

FIN63



FINxx-x



FINxx-P



KIN...



#### Ring and Fork Terminals

Cable forks (VID) or cable rings (OKO) with internal diameter 4,3mm. Crimp to conductors with specific size. Insulation's colour: R=red, B=blue, Y=yellow.

OKO...



VID...



#### Cable Couplers

SPO series cable couplers are designed for permanent crimping connection of two conductors. Allowed conductors' diameters are defined in table below. SPO-FAST connector is designed for repeat usage. Insulation's colour: R=red, B=blue, Y=yellow.

SPO-B,SPO-R,SPO-Y



SPO-FAST



#### Cable End-Sleeves

##### Non-Insulated Cable End-Sleeves

They are made from copper and tin-plated, intended for conductors with specific diameters.

NIT Series



##### Insulated Cable End-Sleeves

They are made from copper and tin-plated, polypropylene insulation, intended for conductors with specific diameters. Operating temperature range is -55°C to +105°C. Using insulated cable end-sleeves raises work safety and saves mounting time.

NITI Series



#### Miscellaneous

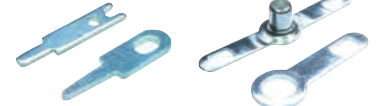
##### Test Points



##### Soldering pins


Soldering pins for PCB mounting (solder/rivet). Dimensions are specified in the table below.


SPOC Series





These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).

Group of connectors serving for power supply of devices, as well as for interconnection of devices, sensors and other components in an industrial environment.


 Skupina konektorů sloužící k napájení zařízení, jakož i k připojení zařízení, senzorů a jiných komponentů v průmyslovém prostředí.

 Gruppe von Steckverbindern zur Stromversorgung von Geräten sowie zur Zusammenschaltung von Geräten, Sensoren und anderen Komponenten in industrieller Umgebung.

 A csatlakozók azon csoportja, melyek a berendezések tápcsatlakoztatására, valamint az egyes berendezések, érzékelők és egyéb alkatrészek csatlakoztatására szolgálnak ipari környezetben.

 Grupa konektorów służących do zasilania urządzeń, jak również do podłączenia urządzeń, czujników i innych elementów w środowisku przemysłowym.

 Grup de conectori care servesc la alimentarea dispozitivelor, precum și la interconectarea dispozitivelor, senzorilor și a altor componente din mediul industrial.

 Skupina konektorov slúžiaca pre napájanie zariadení, ako aj pre pripojenie zariadení, senzorov a iných komponentov v priemyselnom prostredí.

Industrial components are the natural part of all devices, which are intended to be used in demanding conditions or from which we expect highest level of reliability. Industrial connectors are very versatile connectors, usable for many purposes, like most often used to transfer controlling signals, communication data, as well as power voltage. On the other hand power-supply connectors are specifically used for power supply of devices, ensuring reliable connection and safety to operating personnel.

### Classification:

Power-supply connectors can be divided to two main groups – DC/ low voltage connectors and AC/high voltage connectors. All types are available in mating male and female versions, both for cables and for PCBs. Industrial connectors are usually of a more massive construction, than conventional types. They must provide a long term stable connection, that's why they are almost always made of durable and corrosion proof materials. At the same time industrial connectors are usually designed with emphasis on water and dust protection. Resistance to vibrations is another frequent requirement, that's why they often have some kind of a lock, to avoid accidental disconnection. There is a vast amount of industrial connectors types, varying in pins count, shape and mechanical construction. In a production portfolio of world producers you can find a suitable type for any application, usable for power supply, networking and data transmission, as well as coaxial types.



### DC Power Supply Connectors

DC connectors of different diameters and lengths. Also available 3-pin design.



### Car Cigarette Lighter Connectors



These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).

### IEC Connectors



We prepare for our customers and fans a unique newsletter, which is tailor-made. You can choose what you want to read and how often you'll get! Please visit [www.soselectronic.com/newsletter](http://www.soselectronic.com/newsletter)



BELDEN is a dynamic and an innovative company with a vast product portfolio for effective signal transmission solutions including data cables, connectors, I/O modules and network equipment. Belden's global product brands include Hirschmann and Lumberg Automation.

**CZ** BELDEN je dynamická a inovativní společnost s obrovským portfoliem produktů pro efektivní řešení přenosu signálů včetně datových kabelů, konektorů, I / O modulů a síťového vybavení. Mezinárodní skupina Belden zastřešuje značky Hirschmann a Lumberg Automation.

**DE** BELDEN ist ein dynamisches und innovatives Unternehmen mit einem riesigen Produktportfolio für effiziente Lösungen der Signalübertragung, welches Datenkabel, Steckverbinder, I/O-Module und Netzwerkausstattung umfasst. Zur internationalen Gruppe Belden gehören die Handelsmarken Hirschmann und Lumberg Automation.

**HU** A BELDEN egy dinamikus és innovatív cég hatalmas termékínálattal a hatékony adatátviteli technológiák területén, beleértve az adatkábeleket, csatlakozókat, I/O modulokat és hálózati berendezéseket is. A Belden nemzetközi márkái közé tartozik a Hirschmann és a Lumberg Automation is.

**PL** BELDEN jest dynamiczną i innowacyjną spółką z ogromnym portfoliom produktów dla efektywnego rozwiązania transmisji sygnału, włącznie z kablami do transmisji danych, konektorami, modułami W/W oraz wyposażeniem sieciowym. Międzynarodowa grupa Belden zrzesza marki Hirschmann oraz Lumberg Automation.

**RO** BELDEN este o companie dinamică și inovatoare cu un portofoliu vast de produse pentru soluții eficiente de transmitere a semnalelor, inclusiv cabluri de date, conectori, module I/O și echipamente de rețea. Mărcile produsului pe plan mondial ale companiei Belden includ automatizările Hirschmann și Lumberg.

**SK** BELDEN je dynamická a inovatívna spoločnosť s obrovským portfoliom produktov pre efektívne riešenie prenosu signálu vrátane dátových káblov, konektorov, I / O modulov a sieťového vybavenia. Medzinárodná skupina Belden zastřešuje značky Hirschmann a Lumberg Automation.

Belden is for over 100 years a world-class supplier with a comprehensive portfolio of wires and cables, connectivity and networking products for the transmission of signals for data, sound and video applications.

Hirschmann Automation and Control, founded in 1924- Esslingen/Germany is the technology and market leader in industrial networking. Hirschmann Automation and Control offers a complete, integrated structure for data communication, automation and control systems. Hirschmann industrial connectors are widely used for various sensors and data acquisition systems.

Lumberg Automation delivers intelligent wiring solutions, such as electronic field bus components, connectors and distribution box systems, for all applications in industrial automation.

### Why BELDEN?

- global company with extensive know-how and experience
- widely used industrial standard products
- top quality components

### Industrial Connectors

CA-/CM-series are circular connectors for extremely rough environments (hydraulics, pneumatics, etc.). The robust circular connectors of the CA-/CM-series meet the most stringent requirements of general equipments in the field of measurement, control and regulation technology.

#### Technical features:

- High resistance to external influences
- The CM-series is compatible with metal connectors as per MIL-C-5015 or VG 95342
- Robust housing made of impact resistant, glass fiber reinforced plastic
- Available in 4- and 7-pole variants (including PE) in CA-series and in 3- to 17-pole variants in CM-series
- Protection class up to IP67

#### CA / CM - Series

CA3LD CA6GD CA3LS CM02E20 CA00SD1



#### STAK, STAS Series

The rectangular connectors of the compact ST-series have been specially designed for power applications and are intended for current supply and signal transmission in industrial installations, in machinery manufacture as well as in indoor and outdoor building automation. For this reason, you will find the universally stable ST-series both in small drives such as in shutters, tube and servo drives as well as in domestic water supply installations and in the mains voltage supply to lighting equipment, in wind turbine control systems and manufacturing equipment. The highly reliable ST- connectors perform excellently even in current supply under extremely demanding conditions, for example in sensitive measuring devices.



#### Cordsets with Circular Connectors M8 and M12

Innovative sensor-circular connectors excel because of their ergonomic design, and with their clearly defined gripping surfaces and numbering arrangement, they simply have more to offer. In general, the M-series is perfectly suitable for applications involving all types of sensors and actuators in automation and offers excellent fail-safety even in the presence of high reversed-bending stresses (for example in drag chains).



#### Field Attachable Connectors M8 and M12




#### GDM Series


The rectangular connectors of the GDM-series for hydraulic, pneumatic and electro-magnetic actuators in all forms are well-equipped to handle heavy stresses in the field. This series with a high loading capacity is especially well-suited for use with solenoid valves, pressure sensors, flow controllers and in heating equipment in control systems for gas appliances and oil burners. Even in vibration-endangered devices and structural components such as construction machines or in conveyor installations, it is possible to have a highly durable solution with the use of crimp technology. The GDM series can be used wherever a "metal-free" environment is required, for example in the food sector and the chemical industry.








These connectors in general serve to connections devices in industrial conditions and to make connections in distribution boxes, lighting and other industrial applications or buildings installations. Connectors are optimized according to intended application in terms of reliability, saving of space, easy installation of wires, safety and easy orientation in distribution boxes.


 Tyto konektory slouží k propojení zařízení v průmyslových podmínkách, v rozvodných skříních, různých průmyslových aplikacích a instalacích budov. Konektory jsou optimalizovány podle jejich použití, s ohledem na spolehlivost, úsporu místa, snadnou instalaci vodičů, bezpečnost a snadnou orientaci v rozvodných skříních.

 Diese Anschlüsse dienen im Allgemeinen zur Verbindung von Geräten unter industriellen Bedingungen und zur Herstellung von Verbindungen in Verteilerkästen, Beleuchtungsanlagen und anderen industriellen Anwendungen oder Gebäudeinstallationen. Die Anschlüsse sind mit Blick auf die beabsichtigte Anwendung optimiert, hinsichtlich Zuverlässigkeit, Raumersparnis, einfache Installation von Drähten, Sicherheit und einfache Orientierung in Verteilerkästen.

 Ezek a csatlakozók főként az egyes berendezések összeköttetésére szolgálnak ipari körülmények között, elosztódobozok, világítás és egyéb ipari alkalmazások vagy épületgépészet összeköttetésére. A csatlakozók a kívánt felhasználás szerint vannak optimalizálva megbízhatóság, helytakarékoság, könnyű szerelhetőség, biztonság és az elosztódobozokban való átláthatóság szempontjából.

 Konektory te służą do połączenia urządzeń w warunkach przemysłowych i do realizacji połączeń w szafach rozdzielczych, oświetleniu i innych aplikacjach przemysłowych oraz instalacjach budów. Konektory są zoptymalizowane wg ich zastosowania, z uwagą na niezawodność, oszczędność miejsca, prosty montaż przewodów, bezpieczeństwo i łatwą orientację w szafach rozdzielczych.

 Acești conectori servesc în general la dispozitivele de conectare în condiții industriale și pentru a face conexiunile în cutiile de distribuție, iluminat și în alte aplicații industriale sau instalații din clădiri. Conectorii sunt optimizați în funcție de aplicația intenționată în privința fiabilității, economisirii spațiului, instalării ușoare a firelor, siguranței și orientării facile în cutiile de distribuție.

 Tieto konektory slúžia na prepojenie zariadení v priemyselných podmienkach a na vytvorenie spojov v rozvodných skrinách, osvetlení a iných priemyselných aplikáciách a inštaláciách budov. Konektory sú optimalizované podľa ich použitia, s ohľadom na spoľahlivosť, úsporu miesta, ľahkú inštaláciu drôtov, bezpečnosť a ľahkú orientáciu v rozvodných skrinách.

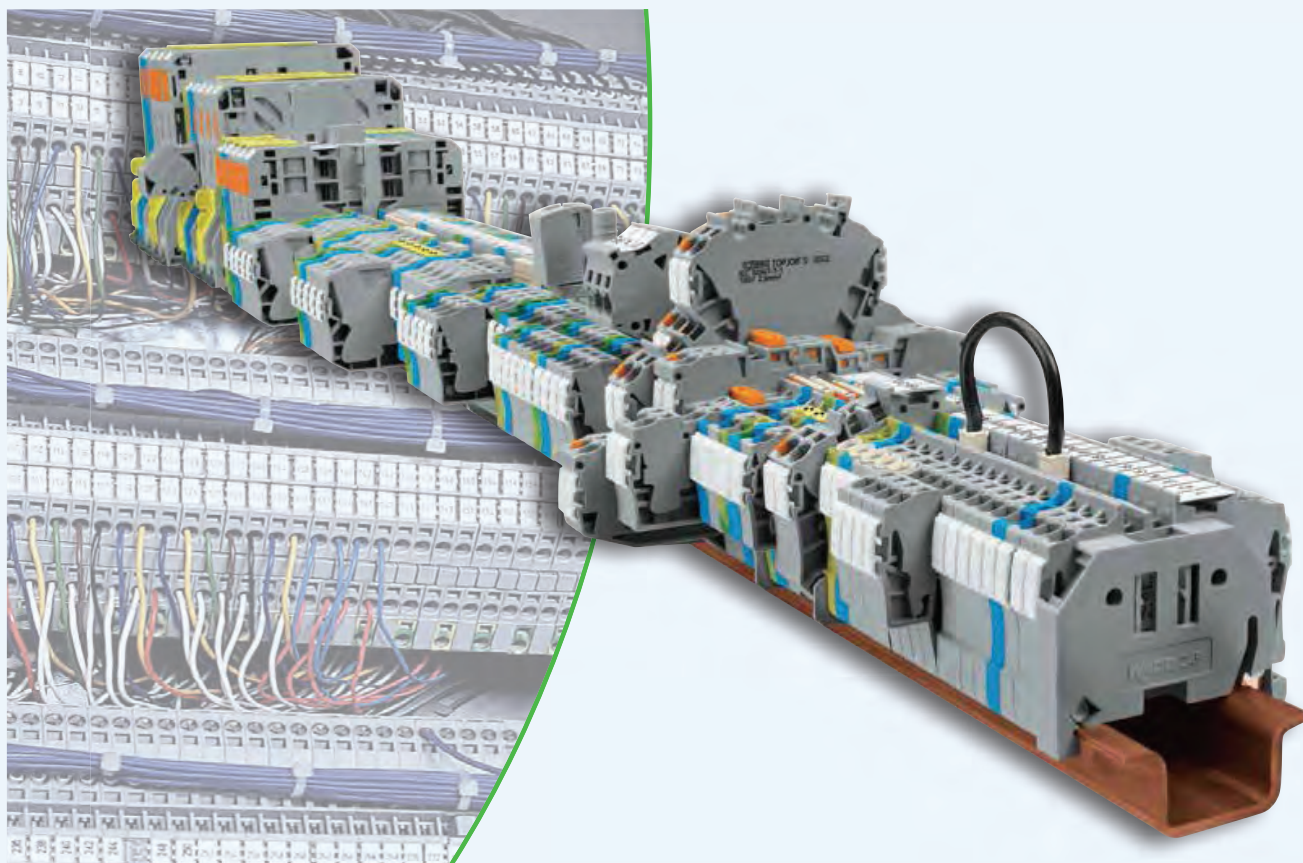
Here you can find PCB terminal blocks with and without screws, plug-in terminal blocks, panel feed-through blocks, rail mounted terminal blocks, lighting and push-wire connectors. All these connectors significantly simplify assembly of devices or installation in distribution boxes.

## Classification:

Connectors and terminals from this group can be divided to three main groups: connectors for PCB, for a DIN-rail and freely applicable connectors like lighting and push-wire connectors. You can choose screw- or screwless versions. Screwless versions significantly shorten assembly time, especially at installation in distribution boxes. Also here are many possibilities of usage, even some non-DIN-rail connectors are usable on a DIN rail by means of an appropriate adapter (usually a small plastic holder). PCB plug-in connectors offer a big advantage of a very easy assembly of a module to a target device and they provide a fast and easy way to exchange modules in case of a service.

## Terms:

**Pollution degree of environment** - Pollution degree is a classification according to the amount of dry pollution and condensation present in the environment. This classification is important since it affects creepage and clearance distances required to insure the safety. Safety standards, such as UL and IEC, specify appropriate distances between high voltage and safety low voltage signals. There are 4 degrees of environment from clean rooms and inside of sealed components (pollution degree 1), through laboratories and offices (degree 2), industrial areas and unheated rooms (degree 3) to outdoor conditions (degree 4).





Since its founding in 1951 in Minden/Germany, WAGO is the company which based its success on an idea to find an alternative to the normal screw-type connection in the connecting technology field. They developed spring clamp terminal blocks. Since many years Wago is the synonym for various push-wire and other spring-clamp connectors.

**Čeština** Od svého založení v r. 1951 v Minden / Německo je WAGO společností, která založila svůj úspěch na ideji najít alternativu k běžným šroubovým spojům v technologii spojů. Společnost vyvinula svorkovnice s pružinovými svorkami. Již mnoho let je Wago synonymem pro různé nasouvací a jiné, pružinové svorky.

**Deutsch** Seit seiner Gründung 1951 in Minden/ Deutschland ist WAGO ein Unternehmen, das seinen Erfolg auf der Idee gründete, eine Alternative zum üblichen Schraubanschluss in der Verbindungstechnik zu finden. Wago entwickelte die Federklemmtechnik. Seit mehreren Jahren ist Wago ein Synonym für verschiedene Steckverbinder und andere Federklemmen.

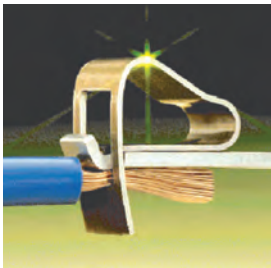
**Hungarian** A WAGO sikeresít az 1951-es németországi Minden-ben való alapítása óta a sorkapcsok csavar nélküli megoldásának kutatásában szerzi. A Wago fejleszette ki a rugós beszerítéval rendelkező sorkapcsokat, melynek köszönhetően a Wago már több éve egyet jelent a különböző beszuró és más rugóval rögzített sorkapcsokkal.

**Polish** Od swego założenia w roku 1951 w Minden / Niemcy, WAGO jest spółką, która oparła swój sukces na idei znalezienia alternatywy do zwykłych połączeń śrubowanych w technologii połączeń. Wago opracował bloki zacisków z zaciskami sprężynowymi. Już wiele lat jest Wago synonimem dla różnych zacisków nasuwanych, oraz innych zacisków dociskanych przez sprężynę.

**Romanian** Încă de la înființare în anul 1951 în Minden / Germania, WAGO este o companie care își datorează succesul ideii de a găsi o alternativă la tehnologia de conectare normală cu șuruburi. Wago a dezvoltat blocuri terminale cu mecanism de strângere cu arc. De mult ani Wago și-a câștigat reputația de producător de diverse conectori cu fixare prin împingere și alți conectori cu strângere prin arc.

**Slovak** Od svojho založenia v r. 1951 v Minden / Nemecko je WAGO spoločnosťou, ktorá založila svoj úspech na ideji nájsť alternatívu k bežným skrutkovým spojom v technológii spojov. Wago vyvinul svorkovnice s pružinovými svorkami. Už mnoho rokov je Wago synonymom pre rôzne nasúvacie a iné pružinové zvierané svorky.

Wago products are continuously, already for many years, becoming standards for industry on the world market. The year 1977 is when the success story of the CAGE CLAMP began – “vibration-proof, fast and maintenance-free connection”.

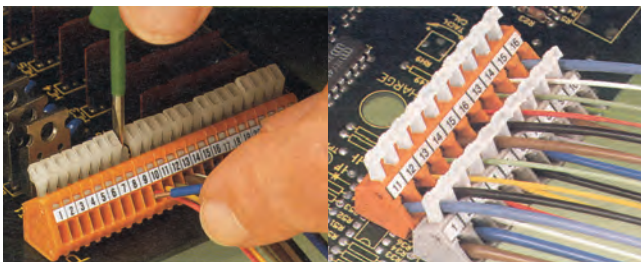


**CAGE CLAMP®**

The CAGE CLAMP® is a universal clamping system for solid, stranded and fine-stranded conductors with rated cross sections from AWG 28 to 2 (0.08 mm to 35 mm).

- **Time saving** - CAGE CLAMP® technology reduces labour charges due to significantly reduced wiring times.
- The **maintenance-free** feature results from the excellent long term consistency of the electrical and mechanical properties of the clamping connection.
- The **vibration-proof** properties of CAGE CLAMP® connections were tested and verified in a vibration test.

## PCB Terminal Blocks with Cage Clamp



### Wago 233-xxx

Wire Section: 0,08-0,5mm<sup>2</sup>  
Maximum Current: 6A  
Standard no of poles 2-24



**RM 2,5mm - Grey:**  
233-1xx - without lever  
233-2xx - with lever

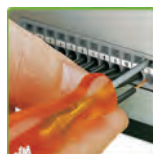
**RM 2,54mm - Orange:**  
233-4xx - without lever  
233-5xx - with lever

### Wago 231-xxx

Wire Section: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 16A  
Standard no. of poles 2-12



Suitable to connect wire leads through a panel opening



### Wago 236-xxx

Wire Section: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 16A



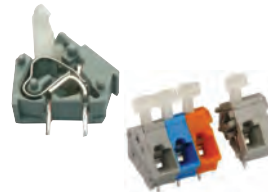
### Wago 255-xxx

Wire Section: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 16A



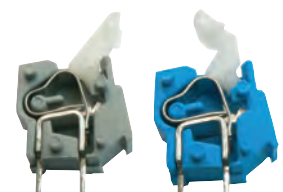
### Wago 256-xxx

Wire Section: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 16A



### Wago 257-4xx

Wire Section: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 16A



### End Plates

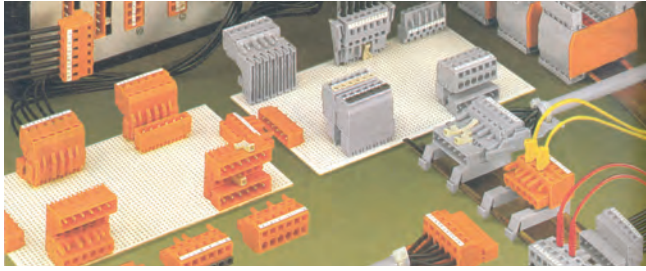


## Why WAGO?

- top quality producer
- pioneer company in a non-screw connectors and terminals
- Wago stands for a synonymum for non-screw connectors
- huge range of accessories, possibility of various sets
- top quality materials used
- space saving and time saving solutions
- reliable connectors and terminals

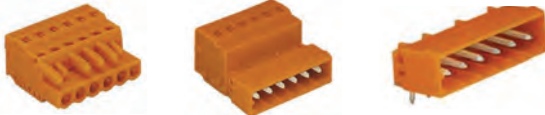


## Wire To Board, Terminals, Headers and Sockets



RM 5mm - Grey  
RM 5,08mm - Orange

### Wago 231-xxx



### Wago 232-xxx



## Rail - Mounted Terminal Blocks with Cage Clamp® S

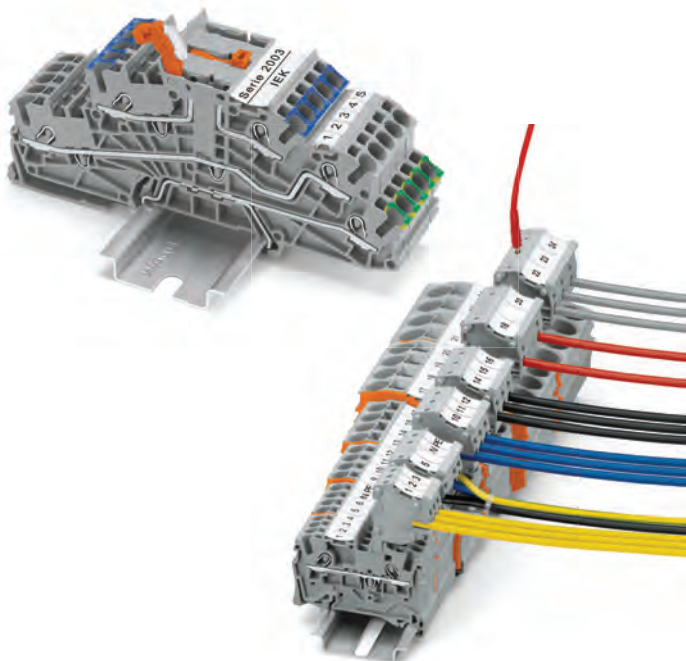


Cage Clamp® S

### Wire connection – Push-in connection

Solid wires ranging from at least two sizes below to one size above the rated cross section can be pushed in directly without tools.

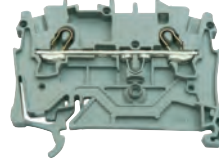
Stranded conductors with ferrules ranging from at least two sizes below the rated cross section up to the rated cross section can also be easily inserted without using any tools.



## Front Entry Wiring Type

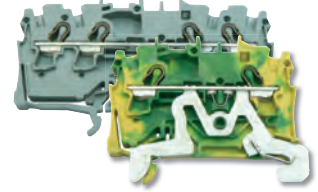
### Wago 2001-xxxx

Wire Section: 0,25-1,5mm<sup>2</sup>  
Maximum Current: 18A



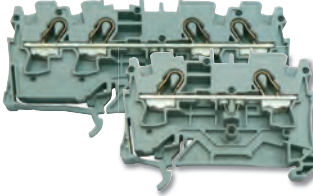
### Wago 2002-xxxx

Wire Section: 0,25-2,5mm<sup>2</sup>  
Maximum Current: 24A



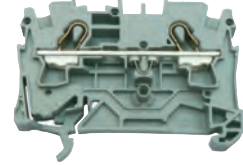
### Wago 2004-xxxx

Wire Section: 0,5-4mm<sup>2</sup>  
Maximum Current: 32A



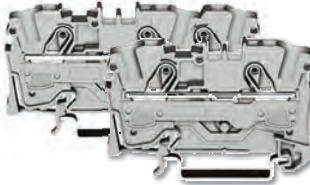
### Wago 2006-xxxx

Wire Section: 0,5-6mm<sup>2</sup>  
Maximum Current: 41A



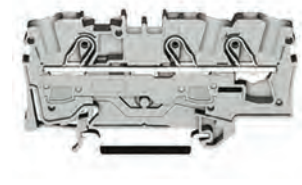
### Wago 2010-xxxx

Wire Section: 0,5-10mm<sup>2</sup>  
Maximum Current: 57A



### Wago 2016-xxxx

Wire Section: 0,5-16mm<sup>2</sup>  
Maximum Current: 76A



### 2002-1x9x

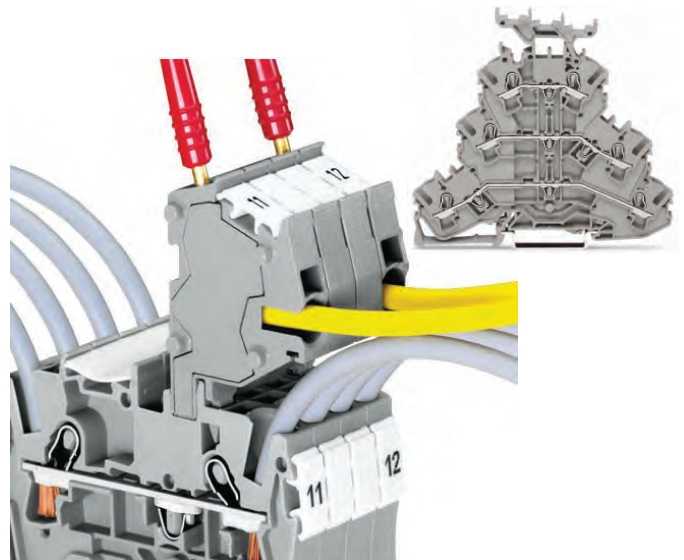


### 2004-1x9x



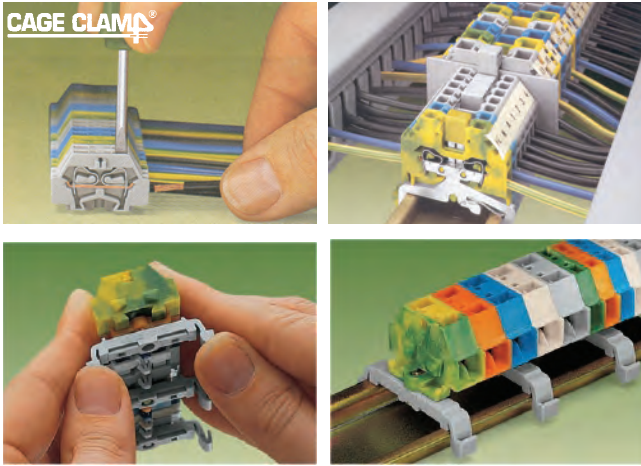
### 200x-4xx

2-10 way, insulated jumper bars





## Side-Entry Wiring Type



### Wago 260-3xx

Wire Section: 0,08-1,5mm<sup>2</sup>  
Maximum Current: 18A



### Wago 261-3xx

Wire Section: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 24A



### Wago 262-3xx

Wire Section: 0,08-4mm<sup>2</sup>  
Maximum Current: 32A



### 209-12x, 209-188

Monunting feet for 35mm DIN rail



### 260-361



### 261-361



### 262-361



### 261-402

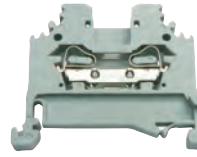


### 260-402



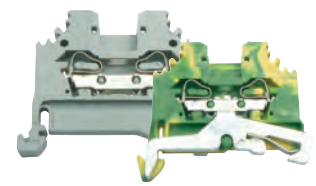
### Wago 279-101

Wire Section: 0,08-1,5mm<sup>2</sup>  
Maximum Current: 18A



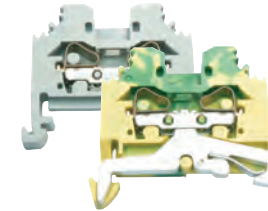
### Wago 280-xxx

Wire Section: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 24A



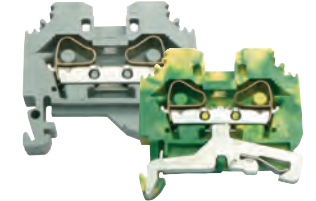
### Wago 281-xxx

Wire Section: 0,08-4mm<sup>2</sup>  
Maximum Current: 32A



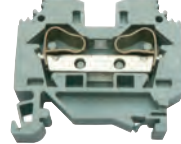
### Wago 282-xxx

Wire Section: 0,08-6mm<sup>2</sup>  
Maximum Current: 41A



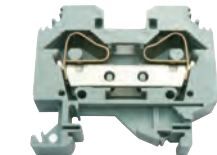
### Wago 284-10x

Wire Section: 0,2-10mm<sup>2</sup>  
Maximum Current: 57A



### Wago 283-10x

Wire Section: 0,2-16mm<sup>2</sup>  
Maximum Current: 76A



### 281-301, 282-301



### 283-301, 284-301



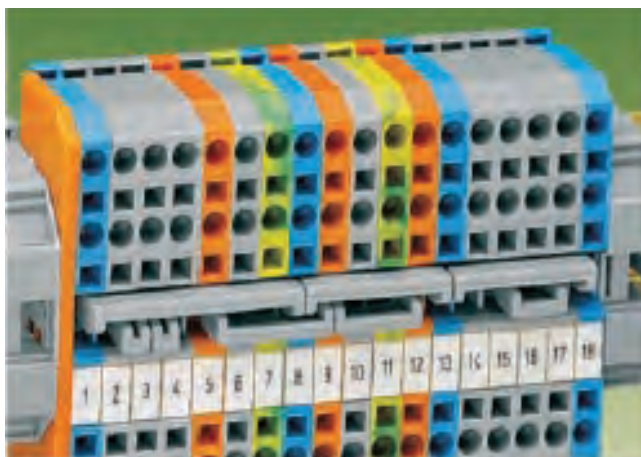
### 279-402



### 28x-402



### 780-45x



## Carrier Rails (TS 35)

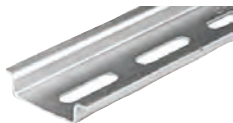
### Wago 210-133

N Bus bar, tin plated, length 1m, Cu 10mmx3mm, weight 270g.



### Wago 210-112

Carrier rail 35x7,5mm 1mm/0,039 in thick Steel, zinc-plated, slotted



### 209-50x

Wago quick marking system white colour. 10 strips of 10 markers per strip (100) per card



### 249-119

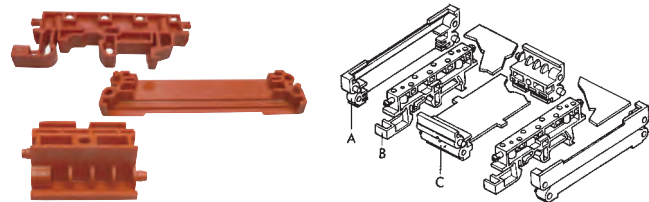
Marker carrier with adjustable height. Suitable for end stop parts W249-116, W249-117 series.



## Enclosures for DIN-Rails



### Wago 210-xxx



This enclosure consist of 3 parts:

- A. Side corner 210-266
- B. Fixing foot for mounting on DIN 35 rails (210-263)
- C. Distance insert - two sizes: 210-272 (25,4 mm) and 210-273 (101,6 mm) - sets the width of the carrier

For more complete carrier you need 2 feet, 2 distance inserts and 2 side corners.

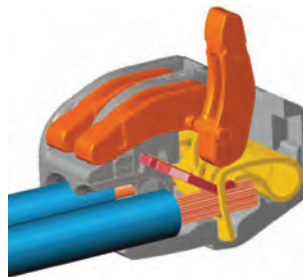
These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).



We can help you with a promotion of your products. Use our marketing channel!

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- 170 000 visits / month
- newsletter sent to 60 000 addresses
- 12 external professional portals
- our own printed magazine

## Universal and Lighting Connectors for Solid and Stranded Wires

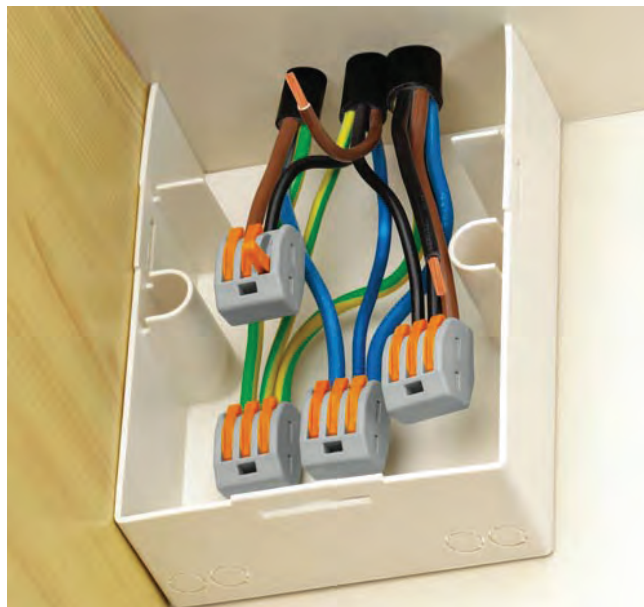
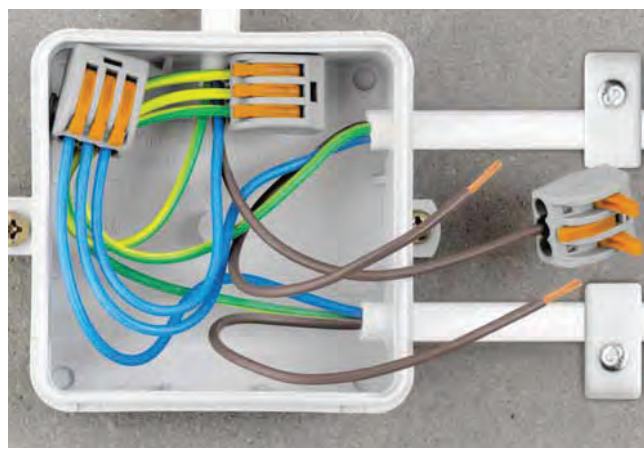
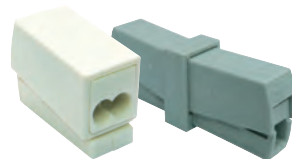


### Wago 222-xxx

Stranded Wire: 0,08-4mm<sup>2</sup>  
Solid Wire: 0,08-2,5mm<sup>2</sup>  
Maximum Current: 32A

### Wago 224-xxx

Stranded Wire: 0,5-2,5mm<sup>2</sup>  
Solid Wire: 1-2,5mm<sup>2</sup>  
Maximum Current: 24A





## Push-Wire Connectors for Junction Boxes

Wago 773-173

Wire Section: 2,5 - 6mm<sup>2</sup>  
Maximum Current: 41A



273-150

Adaptor for 3 terminals of 273 series to DIN rail or screws mounting. Colour orange.



Wago 2273-xxx

How to develop the best socket modules ever? Minimize the space requirements in the socket while ensuring maxim convenience, ease of use, safety and reliability:

- Individually combinable cross sections from 0.5 to 2.5 mm<sup>2</sup>
- Clear color coding for quick access
- Up to 51% less space required than for the 273 Series that has proven itself in billions of applications
- Test slot for all standard test probes
- Transparent enclosure allows visual inspection for correct wiring
- Sight glass for checking touch-proof protection
- Replacement for Wago 273 Series



50% smaller size

0.5 to 2.5 mm<sup>2</sup>



2273-202

2-conductor terminal blocks



2273-203

3-conductor terminal blocks



2273-204

4-conductor terminal blocks



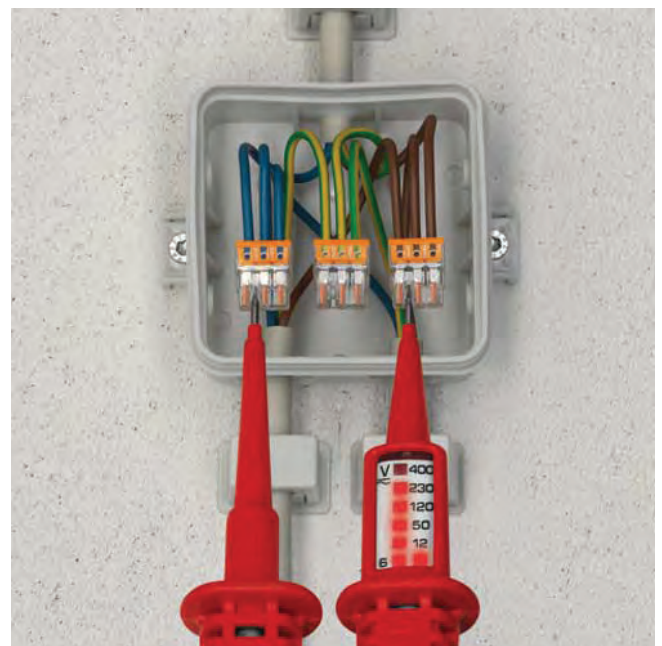
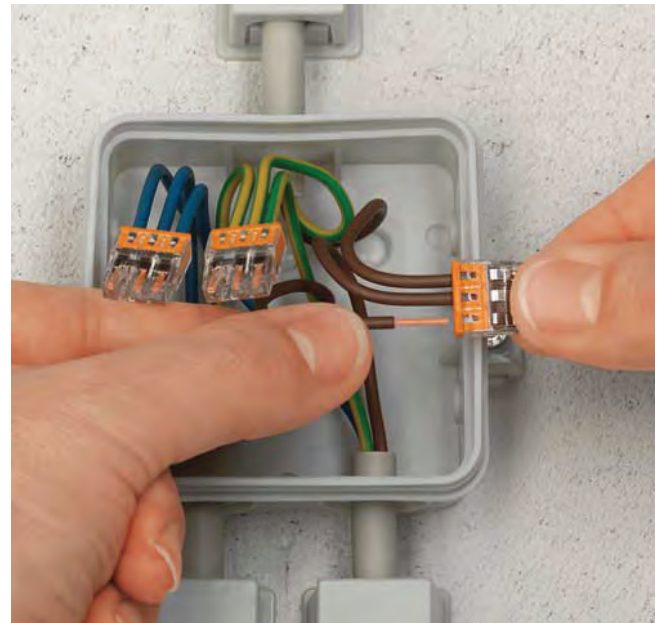
2273-205

5-conductor terminal blocks



2273-208

8-conductor terminal blocks



Sockets Industrial & Power Supply Connectors Installation & Panel Connectors, Rail-Mounted Terminal Blocks Cables, Cords & Laboratory Equipment Switches & Bl



## WINSTA®



So far, the WINSTA® range of connectors for building installation has consisted of 3, 4 and 5-pole plugs and sockets, including pre-assembled connecting and interconnection cables as well as various pluggable distribution connectors and distribution boxes – for standard wiring applications in building installation technology. For improved communication, the WINSTA® family now has names hinting on the model or application.

### WINSTA® PCB connectors

Pluggable connection for PCBs up to 25A, codable. Looping of the feed-through wiring via dual connection. CAGE CLAMP® S connection for all types of conductors - direct connection of solid conductors also possible.

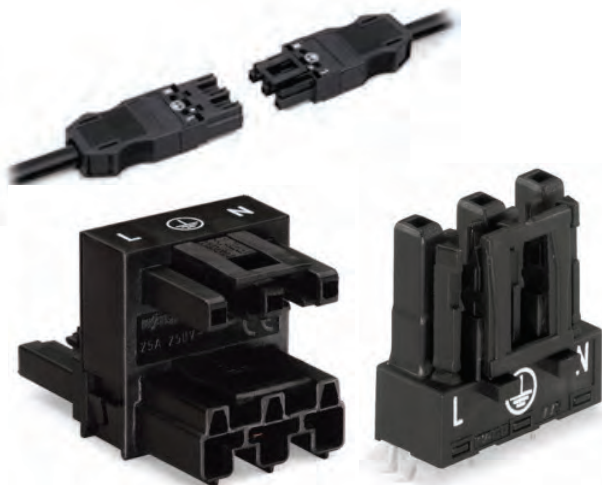
### Other connector families...

- ... with smaller dimensions and reduced technical data (MINI)
- ... for power supply with higher current carrying capacity (MAXI)
- ... for electrical installation applications using flat cables with integrated IDC technology
- ... for round conduits and ducts (RD)
- ... for bus systems (EIB)



### WINSTA® MIDI

**For the majority of applications.** The range of connectors with the largest variety of components (plugs/sockets, snap-in connectors, distribution connectors, cable assemblies, etc.), codings and colors for standard installation applications. Up to 4 mm<sup>2</sup>, 250/400 V and 25A. All other product ranges complete the WINSTA® MIDI series.



## 2060 Series



### Easy In-Line Assembly of LED PCBs

The 2060 Series SMD PCB terminal block is perfect for convenience and compact design. WAGO has developed a new connecting link for easily combining several LED modules on one single LED string, saving a substantial amount of time and money.

Beyond classic wiring, the LED modules can now be easily interconnected in one string using the newly developed connecting links, eliminating manual wiring and considerably reducing the time and effort required. The connecting links are available in 1 to 6-pole versions for all terminal blocks of the 2060 Series, with pin spacing of 4 mm.

A 2-pole SMD terminal block with 8 mm pin spacing also adds to the versatility of this portfolio. It is ideal for LED and industrial applications with higher rated voltages of up to 630 V/6 kV/2.

Technical Parameters	1 Pole			2 - 3 Pole		
Pin Spacing	4 mm 0.157 in			4 mm 0.157 in		
Rating per	IEC/EN 60664-1			IEC/EN 60664-1		
Overvoltage category	III	III	II	III	III	II
Pollution degree	3	2	2	3	2	2
Rated voltage	63 V	160 V	320 V	63 V	160 V	320 V
Rated surge voltage	2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV
Nominal current	9 A	9 A	9 A	9 A	9 A	9 A
Approvals per U	UL 1977			UL 1977		
Rated voltage	600 V			250 V		
Nominal current UL	9 A			9 A		



# Boundless building automation

## Connect – Install – Automation

WAGO ranks among the leading providers of electrical interconnect and automation solutions. With forward-thinking products and insightful strategic decisions, the company is well-known for creating trends and setting industry standards. As a third-generation, family-owned company, WAGO remains steadfastly committed to maintaining respectful relationships with employees, customers and suppliers.



Founded in 1951, WAGO changed the way electrical connections are made with the invention of Spring Pressure Connection Technology. WAGO leads the industry with innovations that make industry safer and more efficient. In 1995, for example, WAGO became one of the world's premier automation suppliers with the introduction of the first modular, fieldbus-independent control system. WAGO products are used in more than 30 countries for a wide range of applications (e.g., power and process technology, building automation, machinery and equipment, as well as industrial and transportation applications). At present WAGO employs 5285 people.



### ELECTRICAL INTERCONNECTIONS

WAGO's success story began with the simple, but revolutionary spring clamp. Known worldwide as CAGE CLAMP®, this innovation is renowned for user-friendly operation and ability to reliably provide a gas-tight connection between conductor and current bar. Because the clamping force automatically adjusts to the conductor size, it is absolutely maintenance-free. In contrast to screw-type connections, connection quality is virtually independent of operator skill, while providing faster operation. Today, WAGO offers the broadest range of screwless termination products thanks to continuous innovations and advancements in Spring Pressure Connection Technology used in new products.

Among WAGO's most well-known ELECTRICAL INTERCONNECTIONS products are: The 273 Series of PUSH WIRE® connectors for junction boxes and new 2273 Series (launched in 2011), which is half the size of its predecessor. Also included: TOPJOB® S, which offers the market's widest range of DIN 35-rail mount terminal blocks, as well as *picoMAX*®, WAGO's revolutionary conductor-to-PCB connection system. X-COM®-SYSTEM, a combination of connectors and rail-mounted terminal blocks has been well-established as the leading universal system wiring solution. The WINSTA® connection system has dramatically simplified building installations while providing faster and safer connections. Supplementing these products are a wide variety of interface modules including relays and transducers, as well as the EPSITRON® family of power supplies. EPSITRON®, which features a diverse range of power ratings and segment-leading capabilities, has developed a strong international following.



### AUTOMATION

The beginning of the 1990s signaled a shift from centralized to distributed control systems. In 1995, WAGO launched the WAGO-I/O-SYSTEM 750 — a completely new, finely modular control solution. The open and flexible architecture of the WAGO-I/O-SYSTEM laid the foundation for further innovation in automation. Recent examples include: DALI or IO-Link Master modules, KNX and BACnet controllers, 16-channel modules or safety modules for monitoring and controlling safety functions. WAGO's modular SPEEDWAY 767 system was introduced in 2006 for in-the-field control applications. With its IP67-rated housing, it is ideal for fast process control or cabinet-free automation in harsh industrial environments.

[www.wago.com](http://www.wago.com)



For more details contact your authorised distributor SOS electronic europe.



Established in 1988 in Montaquilla/ Italy, EUROCLAMP as a specialized sub-contracting company began the production of printed circuit terminal blocks in 1991. Thanks to their experience of more than 30 years within a leading group of companies in the electronic field, Euroclamp have been immediately recognized as a flexible, reliable and highly innovative company.

**CZ** EUROCLAMP, založena v r. 1988 v Montaquilla / Itálie zahájila výrobu svorkovnic do DPS v r. 1991. Díky svým více než třicetiletým zkušenostem v rámci skupiny elektronických společností se Euroclamp okamžitě etabloval jako flexibilní, spolehlivá a inovativní společnost.

**DE** EUROCLAMP, geründet 1988 in Montaquilla/ Italien, startete als spezialisiertes Zulieferunternehmen 1991 die Produktion von Printklemmen. Dank der mehr als 30-jähriger Erfahrung innerhalb der Elektronik-Unternehmensgruppe etablierte sich Euroclamp rasch als flexibles, zuverlässiges und innovatives Unternehmen.

**HU** Az olaszországi Montaquilla-ban 1988-ban alapított EUROCLAMP cég a NYÁK-ba forrasztható sorkapcsok gyártását 1991-ben kezdte. Az elektrotechnikában szerzett több mint 30 éves tapasztalatának köszönhetően rövid időn belül egy flexibilis és innovatív céggé nőtte ki magát.

**PL** Spółka EUROCLAMP, założona w r. 1988 w Montaquilla / Włochy, jako wyspecjalizowany poddostawca, rozpoczęła w roku 1991 produkcję listw zacisków do płytek PCB. Dzięki swoim ponad 30-letnim doświadczeniom w ramach grupy spółek elektrotechnicznych, Euroclamp natychmiast został uznane jako spółka przężna, niezawodna i innowacyjna.

**RO** Înființată în 1988 în Montaquilla/ Italia, EUROCLAMP este o companie specializată în sub-contractare care a început producția de blocuri terminal cu circuit imprimat din 1991. Grație experienței de peste 30 de ani în cadrul unui grup de companii activând în domeniul electronicelor, Euroclamp s-a remarcat drept o companie flexibilă, fiabilă și extrem de inovatoare.

**SK** EUROCLAMP, založená v r. 1988 v Montaquilla/ Taliansko, ako špecializovaná subdávateľská firmam, začala výrobu svorkovnic do DPS v r. 1991. Vďaka svojim vyše 30-ročným skúsenostiam v rámci skupiny elektronických spoločností, sa Euroclamp okamžite etabloval ako flexibilná, spoľahlivá a inovatívna spoločnosť.








Euroclamp is more and more identified as a "solution provider" and not only as a "components provider". This mostly thanks to their skill for custom design-in solutions.

From Euroclamp we offer mainly a wide range of pcb terminal blocks, plug-in connectors and DIN rail enclosures, which feature a quality of EU made products.

### Why EUROCLAMP?

- competitive price
- most of components available directly from our stock
- extensively growing portfolio
- wide range of accessories

### Plug-In Connectors

							
	SH	SH	SH	SH	SH-M	SH-M	SH
wire section	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)
Pitches (mm)	3,5 (7)	3,81 (7,62)	5 (10)	5,08 (10,16)	5 (10)	5,08 (10,16)	7,5
Mounting position	H	H	H	H	H	H	H
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles	02÷24 (02÷12)	02÷24 (02÷12)	02÷24 (02÷12)	02÷24 (02÷12)	2÷3 (1÷2)	2÷3 (1÷2)	02÷16
<b>Mech.al characteristics</b>							
Captive screw	M2	M2	M3	M3	M3	M3	M3
Rec. tightening torque	0,25Nm / 2,3lbs.in.	0,25Nm / 2,3lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.
<b>Electrical characteristics</b>							
Rated current	8A	8A	12A (15A)	12A (15A)	12A (15A)	12A (15A)	15A
Rated voltage	160V (500V)	160V (500V)	250V (500V)	250V (500V)	250V (500V)	250V (500V)	500V
Impulse voltage	2,5 kV (6 kV)	2,5 kV (6 kV)	4 kV (6 kV)	4 kV (6 kV)	4 kV (6 kV)	4 kV (6 kV)	6 kV
<b>General characteristics</b>							
PCB holes diameter	-	-	-	-	-	-	-

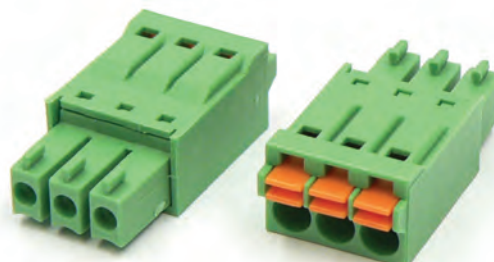


V= Vertical  
H= Horizontal  
W= Double PIN

VR= Reversed Vertical  
HR= Reversed Horizontal

IT= 35° Angled  
IQ= 45° Angled








L= Side  
F= Flying





















### Plug-In Connectors

PLUG-IN CONNECTORS							
	SH-M	SH-K	SH-K	SHS	SV-F/P	SV-F/P	SV-F/P
Wire section	2,5mm <sup>2</sup> (14AWG)	1,5mm <sup>2</sup> (16AWG)	2,5mm <sup>2</sup> (14AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)
Pitches (mm)	7,62	3,5 / 3,81 (7 / 7,62)	5 / 5,08 (10 / 10,16)	5 / 10	3,5 / 3,81	5	5,08 (10,16)
Mounting position	H	H	H	H - V	V	V	V
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Cage clamp / Käfigsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles	2÷3	02÷22 (02÷11)	02÷22 (02÷11)	2÷3 (1÷2)	02÷24	02÷24	02÷24
<b>Mech.al characteristics</b>							
Captive screw	M3	M2	M3	M2,5	M2	M2,5	M3
Rec. tightening torque	0,5Nm / 4,5lbs.in.	0,25Nm / 2,3lbs.in.	0,5Nm / 4,5lbs.in.	0,4Nm / 3,5lbs.in.	0,2Nm / 1,8lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.
<b>Electrical characteristics</b>							
Rated current	15A	8A	12A (15A)	10A	8A	12A	12A (15A)
Rated voltage	500V	160V (500V)	250V (500V)	250V (500V)	160V	250V	250V (500V)
Impulse voltage	6 kV	2,5 kV (6 kV)	4 kV (6 kV)	4 kV (6 kV)	2,5 kV	4 kV	4 kV (6 kV)
<b>General characteristics</b>							
PCB holes diameter	-	-	-	-	-	-	-

PLUG-IN CONNECTORS							
	SV-F/P	SV-F/P-K	SVR-K	SF	SHM	SHM	SRF
Wire section	2,5mm <sup>2</sup> (14AWG)	1,5mm <sup>2</sup> (16AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	-
Pitches (mm)	7,5 / 7,62	3,5 / 3,81	5 (10)	5,08 (10,16)	5	5,08	5,08 / 7,62
Mounting position	V	V	VR	V	H	H	V
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Spring / Federkraft	Spring / Federkraft	Faston
Nr. Poles	02÷11 / 02÷12	02÷22	02÷22 (02÷11)	02÷24 (02÷12)	02÷24	02÷24	02÷05 / 02÷04
<b>Mech.al characteristics</b>							
Captive screw	M2,5	M2	M3	M3	-	-	-
Rec. tightening torque	0,5Nm / 4,5lbs.in.	0,2Nm / 1,8lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	-	-	-
<b>Electrical characteristics</b>							
Rated current	15A	8A	12A (15A)	12A (15A)	12A	12A	16A
Rated voltage	500V	160V	250V (500V)	250V (500V)	250V	250V	320V / 500V
Impulse voltage	6 kV	2,5 kV	4 kV (6 kV)	4 kV (6 kV)	4 kV	4 kV	4 kV / 6 kV
<b>General characteristics</b>							
PCB holes diameter	-	-	-	-	-	-	-

PLUG-IN CONNECTORS							
	PRF	PV	PV	PV-P	PV	PV	PV-LS/LD
Available versions	-	closed/open ends geschlossene/offene Enden	open ends offene Enden	closed ends geschlossene Enden	closed/open ends geschlossene/offene Enden	closed/open ends geschlossene/offene Enden	closed ends geschlossene Enden
Pitches (mm)	5,08 / 7,62	3,5 / 3,81 (7 / 7,62)	5 / 5,08 (10 / 10,16)	5 / 5,08 (10 / 10,16)	7,5 / 7,62	5,08 (10,16)	3,5
Mounting position	V	H - V	H - V	H - V	H - V	HR	L
Connection system	-	-	-	-	-	-	-
Nr. Poles	02÷05 / 02÷04	02÷24 (02÷12)	02÷24 (02÷12)	02÷24 (02÷12)	02÷16	02÷24 (02÷12)	04
<b>Mech.al characteristics</b>							
Captive screw	-	-	-	-	-	-	-
Rec. tightening torque	-	-	-	-	-	-	-
<b>Electrical characteristics</b>							
Rated current	16A	8A	12A (15A)	12A (15A)	15A	12A (15A)	8A
Rated voltage	320V / 500V	160V (500V)	250V (500V)	250V (500V)	500V	250V (500V)	160V
Impulse voltage	4 kV / 6 kV	2,5 kV (6 kV)	4 kV (6 kV)	4 kV (6 kV)	6 kV	4 kV (6 kV)	2,5 kV
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,5mm	min. Ø1,3mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,2mm



V= Vertical  
H= Horizontal  
W= Double PIN




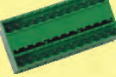



VR= Reversed Vertical  
HR= Reversed Horizontal

IT= 35° Angled  
IQ= 45° Angled

L= Side  
F= Flying










### PLUG-IN CONNECTORS








							
	PV-K	PV-K	PI-IQ	PDH/PDV	PDH/PDV	PDSV	PVS
Available versions	-	-	closed/open ends geschlossene/offene Enden	-	-	closed/open ends geschlossene/offene Enden	-
Pitches (mm)	<b>3,5 / 3,81 (7 / 7,62)</b>	<b>5 / 5,08 (10 / 10,16)</b>	<b>5,08 (10,16)</b>	<b>5</b>	<b>5,08</b>	<b>5,08 (10,16)</b>	<b>3,5 / 5 (7 / 10)</b>
Mounting position	H - V	H - V	IQ	H - V	H - V	H - V	V
Connection system	-	-	-	-	-	-	-
Nr. Poles	02÷22 (02÷11)	02÷22 (02÷11)	02÷24 (02÷12)	07 / 10 / 12 / 19	02÷12	02÷24 (02÷12)	02÷24 (02÷12)
<b>Mech.al characteristics</b>							
Captive screw	-	-	-	-	-	-	-
Rec. tightening torque	-	-	-	-	-	-	-
<b>Electrical characteristics</b>							
Rated current	8A	12A (15A)	12A (15A)	10A	10A	12A (15A)	8A / 10A
Rated voltage	160V (500V)	250V (500V)	250V (500V)	250V	250V	250V (500V)	160V (400V) / 250V (630V)
Impulse voltage	2,5 kV (6 kV)	4 kV (6 kV)	4 kV (6 kV)	4 kV	4 kV	4 kV (6 kV)	2,5 kV / 4 kV (6 kV)
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,3mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,2mm / Ø1,5mm

### Single Deck Terminal Blocks

#### SINGLE DECK TERMINAL BLOCKS

							
	MLK13	MBE15	MVE15	MBES15	MVES15	MVE17	MVK45
wire section	1,0mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	4,0mm <sup>2</sup> (12AWG)
Pitches (mm)	<b>3,5</b>	<b>5 (10)</b>	<b>5 (10)</b>	<b>5,08 (10,16)</b>	<b>5,08 (10,16)</b>	<b>7,5</b>	<b>5</b>
Mounting position	H - V	V	V	V	V	V	V
Connection system	Cage clamp / Käfigsystem	Cage clamp / Käfigsystem	Cage clamp / Käfigsystem	Cage clamp / Käfigsystem	Cage clamp / Käfigsystem	Cage clamp / Käfigsystem	Direct / Direkt
Nr. Poles	2÷3	2÷12 (2÷6)	2÷12 (2÷6)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3	1÷3
<b>Mech.al characteristics</b>							
Captive screw	M2	M2,5	M2,5	M2,5	M2,5	M2,5	M3
Rec. tightening torque	0,2Nm / 1,8lbs.in.	0,4Nm / 3,6lbs.in.	0,4Nm / 3,6lbs.in.	0,4Nm / 3,6lbs.in.	0,4Nm / 3,6lbs.in.	0,4Nm / 3,6lbs.in.	1Nm / 9lbs.in.
<b>Electrical characteristics</b>							
Rated current	10A	17,5A	17,5A	17,5A	17,5A	17,5A	32A
Rated voltage	130V	450V (750V)	450V (750V)	250V (750V)	250V (750V)	750V	
Test voltage	1,25 kVrms/60s	2,5 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	3 kVrms/60s	
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,3mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,8mm

#### SINGLE DECK TERMINAL BLOCKS

							
	MV13	MVS13	MVS13	MV15	MV15	MVS15	MVS15-IT
wire section	1,0mm <sup>2</sup> (16AWG)	1,0mm <sup>2</sup> (16AWG)	1,0mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)
Pitches (mm)	<b>3,5 / 3,81 (7 / 7,62)</b>	<b>3,5 (7)</b>	<b>3,81 (7,62)</b>	<b>5 (10)</b>	<b>5,08 (10,16)</b>	<b>5 / 5,08 (10 / 10,16)</b>	<b>5 (10)</b>
Mounting position	H - V	H - V	H - V	H - V	H - V	H - V	IT
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles	2÷12 (2÷6)	2÷12 (2÷6)	2÷12 (2÷6)	2÷12 (2÷6)	2÷12 (2÷6)	2÷12 (2÷6)	2÷3 (1÷2)
<b>Mech.al characteristics</b>							
Captive screw	M2	M2	M2	M3	M3	M3	M3
Rec. tightening torque	0,2Nm / 1,8lbs.in.	0,2Nm / 1,8lbs.in.	0,2Nm / 1,8lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.
<b>Electrical characteristics</b>							
Rated current	12A	12A	12A	13,5A	13,5A	17,5A	17,5A
Rated voltage	130V (450V)	130V (450V)	130V (450V)	250V (750V)	250V (750V)	450V (750V)	450V (750V)
Test voltage	1,25 kVrms/60s (2,5 kVrms/60s)	1,25 kVrms/60s (2,5 kVrms/60s)	1,25 kVrms/60s (2,5 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,1mm	min. Ø1,1mm	min. Ø1,1mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,5mm	min. Ø1,5mm



V= Vertical  
H= Horizontal  
W= Double PIN





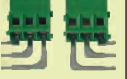


VR= Reversed Vertical  
HR= Reversed Horizontal

IT= 35° Angled  
IQ= 45° Angled








L= Side  
F= Flying










## SINGLE DECK TERMINAL BLOCKS

							
	<b>MVS17</b>	<b>MVS17</b>	<b>MVE25</b>	<b>MVE25-HR</b>	<b>ML25-D/S</b>	<b>MI25</b>	<b>MI25</b>
Wire section	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)
Pitches (mm)	<b>7,5 (15)</b>	<b>7,62 (15,24)</b>	<b>5 (10)</b>	<b>5 (10)</b>	<b>5 (10)</b>	<b>5 (10)</b>	<b>5,08 (10,16)</b>
Mounting position	H - V	H - V	H - V	HR	L	IQ	IT - IQ
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles	2÷12 (2÷6)	2÷12 (2÷6)	2÷12 (2÷6)	2÷3 (1÷2)	3 (2)	2÷3 (1÷2)	2÷3 (1÷2)
<b>Mech.al characteristics</b>							
Captive screw	M3	M3	M3	M3	M3	M3	M3
Rec. tightening torque	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.
<b>Electrical characteristics</b>							
Rated current	17,5A	17,5A	16A	16A	16A	16A	16A
Rated voltage	750V	750V	450V (750V)	250V (750V)	250V (750V)	450V (750V)	450V (750V)
Test voltage	3 kVrms/60s	3 kVrms/60s	2,5 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,4mm	min. Ø1,3mm	min. Ø1,4mm	min. Ø1,3mm	min. Ø1,3mm

## SINGLE DECK TERMINAL BLOCKS

							
	<b>MIP25</b>	<b>MIP25</b>	<b>MVST25</b>	<b>MV25</b>	<b>MV25D</b>	<b>MVSP25</b>	<b>MVE27</b>
Wire section	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)
Pitches (mm)	<b>5 (10)</b>	<b>5,08 (10,16)</b>	<b>5 / 5,08</b>	<b>5,08 (10,16)</b>	<b>5,08 (10,16)</b>	<b>5,08 (10,16)</b>	<b>7,5 (15)</b>
Mounting position	IQ	IQ	H - V - W	H - V	V	H - V	H - V - HR
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles	2÷3 (1÷2)	2÷3 (1÷2)	2÷3	2/3/4/8 (1/2/4)	2/3/4/8 (1/2/4)	2÷3 (1÷2)	2÷3 (1÷2)
<b>Mech.al characteristics</b>							
Captive screw	M3	M3	M2,5	M3	M3	M3	M3
Rec. tightening torque	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,4Nm / 3,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.
<b>Electrical characteristics</b>							
Rated current	24A	24A	24A	16A	24A	24A	16A
Rated voltage	250V (750V)	250V (750V)	250V	450V (750V)	250V (750V)	450V (750V)	750V
Test voltage	2 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2 kVrms/60s	2,5 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	3 kVrms/60s
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,5mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,5mm	min. Ø1,4mm

## SINGLE DECK TERMINAL BLOCKS

							
	<b>MV27</b>	<b>MV27D</b>	<b>MI27-IT</b>	<b>MVSP27</b>	<b>MV46</b>	<b>MV46-IT</b>	<b>MV47</b>
Wire section	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	6,0mm <sup>2</sup> (10AWG)	6,0mm <sup>2</sup> (10AWG)	6,0mm <sup>2</sup> (10AWG)
Pitches (mm)	<b>7,5 (15)</b>	<b>7,5 (15)</b>	<b>7,5 (15)</b>	<b>7,62 (15,24)</b>	<b>6,35 (12,7)</b>	<b>6,35 (12,7)</b>	<b>7,62 (15,24)</b>
Mounting position	H - V	V	IT	H - V	H - V	IT	H - V
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)
<b>Mech.al characteristics</b>							
Captive screw	M3	M3	M3	M3	M3	M3	M3
Rec. tightening torque	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,8Nm / 7,2lbs.in.	0,8Nm / 7,2lbs.in.	0,8Nm / 7,2lbs.in.
<b>Electrical characteristics</b>							
Rated current	16A	24A	16A	24A	32A	32A	32A
Rated voltage	750V	750V	750V	750V	450V (750V)	450V (750V)	750V
Test voltage	3 kVrms/60s	3 kVrms/60s	3 kVrms/60s	3 kVrms/60s	2,5 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	3 kVrms/60s
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,5mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,3mm



V= Vertical  
H= Horizontal  
W= Double PIN

VR= Reversed Vertical  
HR= Reversed Horizontal

IT= 35° Angled  
IQ= 45° Angled








L= Side  
F= Flying

Sockets Industrial & Power Supply Connectors Installation & Panel Connectors, Rail-Mounted Terminal Blocks Cables, Cords & Laboratory Equipment Switches & Bl















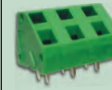
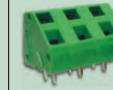
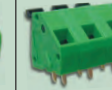
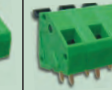
### SINGLE DECK TERMINAL BLOCKS

							
	<b>ME672</b>	<b>MV49</b>	<b>MV10</b>	<b>MV10-A</b>	<b>MVP35</b>	<b>MT17</b>	<b>MT21</b>
wire section	6,0mm <sup>2</sup> (10AWG)	6,0mm <sup>2</sup> (10AWG)	10mm <sup>2</sup> (8AWG)	10mm <sup>2</sup> (8AWG)	35mm <sup>2</sup> (2AWG)	2x2,5mm <sup>2</sup> (2x14AWG)	2x2,5mm <sup>2</sup> (2x14AWG)
Pitches (mm)	<b>7,62</b>	<b>9,52 (19,04)</b>	<b>10,16 (20,32)</b>	<b>10,16</b>	<b>15</b>	<b>7,5 (15)</b>	<b>10 (20)</b>
Mounting position	H	H - V	V	V	V	V	V
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Clamping / Kopfklemme	Clamping / Kopfklemme
Nr. Poles	2	2÷3 (1÷2)	2÷3 (1÷2)	2÷3	1	2÷3 (1÷2)	2÷3 (1÷2)
<b>Mech.al characteristics</b>							
Captive screw	M3,5	M3	M4	M4	M5	M3	M3,5
Rec. tightening torque	0,8Nm / 7,2lbs.in.	0,8Nm / 7,2lbs.in.	1,2Nm / 10,8lbs.in.	1,2Nm / 10,8lbs.in.	3Nm / 27lbs.in.	0,5Nm / 4,5lbs.in.	0,8Nm / 7,2lbs.in.
<b>Electrical characteristics</b>							
Rated current	41A	32A	57A	42A	125A	24A	25A
Rated voltage	450V	750V	750V	750V	1000V	450V (750V)	750V
Test voltage	2,5 kVrms/60s	3 kVrms/60s	3 kVrms/60s	3 kVrms/60s	3,5 kVrms/60s	2,5 kVrms/60s (3 kVrms/60s)	3 kVrms/60s
<b>General characteristics</b>							
PCB holes diameter	-	min. Ø1,3mm	min. Ø1,7mm	min. Ø1,7mm	min. Ø1,8mm	min. Ø1,4mm	min. Ø1,5mm

### Multi Deck Terminal Blocks

							
	<b>MMT15</b>	<b>MVD15</b>	<b>MVD25</b>	<b>MVD25</b>	<b>MVDK25</b>	<b>MVT25</b>	<b>MMT27</b>
wire section	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)	2,5mm <sup>2</sup> (14AWG)
Pitches (mm)	<b>5,08 (10,16)</b>	<b>5 / 5,08 (10 / 10,16)</b>	<b>5 (10)</b>	<b>5,08 (10,16)</b>	<b>5,08 (10,16)</b>	<b>5,08 (10,16)</b>	<b>7,5</b>
Mounting position	V	V	V	V	V	V	V
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	2÷3 (1÷2)	1
<b>Mech.al characteristics</b>							
Captive screw	M3	M3	M3	M3	M3	M3	M3
Rec. tightening torque	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.
<b>Electrical characteristics</b>							
Rated current	13,5A	13,5A	16A	16A	16A	16A	24A
Rated voltage	250V (750V)	250V (750V)	450V (750V)	450V (750V)	450V (750V)	450V (750V)	750V
Test voltage	2 kVrms/60s (3 kVrms/60s)	2 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	2,5 kVrms/60s (3 kVrms/60s)	3 kVrms/60s
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,3mm	min. Ø1,3mm

### Screwless Terminal Blocks

							
	<b>MVEM50-V</b>	<b>MPE1</b>	<b>MPE1</b>	<b>MG1</b>	<b>MG1</b>	<b>MG1-P</b>	<b>MG1-P</b>
wire section	1mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)	1,5mm <sup>2</sup> (16AWG)
Pitches (mm)	<b>5</b>	<b>3,5</b>	<b>5,08</b>	<b>5 / 5,08</b>	<b>7,5 / 7,62</b>	<b>5 / 5,08</b>	<b>7,5 / 7,62</b>
Mounting position	V	V	V	V	V	V	V
Connection system	Spring / Federkraft	Spring / Federkraft	Spring / Federkraft	Spring / Federkraft	Spring / Federkraft	Spring / Federkraft	Spring / Federkraft
Nr. Poles	2÷3	01÷N	02÷24	01÷N	01÷N	01÷N	01÷N
<b>Mech.al characteristics</b>							
Button	Yes / Ja	Yes / Ja	Yes / Ja	No / Nein	No / Nein	Yes / Ja	Yes / Ja
Releasing spring (mm)	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5
<b>Electrical characteristics</b>							
Rated current	10A	2A	12A	16A	16A	16A	16A
Rated voltage	250V	250V	250V	250V	250V	250V	250V
Test voltage	2 kVrms/60s	2 kVrms/60s	2 kVrms/60s	2 kVrms/60s	2 kVrms/60s	2 kVrms/60s	2 kVrms/60s
<b>General characteristics</b>							
PCB holes diameter	min. Ø1,3mm	min. Ø1,2mm	min. Ø1,2mm	min. Ø1,4mm	min. Ø1,4mm	min. Ø1,4mm	min. Ø1,4mm



V= Vertical  
H= Horizontal  
W= Double PIN

VR= Reversed Vertical  
HR= Reversed Horizontal

IT= 35° Angled  
IQ= 45° Angled

L= Side  
F= Flying



### Supports

<b>SUPPORTS</b>	VPC12/16/17	M-45/72/107	E-72/E-107	CEM17	CEM35-V	CEM35-H	SDA/D/P/U
Mounting type	DIN EN50022 - EN50035	DIN EN50022 - EN50035	DIN EN50022 - EN50035	DIN EN50022	DIN EN50022	DIN EN50022	DIN EN50022 (35x7,5/15)
Max nr. connectable poles	-	-	-	12	24	24	-
Module width	-	-	-	<b>17,5mm</b>	<b>35mm</b>	<b>35mm</b>	-
PCB position	-	-	-	V	V	H	-
PCB number	-	-	-	1	2	2	-
PCB size	73mm	42-72-107,5mm	72-107,5mm	On request / Auf Anfrage	On request / Auf Anfrage	On request / Auf Anfrage	-
Version	Modular / Modular	Modular / Modular	Extruded / Extrudiert	-	-	-	-
<b>General characteristics</b>							
Available clamp	-	-	-	ML25-LC	ML25-LC	ML25-V	-
Available connector	-	-	-	PV04-3,5-LS/LD-P	-	-	-
Accessories	-	-	-	TP35 - TG35	TP35 - TG35	TP35 - TG35	-

### Accessories

<b>ACCESSORIES</b>	PT	PTP15	POL-S/POL-P	OT-PV	MVI	ZRS/ZRSL	ZRA-5
wire section	-	-	-	-	4,0mm <sup>2</sup> (12AWG)	-	-
Pitches (mm)	<b>5,08 / 10,16 / 15,24</b>	<b>15</b>	-	-	<b>6,35 / 12,7</b>	-	-
Mounting position	-	-	-	-	V	V	V
Connection system	-	-	-	-	Rising clamp / Liftsystem	-	-
Nr. Poles	1÷N	1÷N	6	1	1÷N	-	-
<b>Mech.al characteristics</b>							
Captive screw	-	-	-	-	M3	-	-
Rec. tightening torque	-	-	-	-	0,5Nm (4,5lbs.in.)	-	-
<b>Electrical characteristics</b>							
Rated current	24A	125A	-	-	25A	5A	16A
Rated voltage	-	-	-	-	450V / 750V	250V	250V
Test voltage	-	-	-	-	2,5 / 3kVrms/60s	2 kVrms/60s	2 kVrms/60s
<b>General characteristics</b>							
PCB holes diameter	-	-	-	-	-	min. Ø1,5mm	min. Ø2,3mm   Ø1,8mm
Application	T. blocks / Printklemmen	T. blocks / Printklemmen	Plug-in conn. / Steckverbinder	Plug-in conn. / Steckverbinder	-	-	-

### Panel Feed - Through T. Blocks

<b>PANEL FEED-THROUGH T. BLOCKS</b>	MPT275	MPT410	MPT610	MPT1010	MPT1612	MPT2515	MPT5018
wire section	2,5mm <sup>2</sup> (14AWG)	4mm <sup>2</sup> (12AWG)	6mm <sup>2</sup> (10AWG)	10mm <sup>2</sup> (8AWG)	16mm <sup>2</sup> (6AWG)	25mm <sup>2</sup> (4AWG)	50mm <sup>2</sup> (1/0AWG)
Pitches (mm)	<b>7,5</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>12,1</b>	<b>15,1</b>	<b>18,8</b>
Mounting position	V	V	V	V	V	V	V
Connection system	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem	Rising clamp / Liftsystem
Nr. Poles / Polzahl:	1	1	1	1	1	1	1
<b>Mech.al characteristics</b>							
Captive screw	M3	M3	M4	M4	M5	M5	M6
Rec. tightening torque	0,5Nm / 4,5lbs.in.	0,5Nm / 4,5lbs.in.	1,2Nm / 10,8lbs.in.	1,2Nm / 10,8lbs.in.	2Nm / 18lbs.in.	2Nm / 18lbs.in.	max 6Nm / 54lbs.in.
<b>Electrical characteristics</b>							
Rated current	24A	32A	41A	57A	76A	101A	150A
Rated voltage	450V	450V	450V	450V	450V	750V	1000V
Test voltage	2,5 kVrms/60s	2,5 kVrms/60s	2,5 kVrms/60s	2,5 kVrms/60s	2,5 kVrms/60s	3 kVrms/60s	3,5 kVrms/60s
<b>General characteristics</b>							
Ø Wall drilling	Ø5,2mm	Ø8,2mm   Ø7,2mm	Ø8,2mm   Ø7,2mm	Ø8,2mm   Ø7,2mm	Ø10mm   Ø3,3mm	Ø12mm   Ø4,3mm	Ø15mm   Ø4,2mm
Accessories	CMR75x	CMR10x - DZP7	CMR10x - DZP7	CMR10x - DZP7	DZP9	DZP10	CP-MPT50



RoHS Conform

V= Vertical  
H= Horizontal  
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VR= Reversed Vertical  
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IT= 35° Angled  
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L= Side  
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In this group you can find wires, cables, cords for power-supply and data transmission, cords for testing and measurement, as well as various connectors, sockets and other components used in electronic laboratory at testing or servicing of devices.


 V této skupině můžete najít vodiče, kabely, šňůry pro napájení a přenos dat, měřicí a testovací šňůry a různé konektory, zdířky a jiné komponenty používané v laboratoři při testování nebo servisu zařízení.

 In dieser Gruppe finden Sie Drähte, Kabel, Versorgungs- und Datenübertragungskabel, Mess- und Testleitungen sowie verschiedene Stecker, Buchsen und andere Komponenten, die im Labor zum Testen oder Wartung von Geräten eingesetzt werden.

 Ebben a csoportban vezeték, táp-, adat- és mérőkábel, különböző csatlakozók, aljzatok és egyéb, elektromos laborban készülőek teszteléséhez és javításához használatos alkatrészek találhatók.

 W grupie tej znaleźć można druty, kable, przewody do zasilania i transmisji danych, przewody pomiarowe i testowe, jak również różne konektory, gniazda i inne komponenty stosowane w laboratorium podczas testowania lub serwisu urządzeń.

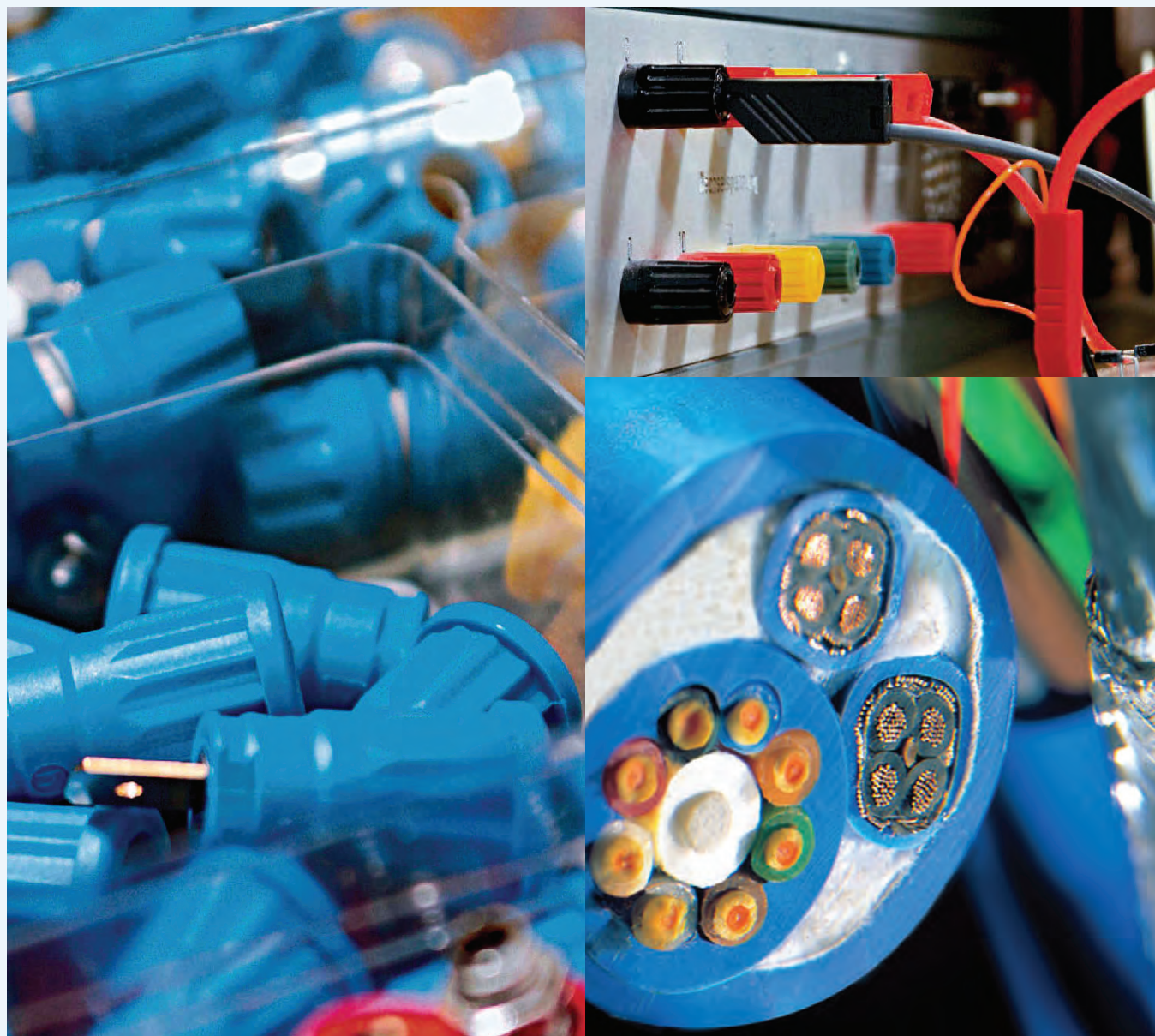
 In acest grup puteți găsi fire, cabluri, cabluri de alimentare și transmisie de date, cabluri de testare și măsurare, precum și diverse componente folosite în laboratorul electronic la testarea sau repararea dispozitivelor.

 V tejto skupine môžete nájsť drôty, káble, šňůry pre napájanie a prenos dát, meracie a testovacie šňůry ako aj rôzne konektory, zdierky a iné komponenty používané v laboratóriu pri testovaní alebo servisovaní zariadení.

Thanks to a wide range of available components, in the most of cases it is easy to find the right component for your application. In this group you can also find important components necessary at development, testing and servicing, like measuring leads, test clips, banana jacks and other.

## Classification:

Together with a development of electronic components, also electric cables are continuously improved. Some basic principles remain stable, like e.g. a necessary diameter of a conductor for a given current, but a main progress is in the cable construction and in the field of materials used for insulation. Standard cables, highly flexible, weather resistant or for solar applications, all these are available in a wide variety of types. According to your application you can choose universal wires and cables or special designed for a given usage like for networking, telephone, power supply, loudspeakers, audio&video, coaxial, solar and many other.







LAPP KABEL is Germany-based company with history dating from 1957. ÖLFLEX®, was the first industrially produced signal cable in the world. Lapp Kabel produces top quality cables and conductors for all industry segments.

**CZ** LAPP KABEL je německá společnost, založena v roce 1957. ÖLFLEX® byl prvním průmyslově vyráběným ovládacím kabelem na světě. Lapp Kabel vyrábí vysoce kvalitní kabely a vodiče pro všechny segmenty průmyslu.

**DE** LAPP KABEL ist ein deutsches Unternehmen mit einer seit 1957 datierten Geschichte. ÖLFLEX® war weltweit das erste industriell gefertigte Signalkabel. Lapp Kabel produziert hochwertige Kabel und Leiter für alle Industrie-segmente.

**HU** A LAPP KABEL 1957-ben alapított német cég. Az átalakul készített ÖLFLEX® volt az első iparilag készített adatkabel a világon. A Lapp Kabel jó minőségű kábeleket és vezetékeket gyárt az ipar minden területére.

**PL** LAPP KABEL to spółka niemiecka, założona w roku 1957. ÖLFLEX®, był pierwszym na świecie, produkowanym na skalę przemysłową, kablem sygnałowym. Lapp Kabel produkuje wysokiej jakości kable i przewody dla wszystkich gałęzi przemysłu.

**RO** LAPP KABEL este o companie cu sediul în Germania, cu un istoric datând din anul 1957. ÖLFLEX®, a fost primul cablu de semnal produs industrial din lume. Lapp Kabel produce cabluri și conductori de cea mai bună calitate pentru toate segmentele industriei.

**SK** LAPP KABEL je nemecká spoločnosť založená v roku 1957. ÖLFLEX®, bol prvý priemyselne vyrábaný signálový kábel na svete. Lapp Kabel vyrába vysoko kvalitné káble a vodiče pre všetky segmenty priemyslu.

In the Lapp Kabel portfolio you can find power and control cables, data communication systems, industrial connectors, protective cable conduit systems, optical transmission systems and cable accessories. Using innovative top quality materials, Lapp Kabel has gained an international reputation. Lapp Kabel cables and conductors are widely used in mechanical and systems engineering, automotive industry, electrical and installations engineering, photovoltaic systems and other. The Lapp Group has 2800 employees, 15 production sites, 100 outlets and 40 sales organisations around the world. With over 40 000 standard stock items is Lapp Kabel able to provide the right solution for virtually any application.

## Why LAPP KABEL?

- top quality internationally known cables and leads
- over 40 000 standard stock items

## Did You Know?

Lapp Kabel products can be found in a whole host of stunning objects, from the stage machinery used by the Rolling Stones and the new opera house in Peking, to ancient monuments and modern departure lounges, to the newest container cranes and the largest wind turbines in the world.



**ÖLFLEX®**  
**Power- and Control Cables**  
ÖLFLEX® is used in machinery, machine tools, system and appliance engineering, measuring, control, heating and air conditioning technologies. For permanent connections or in cable chains, halogenfree or internationally certified, you can choose from our comprehensive range of standard products.



**HITRONIC®**  
**Optical Transmission Systems**  
HITRONIC® fibre optic cables are designed to transfer large volumes of data. Communications media via fibre optics are fast, efficient, and secure. Not even electromagnetic interference can affect HITRONIC® fibre optic cable. The HITRONIC® range of products includes cables for office communications, industrial applications, simplex, duplex, hybrid wiring, or cable chain applications.



**UNITRONIC®**  
**Data Communication Systems**  
Lapp produces a full range of data cables for fast and secure transfers of large volumes of data. From machine electronics and bus systems to super-fast LAN data networks or highly-versatile applications: We have the data cables you need for virtually any situation. Series LIYY and LIYCY are available from our stock.



**SKINTOP®**  
**Cable Glands**  
SKINTOP® cable glands guarantee secure connections every time. Simply thread the cable and twist. That's all! Your cables are perfectly centered, secured, hermetically sealed, and ready for action. Choose from ÖLFLEX® Power- and control cables a wide range of models in plastic or brass, for EX and EMC applications, halogen-free types or anti-kink protection, metric, PG or NPT.



**FLEXIMARK®**  
**Cable Marking Products**  
Labels on single cores, cables, and control cabinets need to remain legible for years to come. This is the best way to keep things well organized and avoid potential problems. From plastic to durable stainless steel, manual or electronic identification, with FLEXIMARK® you can be sure that your labels will last a lifetime.



**SILVYN®**  
**Protective Cable Conduit Systems And Cable Carrier Systems**  
In many applications cables have to be additionally protected against mechanical and chemical stress. For this type of application, Lapp Group can supply the universal SILVYN® protective cable conduit program. Cable conduits manufactured from metal or plastic material, which can be used with matching glands to form a perfect system connection. The complete system results in all round protection for cables in indoor and outdoor installations. With SILVYN® CHAIN, Lapp Group's widely variable programme of power chains we offer both cable protection and guidance for highly dynamic applications.



**ETHERLINE®**  
**Data Communication Systems for ETHER-NET-Technology**  
The Lapp Group is now in a position to offer comprehensive system solutions in the field of industrial networking. Its Factory Automation division supplies active network components that are used to supplement existing cable and plug technologies. These include services and security systems incorporating firewall solutions, in addition to distribution components such as switches, routers, cables and plug connectors. For its industrial customers, all of this means that a solution from the Lapp Group represents a considerable step forward in terms of security, safety and availability.



**EPIC®**  
**Industrial Connectors**  
When we talk about secure connections, you can take us at our word. EPIC® industrial connectors produce an absolutely secure connection in combination with ÖLFLEX® cables. We provide the right contact for all your needs: From rectangular or circular connectors, to housings, inserts, contacts and accessories, bus or fibre optic cable applications.



With the acquisition of the complete product-line HIRSCHMANN Test & Measurement by SKS- Kontakttechnik in 2006, the decenniums established branded products are being continued with professional competence and inventiveness.

**CZ** SKS Kontakttechnik, v r. 2006 akvizicí kompletní linie produktů HIRSCHMANN Test & Measurement pokračuje s profesionální kompetencí a invencí v produkci značkových, desítky let osvědčených produktů.

**DE** SKS Kontakttechnik setzt mit dem Erwerb einer kompletten Produktlinie HIRSCHMANN Test & Measurement im Jahr 2006 mit Fachkompetenz und Ideenreichtum die Produktion von seit Jahrzehnten bewährten Markenprodukten fort.

**HU** Az SKS Kontakttechnik 2006-ban a HIRSCHMANN Test & Measurement teljes terméksorozatának akvizíciójával folytatja a több évtized alatt bizonyított minőségi termékek professzionális gyártását és fejlesztését.

**PL** SKS Kontakttechnik w r. 2006 poprzez nabycie kompletnej linii produktów HIRSCHMANN Test & Measurement, kontynuuje z profesjonalną kompetencją i inwencją produkcję markowych produktów sprawdzonych w ciągu dziesiątek lat.

**RO** Odată cu achiziția întregii linii de produse HIRSCHMANN Test & Measurement de către SKS- Kontakttechnik în 2006, produsele fabricate de decenii și devenite adevărate branduri continuă să fie dezvoltate cu aceeași competență profesională și inventivitate.

**SK** SKS Kontakttechnik v r. 2006 akvizíciou kompletnej linie produktov HIRSCHMANN Test & Measurement, pokračuje s profesionálnou kompetenciou a invenciou v produkcii značkových desiatky rokov osvedčených produktov.

## Why HIRSCHMANN?



- global company with extensive know-how and experience
- widely used industrial standard products
- top quality components

### Sockets

MBI1 PKI10 BIL20 SEB26 KUN30



### Banana Plugs

MST3 MZS2 BULA20 VON30 MZS4



### Alligator Clips

MA1 AK10 AGF20 AGS20 AK2



### Test Probes

KLEPS Series



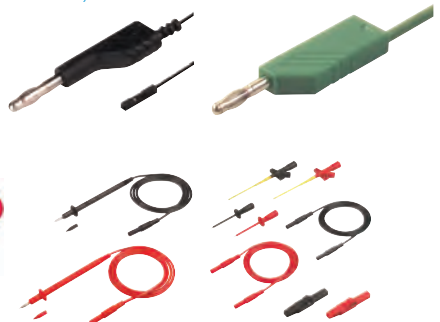
MICRO-SMDCLIP1



PRUF Series



MALN, MLN Series



Switches are one of the most used components. A switch is an electrical (electromechanical) component that can break (or also switch on) an electrical circuit, interrupting the current or diverting it from one conductor to another. Another frequently used form of a switch is a pushbutton.

**CZ** Spínače jsou jedny z nejpoužívanějších komponentů. Spínač je elektrický (elektromechanický) komponent, který dokáže rozpojit (a také spojit) elektrický obvod, přerušit proud nebo jej přepnout z jednoho vodiče na druhý. Další často používanou formou spínače je tlačítko.

**DE** Schalter gehören zu den meistverwendeten Komponenten. Der Schalter ist eine elektrische (elektromechanische) Komponente, die den Stromkreis durchzutrennen (sowie ebenfalls zu verbinden), Strom zu unterbrechen oder ihn von einem Leiter auf einen anderen umzuleiten vermag. Eine weitere häufig genutzte Form von Schalter ist der Taster.

**HU** A kapcsolók talán a leggyakrabban használt alkatrészek. A kapcsoló egy elektromos (elektromechanikus) alkatrész, mely megszakít (vagy bekapcsol) egy elektromos áramkört, megszakítva vagy átkapcsolva az áram útját két vezetők között. A kapcsoló egy igen gyakran használt formája a nyomógomb.

**PL** Przełączniki to jedne z najczęściej stosowanych elementów. Przełącznik to urządzenie elektryczne (elektromechaniczne), które potrafi rozłączyć (lub włączyć) obwód elektryczny, przerwać prąd, lub przekierować go z jednego przewodu w drugi. Dalszą, często stosowaną formą przełącznika jest przycisk.

**RO** Întrerupătoarele sunt unul dintre componentele cele mai folosite. Un întrerupător este o componentă electrică (electromecanică) ce întrerupe (sau, de asemenea, deschide) un circuit electric, întrerupând curentul sau deviiindu-l de la un conductor la altul. O alta forma utilizată de întrerupător este un buton.

**SK** Spínače sú jedny z najpoužívanejších komponentov. Spínač je elektrický (elektromechanický) komponent, ktorý dokáže rozpojiť (a tiež spojiť) elektrický obvod, prerušíť prúd alebo odkloní ho z jedného vodiča na druhý. Ďalšou často používanou formou spínača je tlačidlo.

Almost every device has a switch, which can be operated manually, allowing to switch-on or switch-off the device or to control and set the desired function of the device. Switches or pushbuttons have their strong, important place, providing an easy and transparent controlling of a device as well as safety in terms of possibility to reliably switch-on or switch-off a device (or its part).

### Classification

The most common form of switch is a manually operated electromechanical switch with one or more sets of electrical contacts. Each set of contacts can be either "closed" meaning that electricity can flow between them, or "open", meaning that switch is nonconducting. The mechanism actuating the change between these two states (open or closed, on/off respectively) can be either momentary or alternate.

A controlling mechanism of a switch or button differs according to their intended use, i.e. switches designed to be operated manually by a hand and switches designed to be operated by a machine or any moving mechanical part of a machine.

### Terms

**NO** - normally open, indicating function of a switch in the rest.

**NC** - normally closed, indicating function of a switch in the rest.

**CO** - change over or double throw (DT), A changeover contact or switch is actually a set of three terminals - common, NO and NC.

**SPST** - Single Pole Single Throw. These switches have two terminals which can be connected or disconnected, i.e. a simple on/off switch.

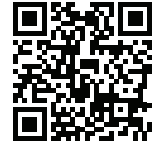
**SPDT** - Single Pole Double Throw. A common terminal connects to either of two others, i.e. a simple changeover switch.

**DPST** - Double Pole Single Throw. These switches have two pairs of terminals. Equivalent to two SPST switches actuated by a single mechanism.

**DPDT** - Double Pole Double Throw. These have two rows of changeover terminals. Equivalent to two SPDT switches actuated by a single mechanism.







MARQUARDT is a one of the most innovative developers and manufacturers of switches and switching systems, with history beginning from 1925/ Germany. Marquardt provides high quality, innovative switching products to the Global Automotive, Power Tool and Appliance Switch Markets.

**CZ** MARQUARDT je jedním z nejvíce inovativních vývojářů a výrobců spínačů a spínacích systémů. Historie společnosti sahá až do roku 1925 / Německo. Marquardt poskytuje vysokou kvalitu, inovativní spínací produkty zejména pro automobilový průmysl, elektrické nástroje a všeobecné aplikace.

**DE** MARQUARDT ist einer der innovativsten Entwickler und Hersteller von Schaltern und Schaltsystemen. Die Unternehmensgeschichte reicht bis ins Jahr 1925 / Deutschland zurück. Marquardt bietet hohe Qualität, innovative Schaltprodukte insbesondere für die Automobilindustrie, Elektrowerkzeuge sowie Allgemeinwendungen.

**HU** A MARQUARDT az egyik leginnovatívabb fejlesztő és gyártó a kapcsolók és kapcsoló-rendszererek területén. A cég története egészen az 1925-ös Németországba nyúlik vissza. Termékei jó minőségű, innovatív kapcsolóelemek főként az autópár, elektromos berendezések és általában készülékek számára.

**PL** MARQUARDT to jeden z najbardziej innowacyjnych projektantów i producentów przełączników i systemów łączących. Historia spółki sięga aż do roku 1925/ Niemcy. Marquardt oferuje wysoką jakość, innowacyjne elementy przełączające - przede wszystkim dla przemysłu motoryzacyjnego, narzędzi elektrycznych i aplikacji ogólnych.

**RO** MARQUARDT este unul din dezvoltatorii si producătorii cei mai inovatori de comutatoare și sisteme de comutare, cu un istoric începând din 1925 in Germania. Marquardt oferă produse de comutare de înaltă calitate, inovatoare pe piețele Auto, Scule Electrice și Interupătoare pentru dispozitive.

**SK** MARQUARDT je jeden z najinovatívnejších vývojárov a výrobcov spínačov a spínacích systémov. História spoločnosti siaha až do roku 1925/ Nemecko. Marquardt poskytuje vysokú kvalitu, inovatívne spínacie produkty najmä pre automobilový priemysel, elektrické nástroje a všeobecné aplikácie.

The Marquardt Group is a global player in the high technology switch manufacturing market, and it maintains its position by developing innovative switching solutions that exceed the quality and performance expectations of our customers. In the Marquardt portfolio you can find universal as well as customized switches like automotive gear selection switches, electronic steering locks and electronic switches for power tools.

Marquardt Switches provides high quality, innovative switching products to the Global Automotive, Power Tool and Appliance Switch Markets.

## Why MARQUARDT?

- company with a vast know-how in switches
- long-term field-proven components
- Marquardt components are widely used in global automotive companies

## Rocker Switches

### 19x13mm Series

1801.1x02



**Type**      **Description**

- 1800.1102** SPST, 10(4)A/250V, Faston 4,8mm, glim-lamp backlight , ON-OFF  
**1801.1102** SPST,10(4)A/250V, Faston 4,8mm, ON-OFF  
**1801.1202** SPDT, 4(2)A/250VAC, Faston 4,8mm, OFF-MOM

1800.1102



1801.1146



**Type**      **Description**

- 1801.1146** SPST, 10(4)A/250V, Faston 4,8mm, ON-OFF  
**1801.1119** SPST, 10(4)A/250V, Faston 4,8mm , red mark, ON-OFF

1801.1119



1858.1103



**Type**

**Description**

- 1808.1103** SPDT 6(2)A/230V, Faston 4,8mm, ON-OFF-ON  
**1808.1302** DPNO, 6(4) A/250V, Faston 4,8mm, MOM-OFF-MOM  
**1858.1103** DPST, 10(4)A/250V, Faston 4,8mm, non-flammable. Powerful with inrush currents (capacitive) up to 100 A, ON-OFF

1808.1103



1808.1302



203.089.011



**Type**

**Description**

**203.089.011**

Transparent PVC-protection cap for single-pole switches of size 19x13mm. Serves as dust and water protection of the actuation side.

### 19x22mm Series

1802.1108



**Type**

**Description**

- 1802.1108** DPDT, 10(4)A/250V, Faston 4,8mm, ON-OFF  
**1806.1102** 2xSPST, 10(4)A/250V, Faston 4,8mm, ON-OFF

1806.1102



203.090.011



**203.090.011**

Transparent PVC-protection cap for single-pole switches of size 19x13mm. Serves as dust and water protection of the actuation side.

### 27x12mm Series

1555.310x



Type	Description
1555.3102	DPST, 16(4)A/250V, Faston 6,3mm, backlight, red, ON-OFF
1555.3108	DPST, 16(4)A/250V, Faston 6,3mm, backlight, green, ON-OFF

### 30x11 mm Series

1831.3312

1830.311x

1838.1509



Type	Description
1831.3312	SPST, 20(4)A/250V, black, Faston 6,3mm, ON-OFF
1830.3112	SPST, glim-lamp, red, 20(4)A/250V, Faston 6,3mm, ON-OFF
1830.3118	SPST, glim-lamp, green, 20(4)A/250V, Faston 6,3mm, ON-OFF
1838.1509	SPDT-Center OFF, 6(4)A/250V, Faston 4,8mm, ON-OFF-ON

203.731.011



Type	Description
203.731.011	Transparent PVC-protection cap for single-pole switches of size 30x11 mm. Serves as dust and water protection of the actuation side.

### 30x22mm Series

1832.3312

1835.310x



Type	Description
1832.3312	DPST, 16(4)A/250V, without backlight, Faston 6,3mm, ON-OFF
1835.310x	DPST, 10(4)A/250V, glim-lamp backlight, Faston 6,3mm, ON-OFF

1935.311x

1839.1407



IP65



Type	Description
1935.311x	DPST, 20(4)A/250V, illuminated, IP65, Faston 6,3mm, ON-OFF
1839.1407	DPDT-CenterOFF, 6(4) A/250V, Faston 4,8mm, ON-OFF-ON

203.201.011



Type	Description
203.201.011	Transparent PVC-protection cap for single-pole switches of size 30x22mm. Serves as dust and water protection of the actuation side.

### Toggle Switches

1811.1102



1812.1102



Type	Description
1811.1102	SPDT, 10(4)A/250V, Faston 4,8mm, 19x13mm, ON-OFF
1812.1102	DPDT, 10(4)A/250V, Faston 4,8mm, 19x22 mm, ON-OFF

1823.1101



1824.1101



Type	Description
1823.1101	SPDT, 6(4)A/250V, Faston 4,8mm, $\phi$ 12,2mm, ON-OFF
1824.1101	DPDT, 6(4)A/250V, Faston 4,8mm, $\phi$ 12,2mm, ON-OFF

343.001.023



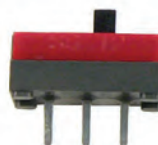
203.105.0x1



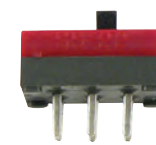
Type	Description
343.001.023	Neopren® - cap for dust and water protection of the actuator side, for MARQ 1823, 1824 series, height 18mm.
203.105.021	Lever receptacle D6,4mm L15mm White
203.105.031	Lever receptacle D6,4mm L15mm Red

### Slide Switches

9078.0101



9078.0201



Type	Description
9078.0101	Slide switch 1-pole, PCB 30V/100mA.
9078.0201	Slide switch 2-poles, PCB 30V/100mA.

### Pushbutton Switches

5000.0501



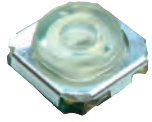
Type	Description
5000.0501	Push-button on panel

**Tact and Key Switches**

One-pole pushbuttons with gold-plated contacts for certain switching. Maximal switching voltage and current 28V/100mA, activation power 0,7N, upthrow 1,6mm, lifetime min. > 1 mil. cycles..

**3006.xxxx**

Low height even with integrated LED, extremely large actuator surface  
Dimensions 10x10x4mm, max. 28VDC / 50mA, upthrow 0,9mm, lifetime min. 100 000 cycles.



Type	Description
3006.2101	yellow LED
3006.2102	orange LED
3006.2112	red LED
3006.2107	green LED

**6425.0101, 6425.4121**

Single- pole normally open contact with or without LEDs. frame 13,55x13,55mm.



Type	Description
6425.0101	hole for LED
6425.4121	yellow LED

**6425.1101**



Type	Description
6425.1101	Key Switch PCB Frame 10,9x13,5mm 100mA 28V

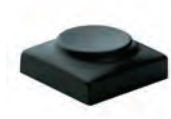
**825.0xx.021**

Square key caps with whitw characters, 19x19mm, grey colour, suitable for 6425 series



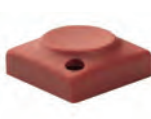
**826.000.0xx**

Square key cap 16x16mm, diferent colours, suitable for 6425 series without LED window



**829.000.0xx**

Square key cap 16x16mm, diferent colours, suitable for 6425 series with LED window



**840.000.0xx**

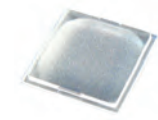
Round key cap, diferent colours, diameter 17mm, heighth 6,8mm, suitable for 6425 series.



Available in many different colours.

**835.900.013**

Two-part key cap with snap-on transparent caps. 16x16mm, heighth 6,8mm, Suitable for 6425 series key switches with or without LED



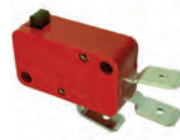
**190.059.013**

Recommended appliance cut-out and perforation pattern component side  
Suitable for 6425 series.



**Miniature Snap-Action Switches**

**1005.1004**



**1006.0701**



**1006.0901**



Type	Description
1005.1004	SPDT, 20(4)A 400VAC 1c, faston 6,3mm.
1006.0701	SPDT, 10(4)A 400VAC, wheel, soldering eyelets.
1006.0901	SPDT, 10(4)A 400VAC, lever 35,7mm, soldering eyelets.

**1080.0403**



**1040.0114**



Type	Description
1080.0403	Snap-Action Switch 1-(1) SPDT 16(8)A 250VAC F6,3
1040.0114	Snap-ActionSwitch 1-(1)SPDT 4(1)A250V Lever0,6x80 F2,8

**1050.0202**



**1050.xxx**



Type	Description
1050.0202	Snap-Action Switch 1-(1) SPDT 5A 250V Mushroom, Solder
1050.0103	Snap-Action Switch 1-(1) SPDT 10(1,5)A 250VAC Solder
1050.1102	Snap-Action Switch 1-(1) SPDT 5A 250VAC F2,8
1050.1122	Snap-Action Switch 0-(1) SPNO 5A 250VAC F2,8
1050.2151	Snap-Action Switch 1-(1)SPDT 2(0,5)A250V Gold Plat.Sold

**1050.5202**



**1050.5702**



Type	Description
1050.5202	Snap-Action Switch 1-(1) SPDT 5A 250VAC Lever, Solder
1050.5702	Snap-Action Switch 1-(1) SPDT 5A 250VAC Roller, Solder

**Foot switches**

**2410**

Standard foot switch, 1-(1) SPDT 6(2,5)A 250V AC.



**2420**

Waterproof foot switch, IP65/67, SPST, SPDT, one or double position, 16(8A) 250V AC.







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MEC is one of the leading European manufacturers of high quality switches. Since its foundation in 1938/ Denmark, Mec has been making state-of-the-art electromechanical components.

MEC je jedním z předních evropských výrobců vysoce kvalitních spínačů a tlačítek. Od svého založení v roce 1938 v Dánsku se Mec zabývá výrobou špičkových elektromechanických součástek.

MEC ist einer der führenden europäischen Hersteller von qualitativ hochwertigen Schaltern und Tastern. Seit seiner Gründung im Jahr 1938 in Dänemark beschäftigt es sich mit der Herstellung von spitzenmäßigen elektromechanischen Bauelementen.

A MEC Európa egyik vezető kapsolós és nyomógomb gyártója. 1938-as dániai alapítása óta kiváló minőségű elektromechanikus alkatrészek gyártásával foglalkozik.

MEC jest jednym z wiodących europejskich producentów wysokiej jakości przełączników i przycisków. Od swego założenia w roku 1938 w Danii, Mec zajmuje się produkcją wyjątkowych podzespołów elektromechanicznych.

MEC este unul din producătorii lideri europeni de comutatoare de înaltă calitate. De la fondarea sa în 1938/ Danemarca, Mec produce componente electromecanice moderne.

MEC je jedným z popredných európskych výrobcov vysoko kvalitných spínačov a tlačidiel. Od svojho založenia v roku 1938 v Dánsku sa Mec sa zaoberá výrobou špičkových elektromechanických súčiastok.

Mec is focusing on continuous innovation to maintain its position as leader in the segment of high end PCB mount push button switches. By always choosing the best possible solution, whether it is a design principle, a material or a manufacturing process, Mec maintains and improves its sustainable high quality level. With this approach a wealth of know-how has been built up over the years for the benefit of new product development and custom solutions. Mec is flexible in custom solutions also thanks to a complete in-house production including automation, tooling, moulding, stamping, graphics marking and custom assembly.

### Why MEC?

- top quality PCB mount push button switches
- wide possibilities of cap+switch combinations
- dust and water resistant types available
- flexible in custom solutions

### Pushbutton switch - SMT and Through-hole (MULTIMEC)

5ESH Series



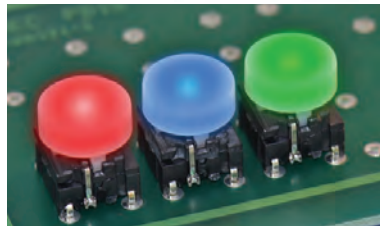
5GSH Series



5ETH Series



5GTH Series



**Low temperature:**

- 15.50x Series - momentary
- 15.55x Series - latching

**High temperature:**

- 15.40x Series - momentary
- 15.45x Series - latching



### Caps & Accessories





### Illumination








Relays are in principle electrically operated switches. Relays offer the big advantage of galvanic isolation of driving circuit from a switched circuit.


 Relé jsou v principu elektricky ovládané spínače. Relé nabízejí velkou výhodu galvanické izolace ovládacího obvodu od spínaného obvodu.

 Relais sind im Prinzip elektrisch betriebene Schalter. Relais bieten den großen Vorteil einer galvanischen Trennung zwischen dem zu steuernden und dem zu schaltenden Stromkreis.

 A relék alapjában véve elektromosan működtetett kapcsolók. Nagy előnyük a vezérlő és a kapcsoló áramkör galvanikus elválasztása.

 Przełączniki to w zasadzie sterowane elektrycznie przełączniki. Wielką zaletą przełączników jest galvaniczne odizolowanie obwodu sterującego od łączonego.

 Releele sunt, în principiu, interupătoare acționate electric. Releele oferă marele avantaj al izolării galvanice de conducere a circuitului, de la un circuit comutat.

 Relé sú v princípu elektricky ovládané spínače. Relé ponúkajú veľkú výhodu galvanickej izolácie ovládacího obvodu od spínaného obvodu.

That's why it is possible to control a circuit with high currents or high voltages by means of substantially lower voltage. Also relays prevent an undesired mutual interfering of various switched circuits through a control unit. Another advantage of relays is their acting as a safety element in case of surges and spikes – typical isolation strength (coil to contacts) of usual small relays is few kVolts.

## Classification

We can divide relays into two main groups – electromechanical relays and relays based on semiconductors (SSR – solid state relays):

SSR have advantage in absolutely silent operation, are capable of even high switching frequencies and have a high lifetime (switching cycles). Available are THT as well as SMT types.

Electromechanical relays are advantageous in for example minimal power losses on contacts and a linear transmission of small signals without a distortion. They also provide a very high protection of driving circuits thanks to a high insulation voltage (coil to contacts), typically 5000 VAC at power relays. Construction of electromagnetic relays vary according to the purpose for which they are designed. Roughly we can divide them into two main categories – signal relays and power relays. Both categories can be designed also as latching (polarized) relay, which has two stable states, thus it has zero power consumption in a relaxed state. As material of contacts, mostly used are alloys based on Ag, Au and Ni.

## Terms

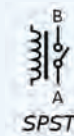
**NO** – normally open, also marked as Form A

**NC** – normally closed, also marked as Form B

**CO** – change over or double throw (DT) one normally-open contact and one normally-closed contact with a common terminal. It is also called a Form C contact or "transfer" contact ("break before make"). If this type of contact utilizes a "make before break" functionality, then it is called a Form D contact.

the coil.

The following designations are commonly encountered:



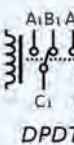
**SPST** – Single Pole Single Throw. These have two terminals which can be connected or disconnected. Including two for the coil, such a relay has four terminals in total. It is ambiguous whether the pole is normally open or normally closed. The terminology "SPNO" and "SPNC" is sometimes used to resolve the ambiguity.



**SPDT** – Single Pole Double Throw. A common terminal connects to either of two others. Including two for the coil, such a relay has five terminals in total.

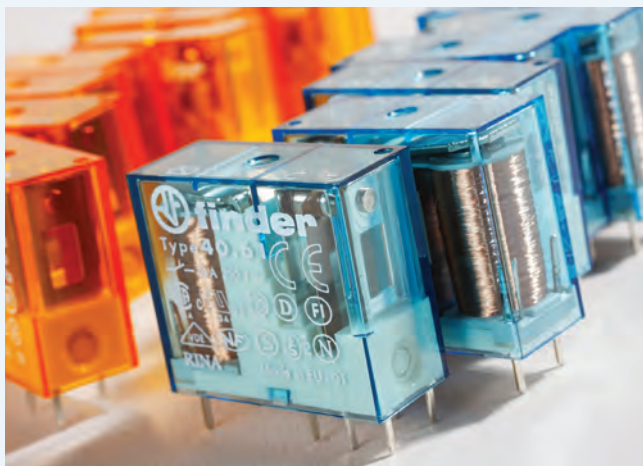


**DPST** – Double Pole Single Throw. These have two pairs of terminals. Equivalent to two SPST switches or relays actuated by a single coil. Including two for the coil, such a relay has six terminals in total. The poles may be Form A or Form B (or one of each).



**DPDT** – Double Pole Double Throw. These have two rows of change-over terminals. Equivalent to two SPDT switches or relays actuated by a single coil. Such a relay has eight terminals, including the coil.

Typical coil voltages are: 1.5, 3, 4.5, 5, 6, 9, 12, 24, 48, 60, 110



## Solid State Relays



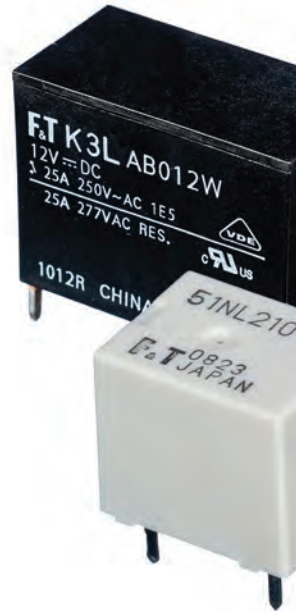
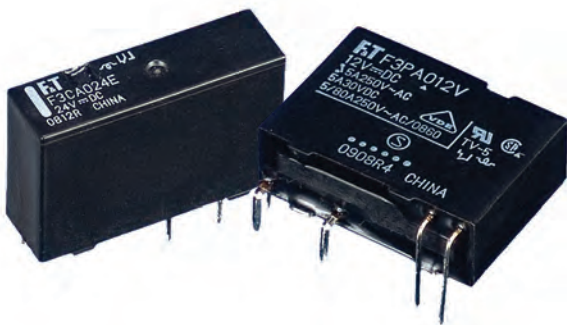
2-125A, AC and DC types, 1-3-phase, zero crossing detection (ZCD) or random switching.

We supply SSRs from companies Comus, Crydom, Omron and Sharp.



**FUJITSU COMPONENTS**  
Years of experience

**FUJITSU**



# Fujitsu relays

Automotive • Power • Signal



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SOS electronic europe.



FUJITSU is one of the leading world producers of high quality relays. FUJITSU merged in 1996 with Takamisawa Electric inheriting the well known Takamisawa relay brand.

**CZ** FUJITSU je jedním z popředních světových výrobců kvalitních relé. FUJITSU se v roce 1996 spojilo s Takamisawa Electric a tím převzalo i dobře známou značku relé Takamisawa. Spojením silných stránek obou společností se stal Fujitsu Components hlavním hráčem na poli výroby relé.

**DE** FUJITSU ist einer der weltweit führenden Produzenten von qualitativ hochwertigen Relais. 1996 fusionierte Fujitsu mit Takamisawa Electric und übernahm auch die namhafte Relais-Marke Takamisawa. Durch Verbindung der Stärken beider Unternehmen wurde Fujitsu Components zum wichtigsten Player auf dem Feld der Relais-Herstellung.

**HU** A FUJITSU a világ nagy kiváló minőségű relé gyártói közé tartozik. A Fujitsu 1996-ban egyesült a Takamisawa Electric-kel így a jól ismert Takamisawa relék gyártását is átvette. A két cég erősségeinek egyesítésével a Fujitsu Components a relé gyártás jelentős szereplője lett.

**PL** FUJITSU jest jednym z wiodących światowych producentów wysokiej jakości przekaźników. Fujitsu połączyło się w roku 1996 z Takamisawa Electric, przez co przejęło również dobrze znaną markę przekaźników Takamisawa. Połączeniem mocnych stron obu spółek, Fujitsu Components stał się głównym graczem na polu produkcji przekaźników.

**RO** FUJITSU este unul din principalii producători mondiali de rele de înaltă calitate. Fujitsu a fuzionat în 1996 cu Takamisawa Electric, moștenind bine-cunoscuta marcă de rele Takamisawa. Combinând atuurile ambelor companii, Fujitsu Components rămâne un actor important în domeniul producției de rele.

**SK** FUJITSU je jedným z vedúcich svetových výrobcov vysokokvalitných relé. Fujitsu sa v roku 1996 spojilo s Takamisawa Electric a tým prevzalo aj dobre známu značku relé Takamisawa. Spojením silných stránok oboch spoločností, je Fujitsu Components hlavným hráčom na poli výroby relé.

Combining the strengths of both companies, Fujitsu Components remains a major player in the relay manufacturing. Relays marked with the name Fujitsu or Takamisawa you can find all over the world in virtually any application where relays are used. Fujitsu relays can replace many types from other producers, cross-reference is available.

### Why FUJITSU?

- [long-term experience in relays](#)
- [ultimate quality](#)
- [top features](#)
- [used all over the world](#)
- [replacements available if necessary](#)

### Did You Know?

**Automotive Relay has ultra-miniature package.**

Measuring 11.8 x 8.8 x 10.3 mm, surface-mount electromechanical relay offers efficient magnetic circuit structure. Model FTR-P6 consumes 800 mW and has 25 A (14 Vdc) contact rating at locked motor load for 100 K. Capable of handling max inrush current of 35 A, relay has max acoustic noise level of 60 dB/5 cm.

### Signal Relays

#### FTR-B3 Series, SMD



- 2 poles 2A
- ultra miniature low profile (5,4 mm), light weight
- high reliability – bifurcated gold overlay silver contacts
- wide operating range, high heat resistant material
- low power
- very good HF characteristics
- latching type available (1 coil)

#### FTR-B4 Series Signal Relay



- 2 poles 2A, DPDT 2C
- ultra miniature slim profile, SMT available
- high reliability – bifurcated gold overlay silver contacts
- low power
- latching type available (1 coil)

#### SY Series Miniature Signal Relay



- 1 pole 1-2A current (SPDT)
- small size and light weight
- High sensitivity
- wide ambient temperature range (-30 to +90°C)
- DIL pitch terminals
- dial-pulse relay available (10pps, 20pps)
- cadmium-free contacts
- coil 3-48 VDC

#### RY Series Signal Relay Ultra Sensitive



- 2 poles 1-2A current (DPST)
- ultra high sensitivity (from 150 mW)
- High reliability – bifurcated contacts
- DIL pitch terminals
- low coil power (120 mW)
- cadmium-free contacts
- coil 3-48 VDC

#### A Series



- low profile (5mm), light weight
- high reliability – bifurcated gold overlay silver contacts
- wide operating range
- plastic sealed type
- latching version available (bistable) (AL-, AL-D-)
- 2 form C (DPDT)
- 0,5A/125VAC, 1A/30VDC
- coil 1,5-48V



### Power Relays

#### JS Series Medium Load control



- 1 pole 8A current (SPST-NO, SPDT)
- low profile (12,5mm)
- mounting space 290 mm2
- UL class B (130°C) coil wire insulation
- High isolation in small package - insulation distance 8mm (5kV AC coil to contact)
- low coil power (220-290 mW)
- cadmium-free available
- coil 5-60 VDC

#### JSL Series Medium Load Control, Polarized (latching)



- 1 pole 8A current (SPST-NO, SPDT)
- low profile (12,5mm), small width (10mm)
- High isolation - insulation distance 8mm (5kV AC coil to contact)
- cadmium-free
- coil 3-24 VDC

#### FTR-F1 Series



- 2 poles 5A (DPST-NO, DPDT)
- low profile (16,5mm)
- reinforced isolation construction (5kV coil to contact)
- coil 5-110 VDC

#### FTR-H1 Series



- 1 pole 10A (SPST-NO, SPDT)
- low profile (16,5mm)
- insulation distance 8mm (5kV AC coil to contact)
- coil 5-48 VDC

#### FTR-H3 Series



- 1 pole 78/120A inrush current (SPST-NO)
- ultra silent (50dB at 5 cm)
- low profile (16,5mm)
- insulation distance 8mm (5kV AC coil to contact)
- electric life 100 000 operations (10A/250VAC)
- low coil power (530 mW)
- coil 5-24 VDC

#### FTR-K1 Series



- 1 pole 16A (SPST-NO, SPDT)
- low profile (15,7mm)
- High isolation - insulation distance 10mm (5kV AC coil to contact)
- high heat resistance
- coil 5-48 VDC

#### FTR-LY Series SLIM



- 1 pole 6A current (SPST-NO, SPDT)
- slim (5,0mm wide)
- mounting space 140 mm2
- High isolation in small package - insulation distance 8mm (5kV AC coil to contact)
- cadmium-free contacts
- coil 5-48 VDC

#### JV Series Medium Load Control



- 1 pole 5A current (SPST-NO, SPDT)
- low profile (12,5mm)
- mounting space 175 mm2
- UL class B (130°C) coil wire insulation
- reinforced insulation system - insulation distance 8mm (5kV AC coil to contact)
- low coil power (200-300 mW)
- cadmium-free contacts
- coil 3-48 VDC

### Automotive Relays

#### FBR 512,522 Series



- dual relay (2 independent in 1 package) (SPD-Tx2)
- 35A
- high resistance to vibration and shock
- improved heat resistance
- 2 contact gap options (FBR510:0,3mm, FBR520: 0,6mm)
- 25A/14V
- -40 to +85°C
- coil 6,9,10,12 VDC

#### FBR 51,52 Series



- 1 pole 30A (SPDT)
- compact and lightweight
- high resistance to vibration and shock
- improved heat resistance
- 2 contact gap options (FBR510:0,3mm, FBR520: 0,6mm)

These are only selected supplied components. For more types, sizes and versions please visit our website [www.soselectronic.com](http://www.soselectronic.com).





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**TE CONNECTIVITY** ist ein internationales Unternehmen, das über 500 000 Produkte entwirft und produziert, die den Energie- und Datenfluss in Produkten aus allen unseren Lebensbereichen herstellen und schützen. Die Produkte von TE Connectivity haben sich dank erstklassiger Qualität und Zuverlässigkeit einen internationalen Ruf erworben.

**TE CONNECTIVITY** nemzetközi cég, mely több mint 500 000 terméket fejleszt és gyárt, melyek összekötik az alkatrészeket és biztosítják az elektromos áram és adatátvitelt az élet minden területét behálózó készülékekben. A TE Connectivity termékei nemzetközi sikerüket kiemelkedő minőségüknek és megbízhatóságuknak köszönhetik.

**TE CONNECTIVITY** to spółka międzynarodowa projektująca i produkująca ponad 500 000 produktów, które przyłączają i chronią przepływ energii elektrycznej oraz danych wewnątrz produktów, związanych z wszystkimi aspektami naszego życia. Produkty spółki TE Connectivity zyskały swoją międzynarodową reputację dzięki wyjątkowej jakości i niezawodności.

**TE CONNECTIVITY** este o companie internațională care proiectează și fabrică peste 500 000 de produse ce conectează și protejează fluxul de energie electrică și datele din interiorul produselor capabile să atingă fiecare aspect al vieții noastre. Produsele TE Connectivity și-au câștigat o reputație internațională pentru calitatea și fiabilitatea remarcabile.

**TE CONNECTIVITY** je medzinárodná spoločnosť, ktorá navrhuje a vyrába viac ako 500 000 produktov, ktoré pripájajú a chránia tok elektrickej energie a dát vo vnútri produktov, ktoré sa dotýkajú všetkých aspektov nášho života. Produkty spoločnosti TE Connectivity získali medzinárodné renomé vďaka vynikajúcej kvalite a spoľahlivosti.

100,000 employees of TE Connectivity cooperate with customers in virtually every industry—from consumer electronics, energy and health-care, to automotive, aerospace and communication networks—enabling smarter, faster, better technologies to connect products. TE Connectivity's rich history is based on two companies, each with impressive engineering prowess and heritage - AMP Incorporated, founded in 1941 and Raychem Corporation, established in 1957. Today you can find among TE Connectivity brands more famous ones like Schrack, Axicom, CGS etc. In the huge TE Connectivity's production portfolio you can find components for circuit protection, connectors, fiber optics and fiber management solutions, identification products, relays, switches and sensors, touch solutions, wires and cables, filters, passive components, tooling, tubing and harnessing, as well as wireless solutions.

### Why TE CONNECTIVITY?

- company with over 50-year history
- internationally renowned components
- huge portfolio

#### V23084-C2001-A303



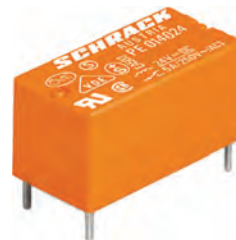
- enclosed double mini PCB relay with CO contacts
- contacts from silver and nickel
- continuous current 20/20A
- easy PCB routing thanks to an optimized terminals layout
- specified temperature range -40 to +85°C
- coil 12V/ 255 Ohms
- dimensions 17.5x16.8x13.2 mm (LxWxH)

#### V23071-A1009-A132



- 1 pole (NO) relay for PCB with up to 70A continuous current
- silver-nickel based contacts
- very low voltage dropout
- specified temperatures -40 to +85°C
- 12V/ 64 Ohm coil
- wide operating voltage range - from 6.9V
- high shock and vibration resistance
- dimensions 24.2 x 18,6 x 18.0 mm (LxWxH)

#### PE014005



- 1 pole 5 A, 1 form C (CO) or 1 form A (NO) contact
- Cadmium-free contacts
- Sensitive coil 200mW
- Ambient temperature 85°C
- Low height 10.0mm
- Plastic materials according to IEC 60335-1 (domestic appliances)
- dimensions 20.0x10.0x10.0 mm (LxWxH)

#### RT114730



- 1 pole 12 / 16 A, 1 CO or 1 NO contact
- DC- or AC-coil
- Sensitive coil 400mW
- 5 kV / 10 mm coil-contact, reinforced insulation
- Ambient temperature 85°C (DC-coil)
- WG version: Product in accordance to IEC60335-1

TE offers the broadest range of Relays and contactors in the world. TE's product line includes leading brands such as AGASTAT, AXICOM, CII, HARTMAN, KILOVAC, OEG, P&B, PRODUCTS UNLIMITED and SCHRACK



FINDER is a very experienced company founded in 1954 specialising in relays and timers. Finder produced over 10 000 different products. All development and production is in Europe – Italy, France and Spain. Main portfolio consists of plug-in / PCB Relays, relay interface modules, timers and monitoring relays and products for residential and commercial applications.

**CZ** FINDER je velmi zkušená společnost, založená v r. 1954, specializující se na relé a časovače. Finder vyrobil přes 10000 různých produktů. Kompletní vývoj a výroba je v Evropě - Itálie, Francie a Španělsko. Hlavní portfolio sestává z relé, reléových vazebných členů, časových a monitorovacích relé a produktů pro aplikace do budov.

**DE** FINDER ist ein höchst erfahrenes, 1954 gegründetes Unternehmen, welches sich auf Relais und Zeitrelais spezialisiert. Finder hat bisher mehr als 10 000 verschiedene Produkte hergestellt. Die gesamte Entwicklung und Produktion ist in Europa - Italien, Frankreich und Spanien angesiedelt. Das Hauptportfolio umfasst Relais, Koppelrelais, Zeit- und Überwachungsrelais sowie Produkte für Gebäudeanwendungen.

**HU** A FINDER egy 1954-ben alapított tapasztalt cég, mely relék és időzítők gyártására szakosodott. Több részlege Európában található - Olaszország, Franciaország és Spanyolország. A cég fő portfóliójába a relék, relés összekötőegységek, időzítő és monitorozható relék és épületgépészeti alkalmazások és termékek találhatók.

**PL** FINDER to spółka o bardzo bogatych doświadczeniach, założona w r. 1954. Specjalizuje się, w przekaźnikach i timerach. Finder wyprodukował ponad 10.000 różnego rodzaju produktów. Cały rozwój i produkcja znajduje się w Europie - Włochy, Francja i Hiszpania. Oferta główna obejmuje przekaźniki, przekaźnikowe elementy łączące, przekaźniki czasowe i monitorujące oraz produkty dla aplikacji w budowlach.

**RO** FINDER este o companie înființată în 1954 specializată în relee și temporizatoare. Finder a produs peste 10.000 de produse diverse. Întreaga activitate de dezvoltare și producție se desfășoară în Europa - Italia, Franța și Spania. Portofoliul societății conține relee fisabile / PCB, module de interfață de releu, temporizatoare și relee de monitorizare, relee și produse pentru aplicații rezidențiale și comerciale.

**ES** FINDER je velmi zkušená společnost založená v r. 1954, specializující sa na relé a časovače. Finder vyrobil vyše 10000 rôznych produktov. Celý vývoj a výroba je v Európe - Taliansko, Francúzsko a Španielsko. Hlavné portfólio pozostáva z relé, reléových väzobných členov, časových a monitorovacích relé a produktov pre aplikácie do budov.

Finder products feature a very good price performance ratio and also very important – stable availability and short delivery terms.

### Why FINDER?

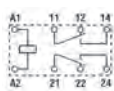
- EU made products
- very good price/performance ratio
- short delivery terms

### Did You Know?

Finder products have many quality approvals certified by the following international organizations: ABS, BBJ, BEAB, CSA, DEMKO, FIMKO, GERMANISCHER, LLOYD, GOST, IMQ, IRAM, LLOYD'S REGISTER, NEMKO, LCIE, RINA, SEV, SEMKO, TÜV, UL, VDE as well as CE certification.

### Signal Relays

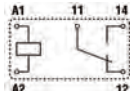
#### F 30.22 Series



Subminiature DIL relay

- low level switching capability
- gold clad contacts
- low coil power (200 mW)
- RT III washtight
- 2 form C (DPDT)
- cadmium-free contacts
- 2A/125VAC
- coil 5-48V

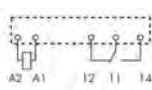
#### F 32.21 Series



Subminiature low profile relay

- only 10.7 mm high
- low coil power (200 mW)
- RT III washtight
- SPDT or SPNO
- 6A/250VAC
- coil 5-48V

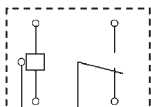
#### F 34.51 Series



Ultra slim 1 pole relay

- only 10.7 mm high
- low coil power (200 mW)
- RT III washtight
- SPDT or SPNO
- 6A/250VAC
- coil 5-48V

#### F 36.11 Series

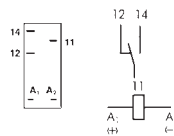


Miniature PCB relay

- miniature "sugar cube" package
- low coil power (360 mW)
- SPDT or SPNO
- RT III washtight
- cadmium free contacts
- 10A/250VAC
- coil 3-48V

### Power Relays

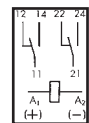
#### F 40.31 Series



Miniature PCB relay

- miniature "sugar cube" package
- low coil power (360 mW)
- SPDT or SPNO
- RT III washtight
- cadmium free contacts
- 10A/250VAC
- coil 3-48V

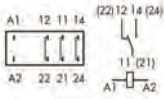
#### F 40.52 Series



Miniature PCB/Plug-in 2-pole relay

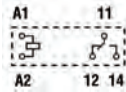
- PCB mount - direct or via socket
- DIN rail mount via socket
- AC, DC and sensitive DC coil versions
- insulation distance 8mm (6kV coil to contacts)
- DPDT
- RT II or RT III washtight
- cadmium free contacts
- 2 pole 8A/250VAC
- coil 6-240VAC or 5-125VDC

### F 40.61 Series



- Miniature PCB/Plug-in relay
- PCB mount - direct or via socket
  - DIN rail mount via socket
  - AC, DC and sensitive DC coil versions
  - insulation distance 8mm (6kV coil to contacts)
  - SPDT
  - RT II or RT III washtight
  - cadmium free option available
  - 16A/250VAC
  - coil 6-240VAC or 5-125VDC

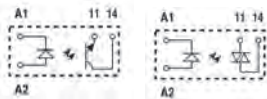
### F 43.41 Series



### F 41.81 Series



SSR



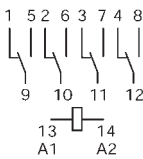
- Low profile PCB SSR
- PCB mount - direct or via socket
  - DIN rail mount via socket
  - silent high speed switching with long electrical life
  - DC 24V control circuit
  - insulation 2.5kV
  - SPST
  - RT III washtight
  - low profile 15.7 mm
  - 5AA/240VAC

Low profile high isolation PCB relay

- PCB mount - direct or via socket
- sensitive DC coil (250 mW)
- very high insulation distance 10mm (6kV coil to contacts)
- SPDT
- RT II or RT III washtight
- cadmium free contacts
- 10A/250VAC
- coil 3-48VDC

## Industrial Relays

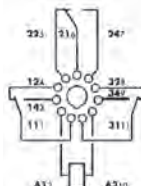
### F 55.34 Series



- General purpose industrial 4 pole 7A PCB relay
- locable test button and mechanical flag
  - AC and DC coils
  - cadmium free contacts
  - coil EMC suppression
  - 4 pole 7A/250VAC
  - coil 6-240VAC or 6-220VDC
  - timer accessories

### F 60.13 Series

Alternative of industry standard RP700.



- General purpose industrial 3 pole 10A PCB relay
- locable test button and mechanical flag
  - AC and DC coils
  - cadmium free contacts
  - coil EMC suppression
  - 3 pole 10A/250VAC
  - coil 6-400VAC or 6-220VDC
  - timer accessories

## Relay Interface Modules

### F 38.51 Series



- Relay interface modules
- 35mm DIN rail mount
  - slim design - 6.2mm wide
  - integral coil indication and protection circuit
  - input leakage current suppression types available
  - insulation distance 8mm (6kV coil to contacts)
  - SPDT
  - cadmium free contacts
  - 6A/250VAC
  - coil 6-240V (AC or DC)

### F 48.52, F 48.61 Series



- Relay interface modules
- 35mm DIN rail mount
  - 1 and 2 pole interface modules 15.8mm wide
  - AC and DC sensitive coils
  - supply status indication and EMC coil suppression module as standard
  - insulation distance 8mm (6kV coil to contacts)
  - SPDT or DPDT
  - 2 pole 8A/250VAC or 1 pole 16A/250VAC
  - coil 12-230VAC or 12-125VDC

### F 80.01 Series



- Multifunction modular timers
- 35mm DIN rail mount
  - multi voltage and multi function
  - six-time scale 0.1s to 24h
  - SPDT
  - 16A/250VAC
  - Functions: ON delay, ON pulse, Symmetrical recycling: ON start, Signal OFF delay, Signal ON and OFF delay, Signal ON pulse

## Sockets and Accessories

Relay sockets enable to use various relays thus to simply adapt an interface module to a given application.



### F 38 Series



- Instant ejection of relay by plastic retaining clip  
Integral coil indication and protection circuit  
35mm rail mounting



### The Switching Function Code

Relay type	Number of Steps	Switching Sequence			
		1	2	3	4
xx.x1	2				
xx.x2	2				
xx.x3	2				
xx.x4	4				
xx.x5	4				
xx.x6	3				
xx.x8	4				

The Switching Function fundamentally defines the particular sequence in which the step relay contacts open and close, and the number of "steps" before this sequence repeats itself. The digit in the fourth position of the Finder part number denotes the Switching Function.

#### Switching function code

The 1 pole 2 step switching function xx.x1 will allow the On/Off control of a single lighting zone.

The 2 pole types allow the independent control of 2 lighting zones. The specific lighting sequence will depend on the specific Switching Function code chosen.

#### Note:

- Not all Finder Step relays are available with all the possible alternative Switching functions.
- The Switching function code generally has the same meaning for all Finder step relays, although there are a few minor anomalies – so in practice refer carefully to the data sheet for the specific relay.

For example:

The Switching Function code "6" (2 pole, 3-step sequence) can be implemented with relay types 20.26 – 26.06 – 27.06, but the latter has coil and contact circuits that are common to each other.



## *pokroková technika, špičková spolehlivost*

### Polovodičová relé pro vysokou četnost spínání

Spínací procesy v elektromechanických relé jsou pro vysokou četnost spínání doprovázeny některými nežádoucími jevy, jako je opalování kontaktů a v neposlední řadě i relativně dlouhá doba přitahu a doba odpadu kontaktů.

Polovodičová relé neboli spínací polovodičové bezkontaktní prvky problematiku opalování kontaktů elektromechanických relé zcela odstraňují. Navíc polovodičové spínací prvky se vyznačují více než řádově kratší dobou sepnutí i dobou odpadu.

Společnost Finder využívá běžně používané patice šíře 6,2 mm pro úzká jednobunková elektromechanická relé rovněž i pro polovodičová relé se spínáním výkonem do 2 A při 24 V DC nebo 240 V AC. Běžně používanými paticemi se zabudovanými indikačními a ochrannými EMC moduly a přídržnou sponou včetně speciálního

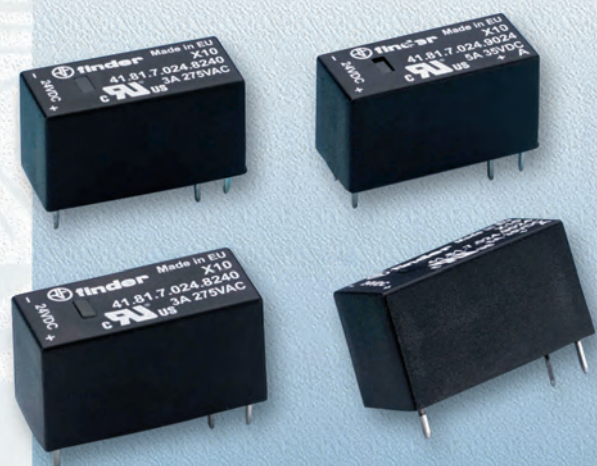
provedení se zabudovanými moduly pro potlačení naindukovaných proudů ze souběžných dlouhých střídavých vedení pro zajištění odpadu kontaktů.

Dalším rozšířením aplikačních možností obdobných patic avšak šíře 14 mm se zabudovanými indikačními a ochrannými EMC moduly pro dvoukontaktní elektromechanická relé je použití pro nová polovodičová relé řady 41 s vyšším spínáním výkonem 5 A při 24 V DC nebo 3 A při 240 V AC.

Oba typy polovodičových relé jsou určeny i pro přímou montáž do desek plošných spojů.

Ve všech aplikacích, kde se předpokládá vysoká četnost spínání a nevyžaduje se galvanické oddělení s vysokou napětovou pevností, je na místě spolehlivé spínání pomocí polovodičových relé.

RNDr. Stanislav Hotmar, CSc.



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www.finder.cz



For more details contact your authorised distributor SOS electronic europe.



MEDER electronic is one of world leading manufacturers of reed switches, reed relays and reed Sensors. Meder electronic is a Germany based company, with twenty five years of experience in design and manufacture of top quality reed contact components.

**CZ** MEDER electronic je jedním z popředních světových výrobců jazyčkových relé, kontaktů a senzorů. Meder electronic je společnost se sídlem v Německu, s 25 letými zkušenostmi v oblasti návrhu a výroby špičkových součástí s jazyčkovými kontakty.

**DE** MEDER electronic ist einer der weltweit führenden Hersteller von Reedrelais, Reedkontakten und Reedensoren. Meder electronic ist ein Unternehmen mit Sitz in Deutschland mit 25-jährigen Erfahrungen im Bereich Entwicklung und Produktion von spitzennäbigen Bauelementen mit Kontaktzungen.

**HU** A MEDER electronic a világ egyik vezető Reed relé, érintkező és érzékelő gyártója. Székhelye Németországban található. 25 éves tapasztalattal rendelkezik a kiváló minőségű érintkezős alkatrészek tervezésében és gyártásában.

**PL** MEDER electronic jest jednym z wiodących światowych producentów kontraktowych przekaźników, przekaźników i czujników. Meder electronic to spółka z siedzibą w Niemczech, z 25-letnimi doświadczeniami w dziedzinie projektowania i produkcji wyjątkowych części ze stykami języczkowymi.

**RO** MEDER electronic este unul din producătorii mondiali de frunte de comutatoare cu lamelă, rele cu lamelă și senzori cu lamelă. Meder electronic este o companie cu sediul în Germania, cu douăzeci și cinci de ani de experiență în proiectarea și fabricarea componentelor de contact lamelar, de cea mai bună calitate.

**SK** MEDER electronic je jedným z popredných svetových výrobcov jazyčkových relé, kontaktov a senzorov. Meder electronic je spoločnosť so sídlom v Nemecku, s 25-ročnými skúsenosťami v oblasti návrhu a výroby špičkových súčiastok s jazyčkovými kontaktmi.

Meder electronic is a global leader in the design, development and manufacture of Reed Sensing and Reed Switching solutions with a selection from hundreds of Reed Switches, Reed Relays, Reed Sensors and Level Floats in the highest quality. Reed Switches are important components used in many different applications like test and measurement, security and alarm, household appliances, automotive, medical devices, telecommunication and many industrial applications. A big advantage of reed switches is that they require little to no power consumption (when combined with a permanent magnet). The reed switches provide a very long lifetime since they are protected by their hermetically sealed glass envelope from environmental contaminants. Another advantage of reed

### Why MEDER?

- producer specialized on reed switch components
- top quality, highly reliable components

switches is the possibility to switch high voltages, high frequency signals and very small currents.

### Reed Relays

Available in SPST (1A), DPST(2A) and SPDT(1C) versions.

DIP xx 12  
DIP xx 21



**Max. Switching Power** 15 W  
**Max. Switching Current** 1 A  
**Max. Switching Voltage** 200 VDC  
**Operate/Release Time** 0,5 ms / 0,1 ms

DIP xx 51



**Max. Switching Power** 3 W  
**Max. Switching Current** 0,25 A  
**Max. Switching Voltage** 175 VDC  
**Operate/Release Time** 0,7 ms / 0,1 ms

DIP xx 1A

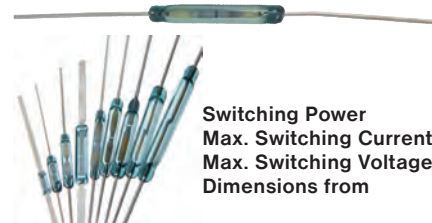


**Max. Switching Power** 10 W  
**Max. Switching Current** 0,5 A  
**Max. Switching Voltage** 100 VDC  
**Operate/Release Time** 0,5 ms / 0,5 ms

SIL xx 1A



KSK



**Switching Power**  
**Max. Switching Current**  
**Max. Switching Voltage**  
**Dimensions from**

MK 67



10 - 50 W  
0,5 - 1 A  
175 - 250 VDC  
10x2mm

MK3, MK4

magnetically operated reed proximity switches in a cylindrical case with an interconnect cable. SPST-NO, 0,5A, 10W

MM312



MM4



### Level Sensors

Standard liquid level sensor for water applications and dilute acids. Prichytáva sa maticou. The standard termination is a PVC cable with a cross section of 0.14 mm<sup>2</sup> and a length of 500 mm.

#### Applications

Liquid container monitoring in household, appliances, automotive applications, test and measurement, and control technology.





### Reed Switches and Magnets


Reed switches consist of two ferromagnetic blades of iron and nickel, hermetically sealed in a glass capsule. The switches are actuated through the introduction or removal of a magnetic field and are for use in wet and dirty environments.





A fuse is a very important component for all electronic devices providing an overcurrent protection of the device or its power supply. It is a type of a low resistance resistor. A fuse interrupts excessive current so that further damage by overheating or fire is prevented.


 Pojistka je velmi důležitý komponent všech elektronických zařízení, poskytující nadproudovou ochranu zařízení nebo jeho napájecího zdroje. Pojistka přeruší zvýšený proud a tím zabraňuje dalším škodám, způsobeným přehřátím nebo požárem zařízení.

 Die Sicherung ist eine sehr wichtige Komponente sämtlicher elektronischer Geräte, die einen Überstromschutz für das Gerät oder seine Stromversorgung bietet. Sicherung ist eine Art Widerstand mit niedrigem ohmschen Widerstand. Die Sicherung unterbricht den Überstrom und beugt damit weiteren Beschädigungen durch Überhitzung oder Brand vor.

 Az elektromos berendezések nagyon fontos alkotórészei a biztosítékok, melyek a készülékek vagy azok tápegységeinek túláram védelmét látják el. Ezek igen kis ellenállású ellenállások, melyek túlzott áramfelvételt eseten megszakítják az áramot, így megelőzve a túlmelegedéstől vagy tűzből eredő további károsodást.

 Bezpiecznik jest bardzo ważnym elementem wszystkich urządzeń elektronicznych i zapewnia ochronę nadprądową urządzenia, lub jego źródła zasilania. Bezpiecznik to rodzaj opornika o niskiej rezystancji. Bezpiecznik przerwie nadmierny prąd, przez co uniemożliwy dalszego przegrzania lub pożaru.

 O siguranță este o componentă foarte importantă pentru toate dispozitivele electronice, oferind o protecție la supracurent a dispozitivului sau a sursei sale de alimentare. Acesta este un tip de rezistor de rezistență scăzută. O siguranță întrerupe curentul în exces, astfel că este prevenită deteriorarea ulterioară prin supraîncălzire sau incendiu.

 Poistka je veľmi dôležitý komponent všetkých elektronických zariadení, poskytujúci nadprúdovú ochranu zariadenia alebo jeho napájacieho zdroja. Poistka je typ rezistora s nízkou rezistenciou. Poistka preruší zvýšený prúd a tým zabraňuje ďalšiemu škodám od prehriatia alebo požiaru.

Its essential component is a metal wire or a strip that melts when too much current flows through it, which interrupts the circuit in which it is connected. The fuse element is made of zinc, copper, silver, aluminum, or alloys to provide stable and predictable characteristics. Together with well known glass tube fuses, miniature PCB mount and SMT types are still more used.

Another relatively new kind of fuses are so called resettable fuses. It is a polymer component – PolySwitch PPTC (polymeric positive temperature coefficient) offering a great advantage of resetting after the fault is cleared and power to the circuit is removed, thereby helping to reduce warranty, service and repair costs. PolySwitch devices have several advantages in comparison to usual PTC devices. PPTC feature a more steep temperature characteristics and they don't suffer from a resistance drop at very high temperatures (over approx. 200°C) like PTC devices. Moreover PPTC devices are insensitive to voltage spikes and they have a much smaller capacitance, that's why they are suitable also for high frequency devices.

## Classification and Terms

### Rated Current $I_N$

A maximum current that the fuse can continuously conduct without interrupting the circuit.

### Speed

The speed at which a fuse blows depends on how much current flows through it and the material of which the fuse is made. The operating time is not a fixed interval, but decreases as the current increases. Fuses have different characteristics of operating time compared to current, characterized as fast-blow, slow-blow, or time-delay, according to time required to respond to an overcurrent condition. Fuse selection depends on the load's characteristics. Semiconductor devices may use a fast or ultrafast fuse since semiconductor devices heat rapidly when excess current flows.

### The $I^2t$ Value

A measure of energy required to blow the fuse element and so a measure of the damaging effect of overcurrent on protected devices; sometimes known as the let-through energy. Unique  $I^2t$  parameters are provided by charts in manufacturer data sheets for each fuse family. The energy is mainly dependent on current and time for fuses.

### Rated Voltage

Voltage rating of the fuse must be greater than or equal to what would become the open circuit voltage. For example, a glass tube fuse rated at 32 volts would not reliably interrupt current from a voltage source of 120 or 230 V. If a 32 V fuse attempts to interrupt the 120 or 230 V source, an arc may result.

### Voltage Drop

A voltage drop across the fuse is usually provided by its manufacturer. Resistance may change when a fuse becomes hot due to energy dissipation while conducting higher currents. This resulting voltage drop should be taken into account, particularly when using a fuse in low-voltage applications. Voltage drop often is not significant in more traditional wire type fuses, but can be significant in other technologies such as resettable fuse (PPTC) type fuses.

### Temperature Derating

Ambient temperature will change a fuse's operational parameters. A fuse rated for 1 A at 25 °C may conduct up to 10% or 20% more current at 40°C and may open at 80% of its rated value at 100 °C. Operating values will vary with each fuse family and are provided in manufacturer data sheets.







SCHURTER is an internationally leading innovator and manufacturer of fuses, connectors, circuit breakers, input systems and EMC products. The company was founded by Heinrich Schurter in 1933. All activities are centralized into the Schurter Holding AG based in Lucerne/Switzerland since 1990.

**CZ** SCHURTER je přední inovátor a výrobce pojistek, konektorů, jističů, vstupních systémů a EMC produktů. Společnost založil v r. 1933 Heinrich Schurter. Od r. 1990 jsou všechny aktivity centralizovány do Schurter Holding AG s centrálou v Luzernu / Švýcarsko.

**DE** SCHURTER ist führender Innovator und Produzent von Sicherungen, Konnektoren, Schutzschaltern, Eingabesystemen und EMV-Produkten. Das Unternehmen wurde 1933 von Heinrich Schurter gegründet. Seit 1990 sind sämtliche Aktivitäten unter dem Dach der Schurter Holding AG mit Sitz in Luzern/Schweiz zusammengefasst.

**HU** A SCHURTER biztosítékok, csatlakozók, kioldók, beléptető rendszerek és EMC termékek vezető gyártói és fejlesztői közé tartozik. A céget 1933-ban Heinrich Schurter alapította. 1990-től minden tevékenységük a Schurter Holding AG-ban, a cég svájci Lucerne-ben található központjában összpontosul.

**PL** SCHURTER to wiodący innowator i producent bezpieczników, konektorów, bezpieczników automatycznych, systemów wejściowych oraz produktów EMC. Spółkę założył w roku 1933 Heinrich Schurter. Od r. 1990 wszystkie działalności zostały zcentralizowane do Schurter Holding AG, z centralą w Lucern / Szwajcaria.

**RO** SCHURTER este un producător internațional inovator de siguranțe, conectoare, întrerupătoare, sisteme de intrare și produse EMC. Compania a fost înființată de către Heinrich Schurter în 1933. Toate activitățile sunt centralizate în Schurter Holding AG cu sediul în Lucerne/Elveția din anul 1990.

**SK** SCHURTER je vedúci inovátor a výrobca poisťiek, konektorov, ističov, vstupných systémov a EMC produktov. Spoločnosť založil v r. 1933 Heinrich Schurter. Od r. 1990 sú všetky aktivity centralizované do Schurter Holding AG, s centrálou v Lucerne/Švajčiarsko.

Schurter produces a wide range of fuses and protective components like telecom fuses, resettable fuses, varistors, fuseholders, over- and under-voltage protection.

### Why SCHURTER?

- highly specialised company with a big experience
- top quality products
- components meet applicable international safety standards

### Did You Know?

The MGA-S type fuse complies with ESA/ESCC generic specification No. 4008 for use in space.

### MST 250T Time Lag Series



#### Technical Parameters

Maximal Voltage	250VAC
Rated Current / Voltage	50A/125VAC
Soldering Temperature	260°C (5s)
Current Value	200mA - 4A

### ST250 F Quick Acting Series



#### Technical Parameters

Maximal Voltage	250VAC
Rated Current / Voltage	50A/125VAC
Soldering Temperature	260°C (5s)
Current Value	200mA - 4A





**PÜSCHEL FUSE TECHNOLOGY** is the Germany based company with over 45 years of history and belongs to leading innovators in the field of fuses and security. As a specialized company with a big know how, Püschel Fuse Technology produces a wide range of top-quality fuses and accessories.

**PÜSCHEL FUSE TECHNOLOGY** je německá firma s více než 45 letou historií, patří k předním inovátorům v oblasti pojistek a bezpečnosti. Jako specializovaná firma s vysokým know-how vyrábí Püschel Fuse Technology širokou škálu kvalitních pojistek a příslušenství.

**PÜSCHEL FUSE TECHNOLOGY** ist eine deutsche Firma mit über 45-jähriger Geschichte und zählt zu den führenden Innovatoren im Bereich Sicherungen und Sicherheit. Als ein spezialisiertes Unternehmen mit umfassendem Know-how produziert Püschel Fuse Technology ein breites Spektrum an qualitativ hochwertigen Sicherungen und Zubehör.

A német **PÜSCHEL FUSE TECHNOLOGY** cég több mint 45 éves tapasztalattal a biztonságos területén a vezető fejlesztők közé tartozik. A szakosodott cég hatalmas tudásbázissal, a kiváló minőségű biztosítékok és tartozékaik széles skáláját gyártja.

**PÜSCHEL FUSE TECHNOLOGY** to firma niemiecka z ponad 45-letnią historią i należy do grona wiodących innowatorów w dziedzinie bezpieczników oraz zabezpieczenia. Jako wyspecjalizowana spółka z olbrzymim know-how, Püschel Fuse Technology produkuje szeroką gamę wysokiej jakości bezpieczników i akcesoriów.

**PÜSCHEL FUSE TECHNOLOGY** este o companie cu sediul în Germania, cu peste 45 de ani de istorie și aparține inovatorilor de frunte în domeniul siguranțelor și a securității. Ca o companie specializată, cu vaste cunoștințe tehnice, Püschel Fuse Technology produce o gamă largă de siguranțe și accesorii de cea mai bună calitate.

**PÜSCHEL FUSE TECHNOLOGY** je německá firma s viac ako 45-ročnou históriou a patrí k popredným inovátorom v oblasti poistiek a bezpečnosti. Ako špecializovaná firma s veľkým know-how, vyrába Püschel Fuse Technology širokú škálu vysoko kvalitných poistiek a príslušenstva.

Püschel Fuse Technology has set a few technical milestones during its history. In the company's portfolio we can find widely used glass tube fuses (5x20mm, 5x25mm, 5x30mm, 6.3x30mm), temperature fuses, automotive fuses and fuse holders. High quality fuses are guarantee of safe and reliable function of your devices.

### Why PÜSCHEL?

- specialized company with over 45 years of history
- top quality Germany made products

### Fuses

#### 5x20T Series Time Lag

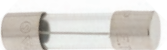
Breaking current 35A or 10xIn (max.100A)/250VAC. Rating 32mA - 16A



118.000 Series

#### 5x20F Series Quick Acting

Breaking current 35A or 10xIn (max.63A)/250VAC. Rating 32mA - 16A



117.000 Series

#### 6,3x32T Series Time Lag

Breaking current 35A or 10xIn (max.63A)/250VAC. Rating 400mA - 20A



Serie 202.000

#### 6,3x32F Series Quick Acting

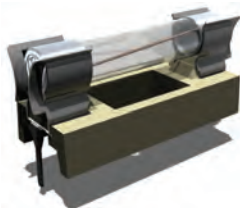
Breaking current 35A or 10xIn (max.100A)/250VAC. Rating 63mA - 20A



Serie 201.000

### Fuse Holders

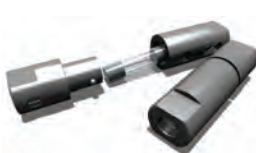
#### SI-HA137500



#### SI-CLIPA



#### SI-HA127100



#### SI-HA126500





Miniature Fuses  
Fuse Holders  
Automotive Fuses

**puschel**  
Fuse Technology





[www.fsp-pueschel.de](http://www.fsp-pueschel.de)


For more details contact your authorised distributor SOS electronic europe.




Enclosures (cabinets) for electronic devices serve as a mechanical protection of devices as well as to prevent electrical shock to equipment users. Assembling material provides necessary mechanical fixing of components.


 Krabičky pro elektronická zařízení slouží jako mechanická ochrana zařízení, jakož i k ochraně uživatele před úrazem elektrickým proudem. Montážní materiál poskytuje potřebné mechanické upevnění komponentů.

 Gehäuse für elektronische Geräte dienen als mechanischer Geräteschutz sowie zum Schutz des Benutzers vor einer Verletzung durch elektrischen Strom. Das Montagematerial bietet die notwendige mechanische Komponentenbefestigung.

 A készülékházak (műszerdobozok) egyaránt biztosítják az elektromos készülékek mechanikai, és a felhasználók áramütés elleni védelmét. Az alkatrészmechanikai rögzítéséhez a szerelési segédanyagok nyújtják a szükséges alkatrészeket.

 Pudełka dla urządzeń elektronicznych służą jako ochrona mechaniczna urządzeń, jak również do ochrony użytkownika przed porażeniem prądem elektrycznym. Materiał montażowy umożliwia wymagane zamocowanie mechaniczne podzespołów.

 Carcasele (cutiile) dispozitivelor electronice servesc drept protecție mecanică a dispozitivelor, precum și pentru a preveni șocul electric al utilizatorilor echipamentului. Materialul de montaj oferă componentele mecanice de fixare, necesare.

 Krabičky pre elektronické zariadenia slúžia ako mechanická ochrana zariadení, ako aj na ochranu užívateľa pred úrazom elektrickým prúdom. Montážny materiál poskytuje potrebné mechanické upevnenie komponentov.

It can be said, that enclosures determine final look of the device. Enclosures must meet many demands according to a purpose, for which they shall be used. Suitability of an enclosure for a given application usually depends mainly on the shape and size of an enclosure, as well as material from which it's made. Similarly, appropriate assembling material is the key group of components for reliable and effective assembly of electronic devices. The right choice of an assembling material also determines a possibility of easy access to components at servicing.

### Classification and Terms

Every field of usage has its own further special demands, like for example handheld enclosures have to feature good ergonomics, enclosure for outdoor usage have to be UV and water resistant, etc. From this reason, enclosures are usually divided to many categories, like: standard, handheld, desktop, USB dongle, DIN-rail and many other. Enclosures for electronic devices are most often made from rigid plastics (PVC,

PS, ABS, polycarbonate and other) and metals, particularly steel and aluminum.

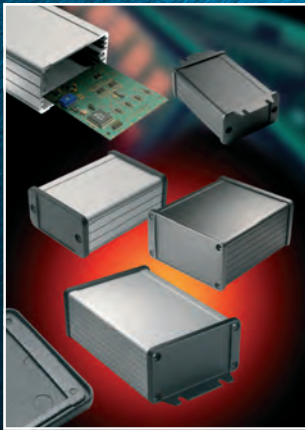
Assembling material helps to reach the desired mechanical construction. Here you can find metal and plastic screws and nuts, spaceoffs, distance sleeves, cable holder, grommets, heat-shrinkable insulation tubes and many other.







HAMMOND  
MANUFACTURING®



1457 IP65



1593



1555 flanged IP67



1590 STOMP



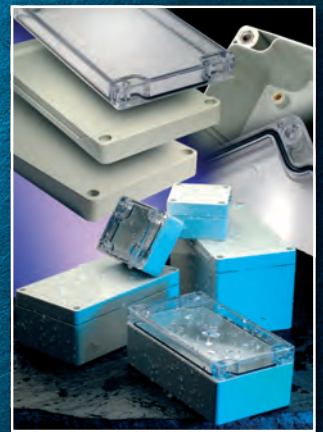
1553



1550Z / 1590Z IP66



1550 / 1590



1554 / 1555 IP66



1591 / 1591XX



Ritec



1455



1551

Standard and modified aluminium, metal and plastic enclosures

[www.hammondmfg.com](http://www.hammondmfg.com)

For more details contact your authorised distributor SOS electronic europe.





HAMMOND Manufacturing was founded in 1917 in Guelph/ Canada. During the late 1920's Hammond focused its efforts on the manufacturing of transformers for the broadcast and communications industries. From 1950's Hammond became a leading supplier of transformers and enclosures for the electrical and electronic industries.

**Společnost HAMMOND Manufacturing** byla založena v roce 1917 v městě Guelph v Kanadě. Předmět své činnosti zaměřila na výrobu transformátorů pro vysílání a komunikační technologie. Od roku 1950 se stal Hammond předním dodavatelem transformátorů a krabiček pro elektrická a elektronická zařízení.

**Das Unternehmen HAMMOND Manufacturing** wurde 1917 in der Stadt Guelph in Kanada gegründet. Den Schwerpunkt seiner Tätigkeit legte es auf die Produktion von Sendetransformatoren und Kommunikationstechnologien. Seit 1950 wurde Hammond zum führenden Lieferanten von Transformatoren und Gehäusen für elektrische und elektronische Geräte.

**A HAMMOND Manufacturing** 1917-ben alakult meg a kanadai Guelph-ben. Az 1920-as évek második felében transzformátorok gyártására fókuszálta erejét, melyeket jeladóknak és a kommunikációs iparban hasznosítottak. Az 1950-es évektől a Hammond vezető transzformátor és műszerdoboz gyártóvá lépett elő az elektromos ipar és elektronika területén.

**HAMMOND Manufacturing** założony został w roku 1917 w Guelph / Kanada. Pod koniec lat 20-tych ubiegłego stulecia Hammond koncentrował swój wysiłek na produkcji transformatorów dla przemysłu nadawczego i komunikacyjnego. Od lat 50-tych, Hammond stał się wiodącym dostawcą transformatorów oraz obudowań dla przemysłu elektrycznego i elektronicznego.

**HAMMOND Manufacturing** este o societate înființată în 1917 în Guelph/ Canada. La sfârșitul anilor 1920, Hammond și-a canalizat eforturile asupra producției de transformatoare pentru industriile de radiodifuzare și comunicații. Din anii 1950, Hammond a devenit un furnizor important de transformatoare și carcase pentru industriile de echipamente electrice și electronice.

**Spoločnosť HAMMOND Manufacturing** bola založená v roku 1917 v meste Guelph v Kanade. Predmet svojej činnosti zamereli na výrobu transformátorov pre vysielanie a komunikačné technológie. Od roku 1950 sa stal Hammond vedúcim dodávateľom transformátorov a krabičiek pre elektrické a elektronické zariadenia.

Today, Hammond Manufacturing with over 500 employees is a global company with customers worldwide. Hammond combines high performance manufacturing equipment and continuous improvement management techniques to enhance their reputation for quality. Operating from facilities in Canada, USA and Europe, Hammond offers a broad range of standard products, modification services and technical support.

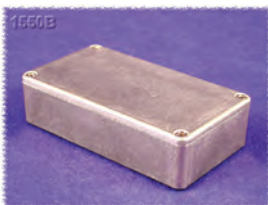
Hammond enclosures feature a very precise design and look, made of high quality materials. Detailed datasheets, 3D views and CAD drawings are available to all enclosures. Hammond offers a custom modification of enclosures, for example milling, drilling, painting and labeling.

### Why HAMMOND?

- long-term experience
- very good mechanical properties
- precise machining
- professional look
- possibility of custom modification

### Diecast Aluminum

**1550, 1590 Series**  
Diecast Aluminum

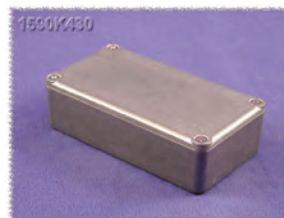


**1590 Series**  
Painted "Stomp Box" - Diecast Aluminum



### Zinc Diecast

**1590K Zinc Series**  
Zinc Diecast



**1590TRP, STP Series**  
Diecast Aluminum - Octagon & Trapezoid



**1590F, FL Series**  
Flanged Lid - FL Series  
With Bottom Flange - F Series



### Watertight Diecast Aluminum

**1550W Series**  
Watertight - (Light Duty) Diecast Aluminum



**1590Z Series**  
Watertight - (Heavy Duty) Diecast Aluminum



**1590 Series**  
Diecast Aluminum With PCB Ribs



**Eddystone Series)**  
Diecast Aluminum



**1590W Series**  
Watertight - (Light Duty) Diecast Aluminum



### Watertight Diecast Aluminum (continued)

#### 1590W-FL Series

Watertight - (Light Duty)  
Diecast Aluminum (Flanged Lid)



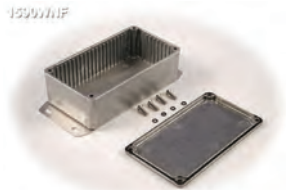
#### 1590W-F Series

Diecast Aluminum (With Bottom  
Flange)



#### 1590W "F" Series

Diecast Aluminum (With Bottom  
Flange) and PCB Ribs



#### 1590Z Series

Watertight - (Heavy Duty)  
Diecast Aluminum



### Plastic

#### 1551 Series

Black Plastic



#### 1551 "TBU" Series

Translucent Blue Plastic



#### 1551 FL Series

Miniature Flanged Lid



#### 1553 Series

Soft Sided ABS Plastic



#### 1553 Series

Soft Sided ABS Plastic, Added  
Colors



#### 1554 Series

Watertight - Flat Lid  
ABS Plastic and Polycarbonate



#### 1554 "2CL" Series

Watertight - Polycarbonate  
Flat CLEAR Lid



#### 1554 "2SL" Series

Watertight - Polycarbonate  
Flat SMOKED Lid



#### 1555 Series

Watertight - Styled Lid  
ABS Plastic and Polycarbonate



#### 1555 "F" Series

Wallmount - Flanged Lid  
Outdoor & Heavy Industrial - wa-  
tertight - plastic enclosures



#### 1590ZGRP Series

Watertight, Glass Reinforced  
Polyester, Heavy Duty, Thick Wall



#### 1591XX Series

Multipurpose  
Flame Retardant ABS



#### 1591XX "TBU" Series

Multipurpose - Translucent Blue  
ABS Plastic



#### 1591XX FL Series

Multipurpose with flanged lid  
Flame Retardant ABS



#### 1591 "T" Series

Multipurpose with card guides:  
Ice Blue, Crystal Clear & IR Red  
Translucent Polycarbonate



#### 1591 Series

Multipurpose with card guides:  
Flame Retardant ABS



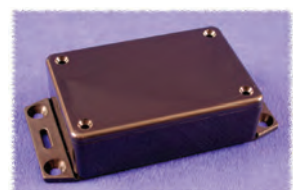
#### 1591FL Series

Multipurpose with card guides  
and flanged lid:  
Flame Retardant ABS



#### 1591 "F2" Series

Multipurpose with card guides  
and bottom flange:  
Flame Retardant ABS





### 1592 Series

Hand Held "T" Display  
Flame Retardant ABS



### 1593 Series

Hand Held/Instrument



### 1593 Series

Translucent Blue ABS Plastic



### 1594 Series

Heavy Duty (Thick Wall):  
Flame Retardant ABS



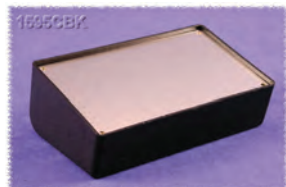
### 1594 "W" Series

Watertight Version  
Flame Retardant ABS



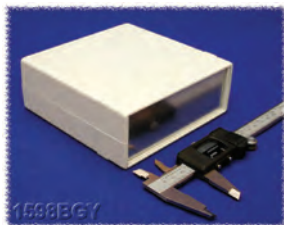
### 1595 Series

Sloping Console,  
Flame Retardant ABS  
With Aluminum Panel



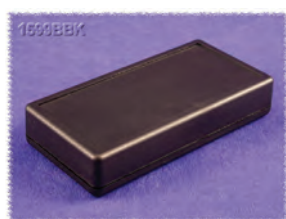
### 1598 Series

Instrument:  
Flame Retardant ABS  
Aluminum or Plastic End Panels



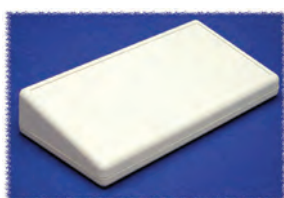
### 1599 Series

Hand Held:  
Flame Retardant ABS

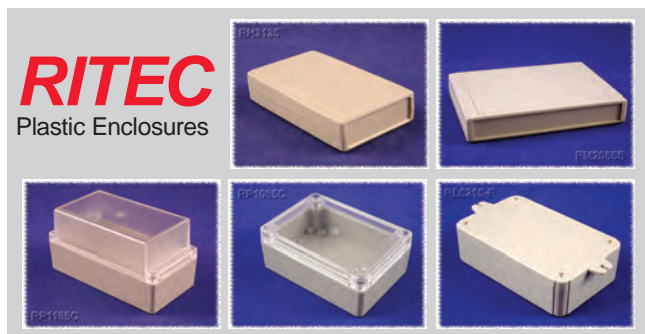


### 1599 T Series

Sloping Consoles:  
Flame Retardant ABS



## Hammond - Ritec Enclosures



## EMI/RFI Plastic

### 1594RFI Series

RFI Shielded - Thick Wall  
Conductive Plastic



### 1599RFI Series

RFI Shielded - Hand Held  
Conductive Plastic



## EMI/RFI Plastic - Coated (Internally)

### 1591R Series

RFI Shield Coating  
Flame Retardant ABS  
Multipurpose with card guides



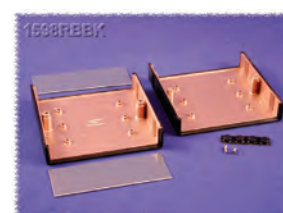
### 1594R Series

RFI Shield Coating  
Flame Retardant ABS  
Thick Wall



### 1598R Series

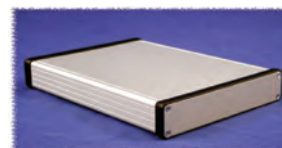
Instrument - with RFI/EMI Shielded Coating  
Flame Retardant ABS (Aluminum End Panels)



## Extruded Aluminum

### 1455 Series

Extruded Aluminum Instrument  
Metal and plastic End Panels



### 1455NC Series

Extruded Aluminum Instrument  
Channel Mount



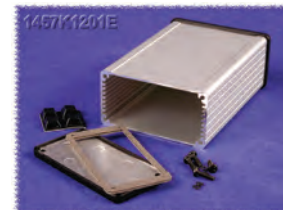
### 1457 Series

Watertight - Extruded Aluminum  
Instrument  
Diecast Metal End Panels



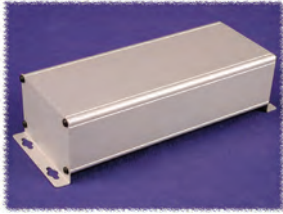
### 1457 "E" Series

EMI/RFI - Extruded Aluminum  
Instrument  
Diecast Metal End Panels



### 1455ZT Series

Wallmount - Extruded Aluminum Instrument



## General Purpose Metal

### RM\_U Series

Rack Mountable Instrument  
Extruded Aluminum



### RM\_U 08 Series

Half-Width - Rack Mountable Instrument  
Extruded Aluminum



### RMCS & RMCV Series

Rack Mountable Instrument



### 1401 Series

Aluminum Instrument



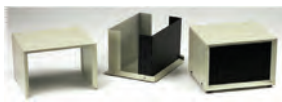
### 1402 Series

Aluminum Instrument



### 1426 Series

Aluminum Instrument



### 1452 Series

Aluminum/Steel Instrument



### 1453 Series

Aluminum/Steel Instrument



### 1454 Series

Steel Instrument



### 1458 Series

Steel Instrument



### 511-513 Series

Steel Instrument  
Ventilated



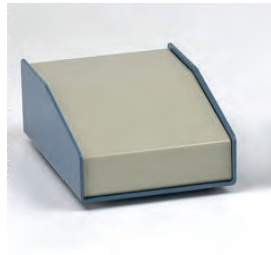
### 516 Series

Transformer Enclosure  
Ventilated



### 1456 & SCEM Series

Sloped Console, Aluminum



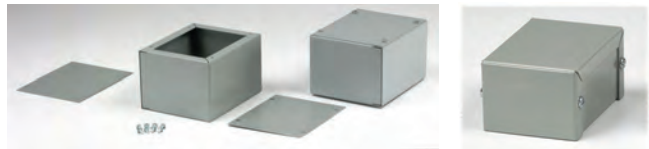
### 500, 515 & 519 Series

Sloped Console  
Steel & Aluminum



### 1411, 1412 & 1415 Series

Aluminum & Steel Utility



### HWCHAS Series

Walnut Chassis - with Aluminum  
Panels



### 1441 CWW & 1431 Series

1444 CWW & 1434 Series  
Steel Chassis - with Walnut Side Panels



### 1441 & 1431 Series

1444 & 1434 Series  
Steel Chassis







TEKO founded in 1957, is Italy based company producing high quality enclosures for electronic devices. Teko designs have been recognized for their consistent quality. Teko has been supplying enclosures for years to market-leading companies from many industry segments.

**TEKO** je italská společnost založena v roce 1957. Vyrábí vysoce kvalitní krabičky pro elektronická zařízení. Teko krabičky se vyznačují stabilní kvalitou. Teko dodává krabičky dlouhodobě mnoha předním společnostem z různých průmyslových odvětví.

**TEKO** ist ein italienisches Unternehmen, das 1957 gegründet wurde. Es produziert qualitativ hochwertige Gehäuse für Elektrogeräte. Teko Gehäuse zeichnen sich durch stabile Qualität aus. Seit Jahren beliefert Teko zahlreiche führende Unternehmen aus vielen Industriezweigen.

A **TEKO** 1957-ben alapított olasz cég. Jó minőségű műszerdobozokat készít elektronikai berendezésekhez. Műszerdobozai kitűnnek tartós, jó minőségükkel. Hosszú évek óta szállít műszerdobozokat számos vezető gyártónak az ipar minden területén.

**TEKO**, to włoska spółka założona w roku 1957. Produkuje wysokiej jakości pudełka i obudowy dla urządzeń elektronicznych. Pudełka Teko cechuje stabilna jakość. Teko zaopatruje obudowy od wielu lat wiodących na rynku firmy z wielu segmentów przemysłowych.

**TEKO** fondată în 1957, este o companie cu sediul în Italia, produce carcase de înaltă calitate pentru dispozitive electronice. Modelele Teko au fost recunoscute pentru calitatea lor consecventă. Teko furnizează carcase de mult ani companiilor care sunt lider de piață din multe segmente industriale.

**TEKO** je talianska spoločnosť založená v roku 1957. Vyrába vysoko kvalitné krabičky pre elektronické zariadenia. Teko krabičky sa vyznačujú stabilnou kvalitou. Teko dlhodobo dodáva krabičky mnohým popredným spoločnostiam z mnohých priemyselných odvetví.

Teko is a reliable partner with a comprehensive stocking and fast off-the-shelf deliveries. Teko also provides a strong technical support, deploying its extensive know-how.

### Why TEKO?

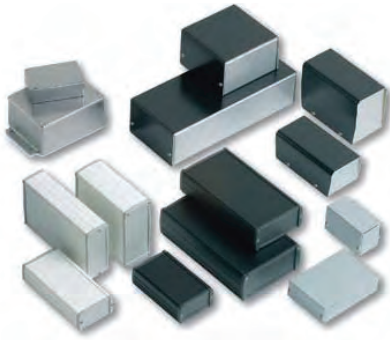
- specialized company with a big know-how
- wide portfolio of quality enclosures
- very good price/performance ratio
- custom modifications possible





### Product Groups

Aluminium



Front Panel



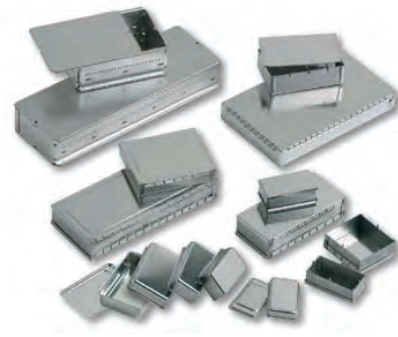
Pult



Top Cover



RF



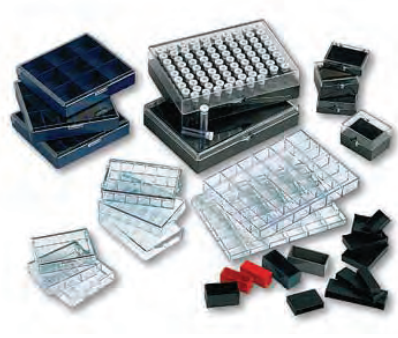
Hand Held



Pocket



Potting Storage



Telebox



Keyboard



Strumentalia



Accessories





NEW AGE ENCLOSURES was established in 2003 as a division of Alltec Integrated. Manufacturing, Inc. specializing in making standard plastic electronic enclosures. The parent company Alltec has over 34 years of professional experience in the custom injection molding industry.

**CZ** NEW AGE ENCLOSURES byla založena v roce 2003 jako divize Alltec Integrated Manufacturing, Inc., specializuje se na výrobu standardizovaných plastových krabiček pro elektronická zařízení. Mateřská společnost Alltec má více než třicetileté zkušenosti v oblasti zákaznického vstříkování plastů.

**DE** NEW AGE ENCLOSURES wurde 2003, als Geschäftsbereich von Alltec Integrated Manufacturing, Inc., gegründet. Es spezialisiert sich auf die Produktion von standardisierten Kunststoffgehäusen für elektronische Geräte. Die Muttergesellschaft, Alltec, verfügt über mehr als 34-jährige Erfahrungen im Bereich kundenspezifischer Spritzguss.

**HU** A NEW AGE ENCLOSURES-t 2003-ban alapítottak, mint az Alltec Integrated Manufacturing, Inc. hagyományos műanyag műszerdobozok gyártására szakosodott részlegét. Az Alltec anyacég több mint 34 éves szakmai tapasztalattal rendelkezik a fröccsöntő iparban.

**PL** Spółka NEW AGE ENCLOSURES została założona w roku 2003 jako oddział firmy Alltec Integrated Manufacturing, Inc., specjalizuje się w produkcji standardowych obudowań plastikowych. Spółka matka - Alltec - posiada ponad 34-letnie doświadczenia w przemyśle formowania wtryskowego.

**RO** NEW AGE ENCLOSURES este o societate înființată în 2003 ca o divizie a Alltec Integrated Manufacturing, Inc. specializată în fabricarea de carcase electronice standard din plastic. Compania mamă Alltec are peste 34 de ani de experiență profesională în industria de matrițe de injecție personalizate.

**SK** NEW AGE ENCLOSURES bola založená v roku 2003 ako divízia Alltec Integrated Manufacturing, Inc. a špecializuje sa na výrobu štandardizovaných plastových krabičiek pre elektronické zariadenia. Materská spoločnosť Alltec má viac ako 34 - ročné skúsenosti v oblasti zákaznického vstrekovania plastov.

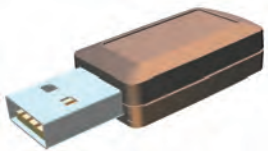
Shared manufacturing facility and warehouse is located in San Luis Obispo, in California. For decades, for hundreds of customers, Alltec and now New Age have provided engineering products and services with outstanding customer service. As an employee owned corporation, it simply has a higher level of commitment. In production line we can find wide portfolio of electronic enclosures, accessories and instrument cases.

### Why NEW AGE Enclosures?

- big experience in enclosures production
- top quality products
- detailed datasheets, 3D models and CAD drawings
- possibility of custom modification
- time saving solutions

### The Range of Plastic Electronic Enclosures by NEW AGE:

USB Enclosures



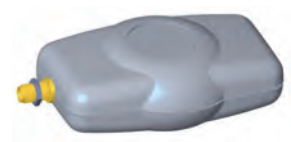
Dongle Devices



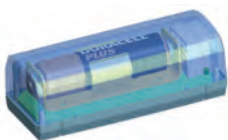
Battery Compartments



Specialty Enclosures



Handheld Instruments



Utility Cases



Wall Mount



Water Resistant



Upcoming Designs



Accessories



#### Customization options include:

- Color - They'll match any Pantone color
- Accessories - Bumper feet, custom screws, battery clips, etc.
- Printing - Add your own graphics, they pad print in-house
- Shielding - Custom conductive material or conductive paint
- Materials - They can help to select the right material for the job
- CNC - Full CNC machining capabilities
- OEM Tool Inserts - reduce costs for large volumes





PHOENIX CONTACT, with headquarter in Blomberg/ Germany, founded in 1923, is a leading manufacturer of electric connection and industrial automation technology. 11,000 employees, 47 own sales companies and 30 sales partner worldwide ensure customer proximity.

**CZ** PHOENIX CONTACT, se sídlem ve městě Blomberg v Německu, byl založen v roce 1923 a je předním výrobcem technologií pro elektrické spoje a průmyslovou automatizaci. 11.000 zaměstnanců, 47 vlastních obchodních společností a 30 obchodních zástupců po celém světě zajišťuje rychlou dostupnost zákazníkům.

**DE** PHOENIX CONTACT mit Sitz in Blomberg/Deutschland wurde 1923 gegründet und ist ein führender Hersteller elektrischer Verbindungstechnik und industrieller Automatisierungstechnik. 11 000 Mitarbeiter, 47 eigene Vertriebsgesellschaften und 30 weltweite Vertriebspartner sichern die Qualität und die Kundennähe des Unternehmens.

**HU** A PHOENIX CONTACT a németországban található székhelyével 1923-ban alakult és az elektromos összeköttetések és ipari automatizációs technológiák egyik vezető gyártója lett. 11000 alkalmazottal, 47 saját forgalmazó cégével és 30 partnerével biztosítja világszerte ügyfeleinek termékeit.

**PL** PHOENIX CONTACT, z siedzibą w Blomberg w Niemczech, został założony w roku 1923 i jest obecnie produkującym producentem technologii połączeń elektrycznych oraz automatyki przemysłowej. 11 000 pracowników, 47 własnych spółek handlowych oraz 30 przedstawicieli handlowych na całym świecie zapewnia szybką dostępność dla Klientów.

**RO** PHOENIX CONTACT, cu sediul în Blomberg/ Germania, fondată în 1923, este un producător de marcă de tehnologii de conectare electrică și automatizare industrială. 11.000 de angajați, 47 agenții proprii de vânzări și 30 de parteneri de vânzări în întreaga lume asigură apropierea de clienți.

**SK** PHOENIX CONTACT, so sídlom v Blomberg v Nemecku, bol založený v roku 1923 a je popredným výrobcem technológií pre elektrických spoje a priemyselnú automatizáciu. 11.000 zamestnancov, 47 vlastných obchodných spoločností a 30 obchodných zástupcov po celom svete zabezpečuje rýchlu dostupnosť zákazníkom.

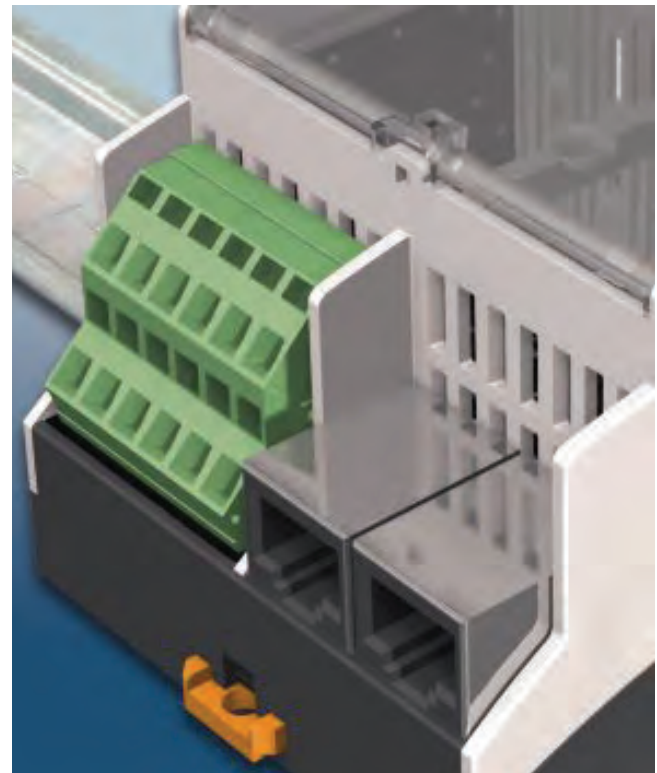
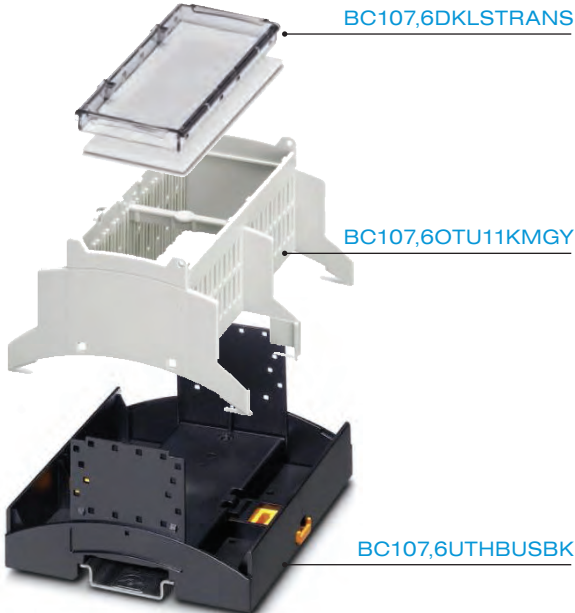
Phoenix Contact operates on the market in five business sectors: industrial connection technology, device connection method, power and signal quality, and signal conditioning (interfaces). Phoenix Contact products are in many sectors an industrial standard.

In the device connection sector, we can find many top quality enclosures. These DIN-rail enclosures feature also a big variability and a possibility to use a common bus.

### Why PHOENIX CONTACT?

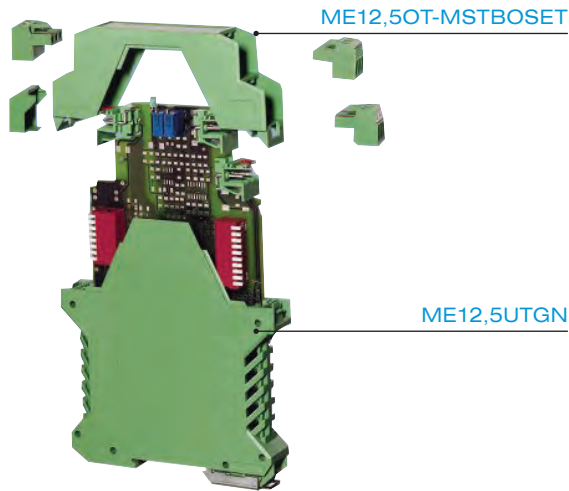
- global company with many subsidiaries and extensive customer support
- top quality products known as industrial standard
- wide versatility and variability

### BC Series

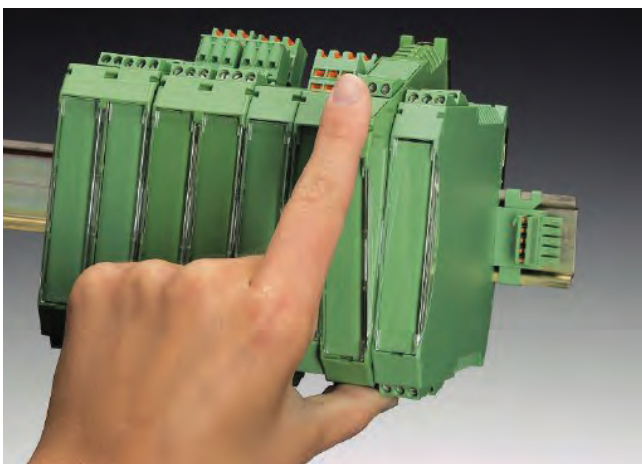
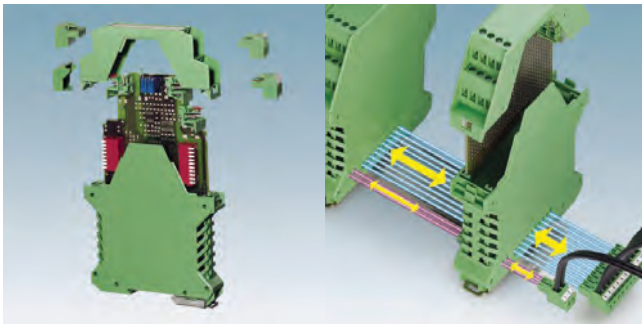




### ME Series



- top quality
- modularity and variability
- possibility to use an interconnection bus
- made of UL94-V0 class materials



### Accessories

HBUS35,6-16P-2SBK



HBUS107,6-16P-1SBK



BL2-2,54/16-ST



MKDSO1,5/4



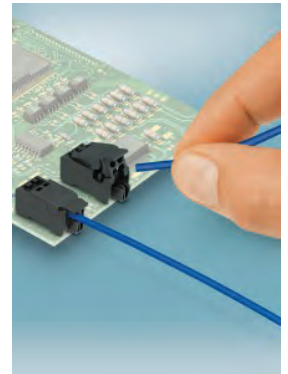
#### PTQ

##### Solderable Mini PCB Terminal Block with QUICKON IDC Fast Connection

The two-position PTQ mini PCB terminal block with an overall height of only 8 mm was specially developed for use in THR soldering processes. The tape on reel packaged PTQ is suitable for fully automated assembly processes, enabling a time saving and increased production efficiency.

Tool-free conductor connection takes place in pairs using insulation displacement: insert conductor without tripping, push down the actuation lever - finished!

- Current: up to 4 A
- Voltage: up to 160 V
- Connection cross section: solid/stranded 0.14 - 0.34 mm<sup>2</sup> / AWG 26-22
- Pitch: 2.5 mm
- Height: 8 mm



#### PTSM

##### Miniature spring connector

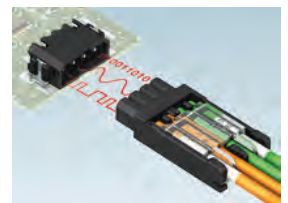
- Current up to 6 A
- Voltage up to 160 V
- 0.14/0.2 - 0.75 mm<sup>2</sup> (24 - 20 AWG) solid/stranded connection cross-section
- 2.5 mm pitch
- THR and SMD base strips
- Base strips are taped
- Horizontal and vertical versions for optimum conductor connection
- Spring direct plug-in method



#### PTPM

##### Miniature pierce connector

- Current up to 4 A
- Voltage up to 125V
- 0.14 - 0.34 mm<sup>2</sup> (26 - 20 AWG) stranded connection cross-section
- 2.5 mm pitch
- THR and SMD base strips
- Base strips are taped
- Horizontal and vertical versions for optimum conductor connection
- No pretreatment of conductors with pierce connection method





ETTINGER, founded in 1964/ Germany, specializes on electromechanical components. In Ettinger portfolio you can find a wide range of mechanical and electromechanical components necessary for construction, assembly and finalization of devices.

**ETTINGER**, založen v r. 1964/Německo, se specializuje na elektromechanické komponenty. V portfoliu Ettinger můžete najít širokou škálu mechanických a elektromechanických komponentů, potřebných pro konstrukci, výrobu a finalizaci zařízení.

**ETTINGER**, gegründet im Jahr 1964/ Deutschland, spezialisiert sich auf elektromechanische Bauteile. Im Ettinger-Portfolio finden Sie eine Vielzahl von mechanischen und elektromechanischen Bauelementen für die Konstruktion, Produktion und Fertigstellung von Geräten.

Az 1964-ben Németországban alapított ETTINGER cég elektromechanikus alkatrészekre szakosodott. Kínálatában megtalálható a mechanikus és elektromechanikus alkatrészek széles választéka, melyek elengedhetetlenül fontosak a készülékek megépítéséhez és összeszereléséhez.

**ETTINGER** założony w r. 1964/Niemcy, specjalizuje się na komponenty elektromechaniczne. W portfolio Ettinger znaleźć można szeroką skalę części mechanicznych i elektromechanicznych, potrzebnych do konstrukcji, produkcji oraz finalizacji urządzeń.

**ETTINGER**, înființată în anul 1964 în Germania, este o companie specializată în componente electromecanice. În portofoliul Ettinger puteți găsi o gamă variată de componente mecanice și electromecanice necesare pentru construcții, asamblări și finalizarea dispozitivelor.

**ETTINGER** založený v r. 1964/Nemecko, sa špecializuje na elektromechanické komponenty. V portfólu Ettinger môžete nájsť širokú škálu mechanických a elektromechanických komponentov potrebných pre konštrukciu, výrobu a finalizáciu zariadení.

You can use Ettinger components in virtually any device. Ettinger delivers about 27000 various components like battery contacts, bushings, cable clips and holders, connectors, enclosures, fuses and holders, knobs, labels, screws and nuts, standoffs, spacers, washers, power inlets, rubber feet, terminals and many other.

## Why ETTINGER?

- wide portfolio of quality components
- quick stable deliveries
- about 27000 stock products

## Electronic components with precise distance

- Batterie, Contacts
- Battery & Coincell-Holders
- Bushings
- Cable & Fiber Management
- Cable Clamps
- Cable Clips
- Cable Ties & Holder
- Caps
- Captive Fasteners
- Card Guides / Ejectors
- Ceramic + Strip Terminals
- Circuit Board Supports
- Component Mounts
- Connec. Blade Typ, D-Sub/DC
- Connector Signal IP68/Koax
- Connectors IDC + Standart
- Connectors-Sealed
- Continuous Grommet Strip
- Enclosure-Plug/Handheld
- Enclosures Hammond
- Enclosures Instrument
- End-Sleeves
- Eyelets-Rivets
- Fan-Guards+Accessories
- Ferrite - EMI Shielding
- Fuse Holder
- Fuses
- Handles
- Hardware / Brackets / Sets
- Harness Wrap/Shrinkable
- Knobs/Accessories
- Labels
- LED Systems / Assemblies
- LED-Assemblies
- LED-Spezial Parts
- LED-Standard, Mounts, Spacers
- Light Pipe
- Machine-Screws DIN / UNC
- Mains Filters
- Momentary Switches
- Mounting Material Plastic
- Nuts - DIN
- Nuts, Well-Nut, specials
- Power Inlets IEC
- Power/Patchcords/Plugs
- Quick-Fit Terminals
- Round Spacer
- Rubber Feet+Handles
- Screw Terminals
- Self Tapping Screws
- Shells / Filter
- Shock mount
- Solder Eyelets
- Solderless Terminals
- Solderless Terminals Female
- Solder-Terminals/Pins
- Special Parts / Electronic
- Special Parts / Screws, Nuts
- Standoffs
- Standoffs, Nylon
- Star-Ball Knops
- Straight-Thru Fittings
- Strain Reliefs
- Switches / Accs.
- Terminal Strips
- Terminal Strips / Shunts
- Thread Holder
- Washers




Equipment  
Switches & Buttons  
Relays  
Fuses  
Enclosures & Assembling Material  
Fans  
Heatsinks and Thermal Management





# ETTINGER





Fans are most often used in cases, when a passive-convictional cooling is not sufficient and it is necessary to use an active cooling.


 Ventilátory se nejčastěji využívají v případech, kdy nestačí pasivní - konvekční chlazení a je nutné použít aktivní chlazení.

 Lüfter werden am häufigsten in Fällen genutzt, wenn die passive - Konvektionskühlung nicht ausreicht und der Einsatz einer aktiven Kühlung notwendig ist.

 A ventilátorokat leggyakrabban azokban az esetekben alkalmazták, amikor a passzív - konvekciós hűtés nem elegendő, és aktív hűtést kell alkalmazni.

 Wentylatory najczęściej używane są w przypadkach, kiedy nie wystarcza chłodzenie pasywne - konwecyjne, i konieczne jest zastosowanie chłodzenia aktywnego.

 Ventilatoarele sunt de regulă utilizate atunci când sistemul de răcire pasiv - convecțional nu este suficient și se impune utilizarea unui sistem de răcire activ.

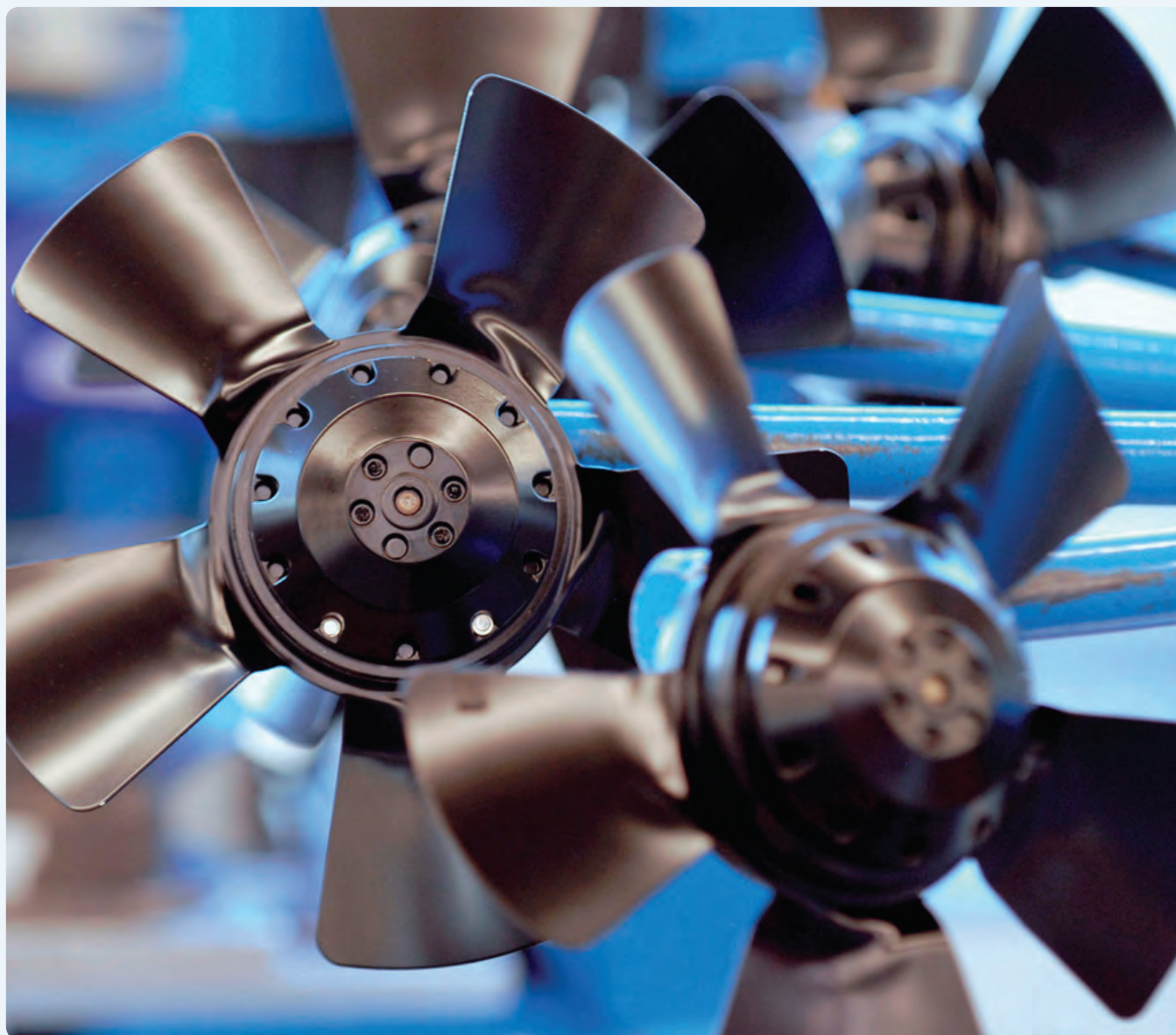
 Ventilátory sa najčastejšie používajú v prípadoch, kedy je už pasívne - konvekčné chladenie nedostatočné a je potrebné použiť aktívne chladenie.

Though passive cooling is usually preferred because of no moving parts are necessary in this case, active cooling by a cooler is far more powerful and provides extra protection in case of unexpected increase of ambient temperature. In this case air is bringing through the fan to the components which have to be cooled. Fans are often used in combination with a heatsink to increase the area of heated surface in contact with the air, thereby improving the efficiency of cooling. Also combined passive and active cooling is often used, where the appliance uses a heatsink sufficient to cool components during normal work and a small fan is switched-on only in the case of a short-time overheating (audio amplifiers for example).

## Classification:

We can divide fans to two main groups – AC and DC Fans. AC fans are usually designed for 110 or 230V and DC fans are most often for 5, 12 or 24V. Fans are constructed with various geometry of blades and various speed of rotation (RPM). Properties of a fan describe two main functional specifications: airflow that can be moved, typically stated in m<sup>3</sup>/h and static pressure. Higher air flow naturally means better cooling ability, but often also an increased acoustic noise generated.

Where noise is an issue larger, slower-turning fans are quieter than smaller, faster, fans that can move the same airflow. Fan noise has been found to be roughly proportional to the fifth power of fan speed; halving speed reduces noise by about 15dB. Fans have sleeve, ball, fluid or magnetic (Maglev) bearing. The type of bearing affects noise of the fan and its lifetime. Most often used are fans with the axial air flow, less frequent are with a crossflow (blowers) and centrifugal types.





Founded in 1980, Sunonwealth Electric Machine Industry Company has become a global leader in the fields of precision motors, mini fans, and thermal modules. SUNON's concentration for more than 30 years on the research and development of core motor technology enables it to release numerous patented products that set the pace for the industrial trend.

**Založen v r. 1980,** Sunonwealth Electric Machine Industry Company se stal globálnim lídrem na poli precizních motorů, mini ventilátorů a chladících modulů. Výsledkem více než třicetileté specializace společnosti SUNON na výzkum a vývoj technologie motorů je množství patentovaných produktů.

**Gegründet 1980,** wurde Sunonwealth Electric Machine Industry Company zum weltweit führenden Anbieter im Bereich Präzisionsmotoren, Mini-Ventilatoren und Kühlmodule. Die mehr als 30-jährige Spezialisierung des Unternehmens SUNON auf dem Gebiet der Forschung und Entwicklung von Motortechnologien ermöglichte ihm die Einführung mehrerer patentierter Produkte.

**Az 1980-ban megalapított** Sunonwealth Electric Machine Industry Company globális vezetővé vált a precíziós motorok, mini ventilátorok és hűtőegységek gyártásában. A SUNON több mint 30 éve specializálódott a motor technológia kutatására és fejlesztésére, ami számos szabadalmazott termék bevezetését tette lehetővé.

**Založony w r. 1980,** Sunonwealth Electric Machine Industry Company stał się globalnym liderem na polu silników precyzyjnych, mini wentylatorów i modułów chłodzących. Ponad 30-letnia specjalizacja spółki SUNON w badaniach i rozwoju technologii silników, umożliwiła jej wprowadzenie wielu produktów opatentowanych.

**Înființată în 1980,** societatea Sunonwealth Electric Machine Industry Company a devenit un lider global în producția de motoare de precizie, mini-ventilatoare și module termice. Atenția acordată de peste 30 ani cercetării și dezvoltării tehnologiei motoarelor îi permite companiei să producă numeroase produse brevetate care imprimă tendințe industriale inovatoare.

**Založený v r. 1980,** Sunonwealth Electric Machine Industry Company sa stal globálnym lídrom na poli precizných motorov, mini ventilátorov a chladiacich modulov. Vyše 30-ročná špecializácia spoločnosti SUNON na výskum a vývoj technológie motorov, jej umožnilo uvedenie viacerých patentovaných produktov.

Sunon's concentration for more than 30 years on the research and development of core motor technology enables it to release numerous patented products that set the pace for the industrial trend. These products include Maglev, the first magnetic levitation motor fan product in the world, Mighty Mini series, the smallest/thinnest fan products in the world, etc. Today Sunon has become the best thermal solution provider for clients across various industries, such as IT, automobile electronics, optical electronics, and network communication, claiming global shares of 26% and 19% respectively in the markets of projectors and notebook computers.

### Why SUNON?

- one of the leaders on the field of thermal solutions
- high quality and long lifetime of products
- very good price/performance ratio

### Did You Know?

The company's name in Chinese literally means "to set up standards", what is really reflected in many innovations and patents for SUNON products.

### SUNON Axial DC Fans



GM Series - SUNON's Green Motor has a lower power consumption and reduced internal temperature rise which enhances service life. To special order some versions are available to meet 70°C ambient operating temperature.

### EE, ME New Series



With the introduction of the MagLev technology, SUNON is offering the best optimised performance on the long-term, at the low noise level and attractive prices. SUNON now goes one step further with the introduction of the EE (ball and slide bearing) and ME (Vapo) series. These series are designed and engineered to maximise the air flow and the fan operating life time. Incorporating highly precise components and new impeller design, this series offers you the best compromise between quality and price.

### Axial AC Fans



Alveolate motor AC fan series with automatic motor wire wrapping technology ensures stable performance of high wind volume, low acoustic noise, also available with functions of dual spinning rate and thermal cutout.

### Fan Accessories



- Metal Finger Guards
- Plastic Finger Guards
- Filters



### Bearing Systems

#### Sleeve Bearings

When low cost is priority for an application, sleeve bearing fans are the right choice. SUNON uses sintered sleeve bearings with a special deep lubrication utilizing hydrodynamic effects. This guarantee a high operating period with minimum noise. The test series, even with high ambient temperatures, have confirmed an average life span of approx. 50 000 hours.

Sleeve bearing fans are ideally suited for vertically mounted positions, since the operating life expectancy in horizontally mounted positions can be distinctly reduced in comparison to specifications.

#### Ball Bearings

Ball bearings are ideal for use in portable devices with various mounting angles. However, caution should be used to prevent the product from falling and impact damaging the ball bearing, which could lead to noise and shortened product life-time.

Fans with ball bearing are available for high capacity requirements such as operating temperatures up to 70°C, specific installations and extended service intervals.

#### MagLev Operating Principle and VAPO Bearings

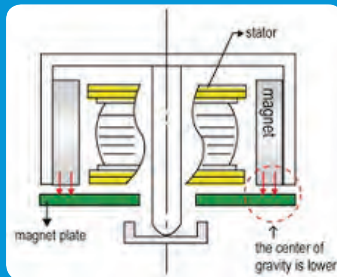
The patented MagLev design is based on magnetic principles and forces that not only propel the fan, but also ensure the stable rotation over its entire 360° movement. Utilizing the attraction of the magnetic levitation force, MagLev Motor Fans eliminate the problems of wobbling and shaking frequently seen on traditional motor fans. With this new technology, the impeller of MagLev Motor Fans is suspended in the air during rotation so that the shaft and the bearing do not come into direct contact with each other to create friction. The result is a new and improved fan with a low noise level, high temperature endurance, and long life

#### Comparison Between SUNON MagLev Fan and Traditional Fan

##### SUNON MagLev Fan

Possesses 3 important factors: the magnet plate, the magnet and the stator

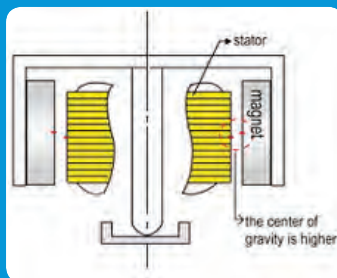
The resulting interaction between the magnet plate and the magnet pulls the rotor downward in a full 360°. Through the lower center of gravity, the rotor runs stably in a consistent orbit.



##### Traditional Fan

2 factors: the magnet and the stator

The conventional fan utilizes a deviating magnetic center to attract the rotor downwards. This kind of technology causes the rotor to vibrate violently due to both the lack of a consistent orbit and a deviation of the magnetic center.



### DC Fans

#### Structural Configuration DC Fans

Designed as electronically converting direct current motor with Vapo bearing, sintered sleeve bearing system, or precision ball bearing system with additional magnetic levitation force (MagLev), both the frame and impeller are made from filled PBT thermoplastic.

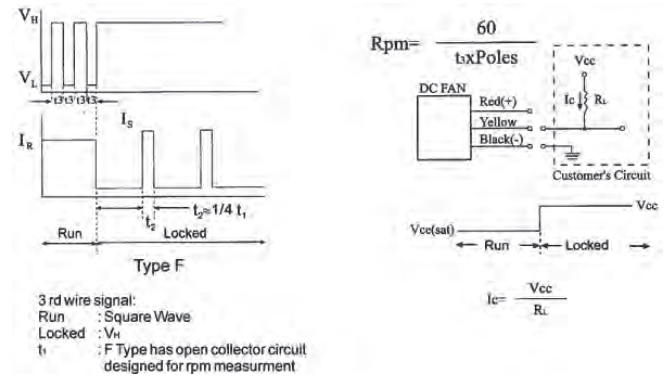
#### DC Fans with Motor Protection

SUNON DC fans from KDE series are also available with improved motor protection (KDE\_A). The motor protection is achieved through an IC developed by SUNON. In the event of failure, the motor is switched off for a short time.

The circuit prevents any further excessive heating up of the motor coils in the event of an error occurring. The motor protection is included in all DC fans with the code letter "A" in classification.

### DC Fans with Output Signal

All SUNON DC fans are available with the option of an output signal, which is transmitted out by a third connecting wire. The connection enables the fan to be monitored and controlled. Therefore, in the event of critical operating conditions, like a blocked fan wheel over the output signal, an alarm can be released. Usually the output is lined out through an open collector terminal of a transistor and must be further wired in the application via a resistor in order to receive, f.e. TTL levels. The logic levels are vary with the individual nominal voltages.



### SUNON DC Fans Marking

Example: KD 1208 PTS 1.13

Code	Feature	Description
KD	Series	KD=axial DC ventilator KDE=axial DC ventilator with VAPO bearing GM = GreenMotor (low power consumption)
12	Power supply	05=5VDC, 12=12VDC, 24=24VDC
08	Frame size	12=120mm, 09=92mm, 08=80mm, 06=60mm, 55=55mm, 05=52mm, 05=50mm, 45=45mm, 04=40mm, 35=35mm, 03=30mm, 02=25mm, 01=20mm, 17=17mm
P	Frame material	P=standard-termoplastic, V=Venturi
T	Frame depth	M=38mm, T=25mm, K=20mm, H=15mm, F=10mm, D=8mm, E=6mm
S	Bearing	S=Sleeve, B=Ball, V=VAPO (only KDE)
1	Speed	X=Super Air, 1=High, 2=Medium, 3=Low
13	Motor	Motor model

### AC Fans

#### AC Axial Fan

SUNON Axial AC Fan, equipped a shaded-pole motor, die-cast aluminum frame, and UL 94V-0 rated injection molded non-flammable thermoplastic impeller, is the most reliable AC Fan in the field. SUNON AC Fan is available in both life-lubricated ball bearing system and oil-impregnated sintered sleeve bearing system to meet the diverse needs of the market.

#### Alveolate System

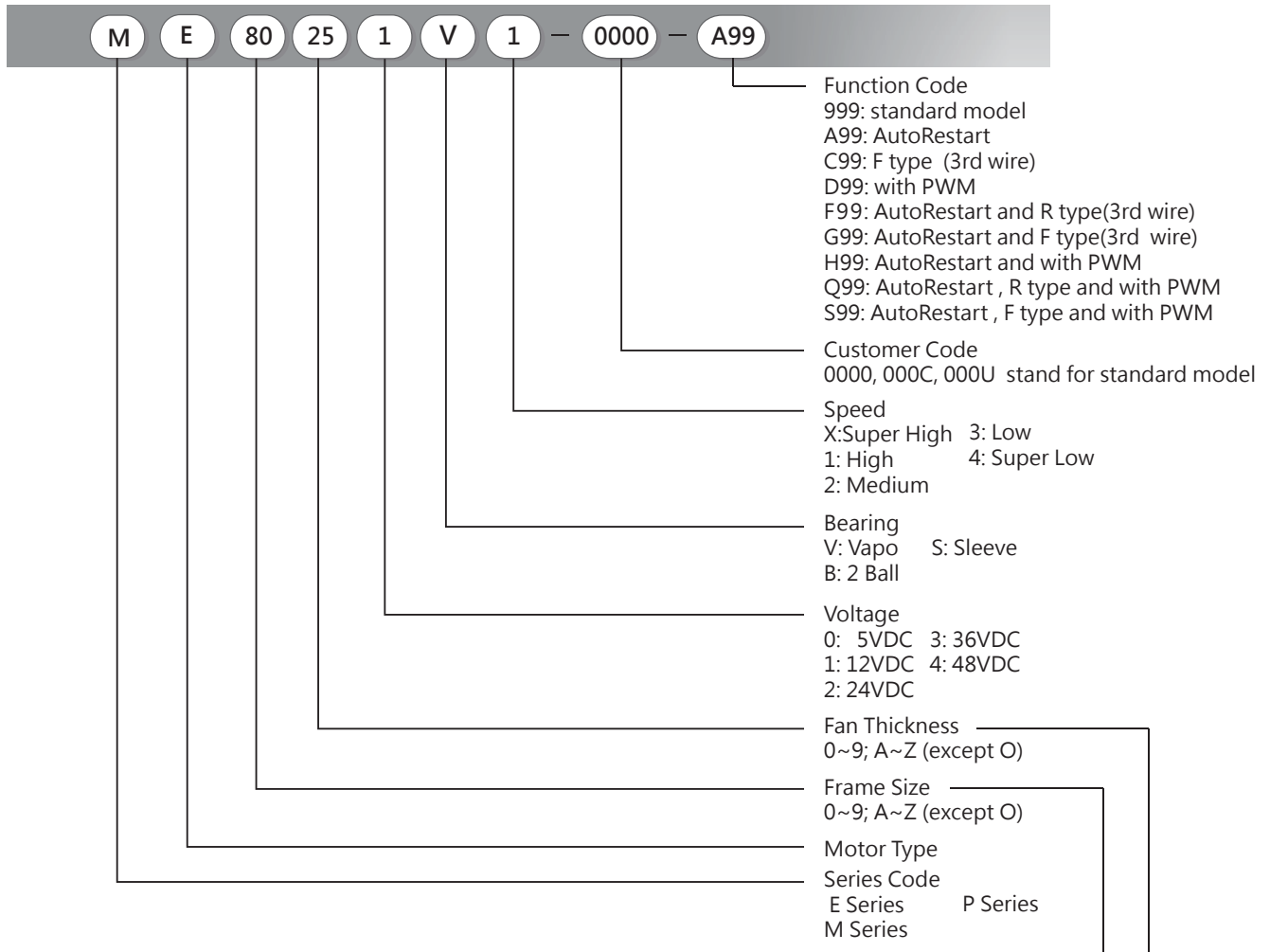
The AC Alveolate motor supplies a high air volume with a low noise level, a system of reducing the temperature and two-speed operation. Counter to traditional models, the SUNON AC coil motor has Alveolate-wire wrapping as well as a condenser start-up guaranteeing low-temperature operation. Moreover, thanks to the reduction in electrical power consumption, the temperature of cellular motor operation is low, producing little heat.

To ensure practical useful life and sound performance of the SUNON product, the AC Alveolate fan is offered with a designed "Thermal limit". When the coil temperature exceeds a limit of 110° C, the thermal limit ensures protection and safety by automatically cutting the electricity supply. This stops the fan rotating until the temperature returns to around 90°C, then the fan starts working again. Moreover, the fan blades are designed to operate silently and supply a high air flow with a low noise level. Responding to market demands, the SUNON AC Alveolate fan is fitted with a third wire, which allows customisation to personal.



### New Model Numbering System

example

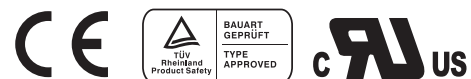


Code	Size(mm)	Code	Size(mm)	Code	Size(mm)	Code	Size(mm)
01~09	01~09	A0~A9	100~109	K0~K9	200~209	V0~V9	300~309
10~19	10~19	B0~B9	110~119	L0~L9	210~219	W0~W9	310~319
20~29	20~29	C0~C9	120~129	M0~M9	220~229	X0~X9	320~329
30~39	30~39	D0~D9	130~139	N0~N9	230~239	Y0~Y9	330~339
40~49	40~49	E0~E9	140~149	P0~P9	240~249	Z0~Z9	340~349
50~59	50~59	F0~F9	150~159	Q0~Q9	250~259		
60~69	60~69	G0~G9	160~169	R0~R9	260~269		
70~79	70~79	H0~H9	170~179	S0~S9	270~279		
80~89	80~89	I0~I9	180~189	T0~T9	280~289		
90~99	90~99	J0~J0	190~199	U0~U9	290~299		

### Certification



### Safety



### Model Numbering System

#### General AC Fan

example

**SF11580AT 1 08 2 H B L .GN**

MODEL SERIES

SFxxx

SPxxx

DPxxx

VOLTAGE

1 : 115 VAC

2 : 220 -240 VAC

FRAME SIZE

08 : 80 mm

09 : 92 mm

12 : 120 mm

FRAME THICKNESS

2 : 25 mm

3 : 38 mm

RoHS Compliance

TERMINALS

T : Terminal

L : Lead wire

BEARING SYSTEM

B : Ball

S : Sleeve

SPEED

X : Super

H : High

M : Middle

L : Low

#### New Type AC Fan

example

**A 1 17 5 - H B T**

MODEL SERIES

A : New AC fan series

AB : New AC blower series

MA : MagLev AC Fan series

VOLTAGE

1 : 115 VAC

3 : 380 VAC

2 : 220-240 VAC

FRAME SIZE

08 : 80 mm

17 : 172 mm

09 : 92 mm

25 : 254 mm

12 : 120 mm

FRAME THICKNESS

2 : 25 mm

7 : 72 mm

3 : 31~38mm

9 : 89~90mm

5 : 50~51 mm

TERMINALS

T : Terminal

L : Lead wire

BEARING SYSTEM

V : MagLev

S : Sleeve

B : Ball

SPEED

X : Super

H : High

M : Middle

L : Low

#### P/N

P/N Suffixes have the following significance :

T : Thermal Cutout

TC : Alveolate Motor with Thermal Cutout and Capacitor

TC.R : Round Frame , Alveolate Motor with Thermal Cutout and Capacitor

N : New frame

GN : RoHS compliance

\* Alveolate Motor only available in P/N : TC model



Founded in 1963 in Muldingen/ Germany, EBM-PAPST is a worldwide innovation leader in fans and motors with over 14500 different products. Top quality products set new industry standards in energy efficiency, minimum noise and long service life.

EBM-PAPST, založena v r. 1963 ve městě Muldingen / Německo, je celosvětovým lídrem ve vývoji ventilátorů a motorů s více než 14500 různými výrobky. Špičkové výrobky určují nové průmyslové standardy v účinnosti, minimální hlučnosti a dlouhé životnosti.

EBM-PAPST, gegründet 1963 in Muldingen / Deutschland, ist ein weltweit führendes Unternehmen in der Entwicklung von Ventilatoren und Motoren mit über 14 500 verschiedenen Produkten. Die Spitzenprodukte setzen neue Industriestandards bezüglich Wirkungsgrad, minimale Geräuschbelastung und Langlebigkeit.

Az EBM-Papst 1963-ban alapították a németországi Muldingen-ben. A világ egyik vezető ventilátor és motor gyártója, több mint 14500 különböző termékkel rendelkezik. Kiemelkedő termékei új ipari szabványokat teremtenek hatékonyságukkal, minimális zajszintjükkel és hosszú élettartamukkal.

EBM-PAPST, założona w r. 1963 w mieście Muldingen / Niemcy, jest ogólnosiwiatowym liderem w projektowaniu wentylatorów i silników, z ponad 14 500 różnymi produktami. Wyjątkowe produkty określają nowe standardy przemysłowe w wydajności, minimalizacji hałasu oraz długości okresu życia.

Înfiițata în 1963 în Muldingen / Germania, EBM-PAPST este lider mondial în producția de ventilatoare și motoare, oferind peste 14 500 de produse diferite. Producele de înaltă calitate stabilesc noi standarde industriale în ceea ce privește eficiența energiei electrice, nivelul zgomotului și durata îndelungată de viață.

EBM-PAPST, založená v r. 1963 v meste Muldingen / Nemecko, je celosvetovým lídrom vo vývoji ventilátorov a motorov, s vyše 14500 rôznymi výrobkami. Špičkové výrobky určujú nové priemyselné štandardy v účinnosti, minimálnej hlučnosti a dlhej životnosti.

EBM-Papst products find their use in ventilation technology, air-conditioning and refrigeration units, home and building, drive and rail technology, automotive industry, computers and office, heating, medicine and telecommunications. With over 10000 employees, EBM-Papst is a strong and reliable supplier of fan and motor technologies.

### Why EBM-PAPST?

- world market leader in fans and motors
- top quality products
- almost 50 years of experience

### Did You Know?

In 1965 EBM developed the first compact fan in EC technology, still referred to as non-commutator DC motors at the time.

### DC Axial Fans

#### Series 600F 60 x 60 x 15 mm

- DC fans with electronically commutated external rotor motor
- Fully integrated commutation electronics
- With electronic protection against reverse polarity. The fan only operates when the polarity is correct. Impedance-protected against locked rotor and overloading
- Type 612 FH with electronic protection against blocking
- Fan of fibreglass reinforced plastic. PBT housing, PA impeller
- Air exhaust over struts. Rotational direction CCW looking at rotor
- Electrical connection via 2 leads AWG 28, TR 64. Stripped and tinned ends



#### Series 3400 N 92 x 92 x 25 mm Series 8400 N 80 x 80 x 25 mm

- DC fans with electronically commutated external rotor motor
- Fully integrated commutation electronics
- With electronic protection against reverse polarity, locked rotor and overloading
- Partially impedance protected
- Fan of fibreglass reinforced plastic. PBTP housing, PA impeller
- Air exhaust over struts. Rotational direction CCW looking at rotor
- Optional Vario-Pro: Highly adaptable software configuration of the fan enables a tailor-made solution to the specific requirements of your applications
- Electrical connection via leads AWG 24, TR 64. Stripped and tinned ends



### AC Axial Fans


#### Series 4000 N 119 x 119 x 38 mm


- AC fans with external rotor shaded-pole motor. Impedance protected against overloading
- Metal fan housing and impeller
- Air intake over struts. Rotational direction CW looking at rotor
- Types 4890 N and 4840 N air exhaust over struts
- Electrical connection via 2 flat pins 3.0 x 0.5 mm
- Also available: Models with mounting bosses and single leads
- Fan housing with ground lug for screw M 4 and UNC








Components from this group serve to keep a working temperature of electronic components and devices in an appropriate range.


 Komponenty z této skupiny slouží k udržení pracovní teploty elektronických komponentů a zařízení v požadovaném rozsahu.

 Komponenten aus dieser Gruppe dienen dazu, die Betriebstemperatur von elektronischen Komponenten und Geräten im gewünschten Bereich zu halten.

 Ezen csoport alkatrészei az egyéb alkatrészek és készülékek működési hőmérsékletének megfelelő tartományban való tartására szolgálnak.

 Komponenty z tej grupy służą do utrzymania temperatury roboczej elementów oraz urządzeń elektronicznych w odpowiednim zakresie.

 Componentele din acest grup servesc la menținerea unei temperaturi de lucru a componentelor și dispozitivelor electronice într-un interval adecvat.

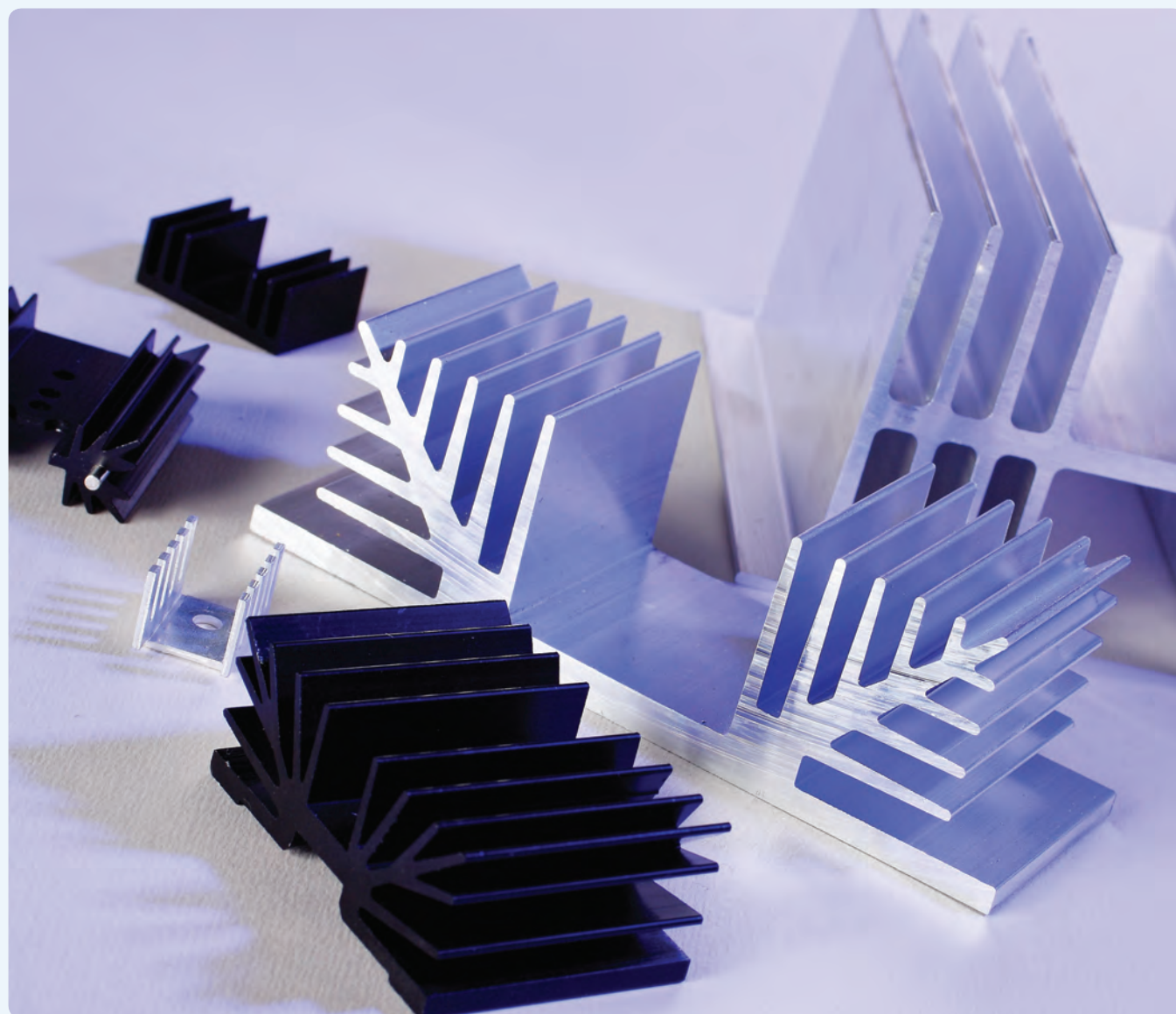
 Komponenty z tejto skupiny slúžia na udržanie pracovnej teploty elektronických komponentov a zariadení v požadovanom rozsahu.

Main role in this field have heatsinks and various profiles conducting heat away from components and transferring it to air or a liquid cooling medium. Heatsinks are often used also to ensure a better product reliability, to make a reserve for a case of extreme temperature conditions. For a better contact and heat transfer between a cooled component and a heatsink, is their surface often treated by a thin layer of a thermo-conductive material.

### Classification:

We can divide heatsinks into two main categories. First big group are small heatsinks intended for use directly with components in some of widely used packages like TO-220, TO-126, TO-3 and other. Second main group is created by heatsink profiles, which can be cut in various lengths, usually used to cool a set of components or a whole device. Most often used material is aluminium, because of its good thermal conductivity, light weight and also - in common conditions they are

corrosion-proof. Because aluminium has a low thermal emissivity, what decreases their efficiency to radiate heat, their surface is often black-anodized. Copper has even better thermo-conductive properties, but it is much more expensive, that's why copper profiles are usually used only for very demanding applications (processors for example) and at liquid cooling.





FISCHER ELEKTRONIK founded in 1969, located in Lüdenscheid/ Germany focuses on heatsinks, cases and connectors. In Fischer Elektronik portfolio we can find components for complete thermal management, various cases incl. 19" system and a wide range of connectors.

**CZ** FISCHER ELEKTRONIK založen v r. 1969, s centrálou v Lüdenscheid / Německo, se specializuje na chladiče, přístrojové krabičky a konektory. V portfoliu Fischer Elektronik můžeme najít kompletní sortiment pro chlazení, různé skříňky včetně 19" systémů a široké spektrum konektorů.

**DE** FISCHER ELEKTRONIK, gegründet 1969 mit Sitz in Lüdenscheid/Deutschland, spezialisiert sich auf Kühlkörper, Gehäuse für Geräte und Steckverbinder. Im Portfolio von Fischer Elektronik finden wir das komplette Kühlkörpersortiment, diverse Gehäuse inklusive das 19"-System und ein breites Spektrum von Steckverbindern.

**HU** A FISCHER ELEKTRONIK-ot 1969-ben alapítottak a németországi Lüdenscheiben. Hűtőbordákra, műszerdobozokra és csatlakozókra szakosodott. Kínálatában megtalálhatóak a hűtéstechnikai alkatrészek teljes választéka, különféle műszerdobozok, beleértve a 19" rack rendszert is, valamint a különféle csatlakozók.

**PL** FISCHER ELEKTRONIK założony w r. 1969, z centralą w Lüdenscheid / Niemcy, specjalizuje się w radiatorach, obudowach oraz konektorach. W ofercie Fischer Elektronik można znaleźć kompletny asortyment dla chłodzenia, różne pudelka łącznie z systemem 19" oraz szerokie spektrum konektorów.

**RO** FISCHER ELEKTRONIK, înființată în 1969 și având sediul în Lüdenscheid/Germania este o companie specializată în producția de radiatoare de căldură, carcase și conectori. În portofoliul Fischer Elektronik regăsim componente pentru un management termic complet, diverse carcase incluzând sistemul de 19 minute și o gamă vastă de conectori.

**SK** FISCHER ELEKTRONIK založený v r. 1969, s centrálou v Lüdenscheide/ Nemecko, sa špecializuje na chladiče, prístrojové krabičky a konektory. V portfóliu Fischer Elektronik môžeme nájsť kompletný sortiment pre chladenie, rozličné skrinky vrátane 19" systému a široké spektrum konektorov.

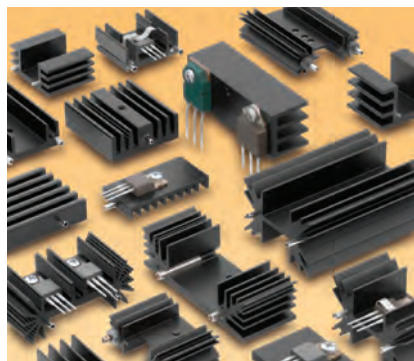
In a production range of Fischer Elektronik we can find heatsinks for all kinds of electronic components and LEDs, mounting material, thermal conductive material, 19" cases, shell and tube cases, connectors for PCB, LED-holders, jumper links, high precision contacts and many other.

Quality products with precise construction and finish, wide portfolio and possibility of custom modification belong to strengths of Fischer Elektronik.

### Why FISCHER ELEKTRONIK?

- quality products with precise construction and finish
- wide portfolio and possibility of custom modification

### Heatsinks



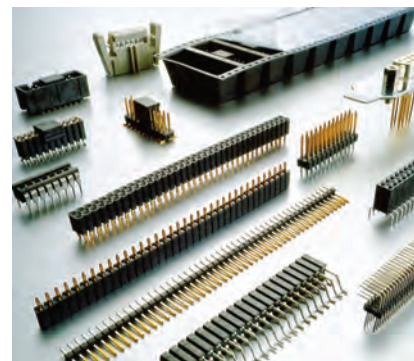
- Attachable heatsink
- Die-cast heatsinks
- Heatsinks for transistors in plastic case
- Fluid coolers
- Heatsinks for LEDs
- Clip-on heatsinks
- Fin coolers
- Miniature cooling aggregates
- Mounting material
- Pin heatsinks
- Approx. 550 standard extruded heatsinks
- Retaining springs for transistors
- Thermally conductive material

### Cases



- 19" subracks
- 19" plug-in chassis
- Insert modules for 19"
- EMC subracks 19"
- 19" front panels
- 19" plug-in box with cooling fins
- 19" plug-in boxes
- Miniature aluminium cases
- Design cases
- Combination cases
- Shell cases
- Part front panels
- Tube cases

### Connectors



- IDC-connectors
- Jumpers
- D-Sub hoods
- D-Sub connectors
- Direct female connector
- PCB connectors
- LED-holders
- PCB connectors
- Jumper links
- Printed circuit connector
- High-precision contacts, loose
- Schutzkragenstiftleisten
- Connector-sleeves

### FISCHER ELEKTRONIK Heatsinks Overview

SK 461 D 28	SK 441 D 28	SK 458 D 28	SK 440 D 28	SK 498 D 28	SK 497 D 28	SK 162 A 57	SK 161 A 57	SK 160 A 57
SK 159 A 57	SK 144 A 83	SK 157 A 54	SK 191 A 55		SK 56 A 53		SK 93 A 55	
SK 158 A 57	SK 102 A 50	SK 479 A 55		SK 501 A 53		SK 438 A 52	SK 82 A 75	
SK 418 A 57	SK 101 A 54		SK 127 A 75		SK 435 A 82	SK 520 A 50	SK 130 A 55	
SK 139 A 53	SK 66 A 54		SK 109 A 81	SK 110 A 81	SK 141 A 80	SK 154 A 46	SK 193 A 50	
SK 439 A 55		SK 416 A 47	SK 190 A 52		SK 199 A 51		SK 91 A 52	
SK 510 A 47	SK 15 A 77	SK 53 A 74	SK 90 A 48	SK 149 A 52		SK 168 A 51		SK 502 A 49
SK 33 A 43	SK 47 A 50		SK 568 A 54		SK 49 A 51		SK 83 A 79	SK 108 A 81
SK 155 A 46	SK 163 A 78	SK 507 A 41	SK 198 A 53		SK 446 A 53		SK 523 A 54	
SK 524 A 52		SK 530 A 56	SK 555 A 51		SK 531 A 56		SK 533 A 56	
SK 534 A 56		SK 535 A 56			SK 536 A 56		SK 557 A 50	



equipment  
 Switches & Buttons  
 Relays  
 Fuses  
 Enclosures & Assembling Material  
 Fans  
 Heatsinks and Thermal Management



### FISCHER ELEKTRONIK Heatsinks Overview

SK 537 A 56		SK 538 A 56		SK 539 A 56				
SK 540 A 56				SK 569 B 34	SK 570 B 34	SK 571 B 34	SK 572 B 34	
SK 57 A 64	SK 61 A 83	SK 86 A 75	SK 118 A 51			SK 466 A 44	SK 467 A 33	
SK 519 A 48	SK 412 A 47	SK 88 A 73	SK 98 A 65	SK 121 A 43	SK 411 A 43	SK 491 A 33	SK 503 A 47	SK 506 A 39
SK 43 A 69	SK 67 A 69	SK 119 A 47		SK 137 A 69	SK 148 A 68	SK 02 A 66	SK 42 A 49	
SK 71 A 64	SK 80 A 74		SK 85 A 46	SK 94 A 49		SK 113 A 49		SK 120 A 45
SK 136 A 48		SK 194 A 82	SK 404 A 65	SK 40 A 83	SK 89 A 77	SK 140 A 77	SK 463 A 44	SK 135 A 40
SK 58 A 45		SK 132 A 44		SK 133 A 45		SK 147 A 74	SK 197 A 65	SK 413 A 44
SK 415 A 90		SK 504 A 45		SK 30 A 67	SK 34 A 67	SK 06 A 80	SK 23 A 80	SK 556 A 77
SK 195 A 71	SK 408 A 41	SK 442 A 43	SK 464 A 40	SK 172 A 82	SK 176 A 78	SK 455 A 32	SK 92 A 42	SK 50 A 38
SK 166 A 49		SK 04 A 63	SK 20 A 68		SK 403 A 64	SK 410 A 45	SK 184 A 68	

< 1 K/W	1-1,5 K/W	1,5-2 K/W	2-2,5 K/W
2,5-3 K/W	3-4 K/W	4-5 K/W	> 5 K/W

### FISCHER ELEKTRONIK Heatsinks Overview


SK 417 A 46		SK 421 A 48		SK 429 A 37		SK 433 A 42		SK 401 A 63		SK 08 A 73		SK 39 A 67	
SK 74 A 71		SK 432 A 83		SK 453 A 32		SK 14 A 67		SK 46 A 79		SK 60 A 74		SK 84 A 68	
SK 79 A 73		SK 100 A 39		SK 111 A 82		SK 436 A 38		SK 450 A 34		SK 489 A 86		SK 419 A 70	
SK 187 A 76		SK 407 A 40		SK 97 A 62		SK 508 A 42		SK 134 A 28		SK 505 A 42		SK 72 A 63	
SK 11 A 79		SK 16 A 72		SK 44 A 90		SK 544 A 76		SK 73 A 64		SK 105 A 90			
SK 175 A 84		SK 402 A 62		SK 434 A 35		SK 445 A 34		SK 499 A 88		SK 05 A 62		SK 405 A 48	
SK 18 A 61		SK 189 A 31		SK 406 A 39		SK 487 A 88		SK 514 A 87		SK 484 A 108		SK 475 A 35	
SK 25 A 61		SK 28 A 63		SK 48 A 73		SK 52 A 74		SK 63 A 61		SK 81 A 41		SK 481 A 86	
SK 19 A 63		SK 518 A 92		SK 457 A 76		SK 165 A 60		SK 182 A 40		SK 185 A 73		SK 414 A 90	
SK 181 A 59		SK 69 A 71		SK 426 A 36		SK 65 A 70		SK 07 A 72		SK 32 A 76		SK 68 A 89	
SK 482 A 87		SK 51 A 60		SK 106 A 30		SK 424 A 33		SK 517 A 92		SK 112 A 89		SK 495 A 87	
												SK 55 A 84	
												SK 99 A 37	


< 1 K/W	1-1,5 K/W	1,5-2 K/W	2-2,5 K/W
2,5-3 K/W	3-4 K/W	4-5 K/W	> 5 K/W


equipment  
 Switches & Buttons  
 Relays  
 Fuses  
 Enclosures & Assembling Material  
 Fans  
 Heatsinks and Thermal Management





GAMA ALUMINIUM located in Žiar nad Hronom/ Slovakia focuses entirely on aluminium profiles processing. Company offers aluminium heatsinks, profiles and construction components. Company offers high quality heatsinks at a very affordable price.


 GAMA ALUMINIUM se nachází v Žiari nad Hronom na Slovensku a zaměřuje se převážně na zpracování hliníkových profilů. Firma nabízí hliníkové chladiče, profily a stavební komponenty za velmi příznivou cenu.

 GAMA ALUMINIUM befindet sich in Žiar nad Hronom in der Slowakei und spezialisiert sich vorwiegend auf die Verarbeitung von Aluminiumprofilen. Die Firma bietet Kühlkörper, Profile und Baukomponenten aus Aluminium zu einem sehr günstigen Preis.

 A GAMA ALUMINIUM a szlovákiai Garamszentkereszten található, és az alumínium profilok gyártására szakosodott. Termékei között alumínium hűtőbordákat, profilokat és építőalkatrészeket találunk. A cég kiváló minőségű hűtőbordákat kínál rendkívül kedvező áron.

 GAMA ALUMINIUM znajdująca się w Żiar nad Hronom / Słowacja, zajmuje się przetwarzaniem profili aluminiowych. Zakres produktów to radiatory aluminiowe, profile oraz komponenty konstrukcyjne. Spółka oferuje wysokiej jakości radiatory w bardzo dogodnych cenach.

 GAMA ALUMINIUM cu sediul în Žiar nad Hronom/ Slovacia este specializată exclusiv în procesarea de profile de aluminiu. Societatea oferă radiatoare de căldură, profile și componente de construcții. Societatea oferă radiatoare de căldură de înaltă calitate la un preț extrem de convenabil.

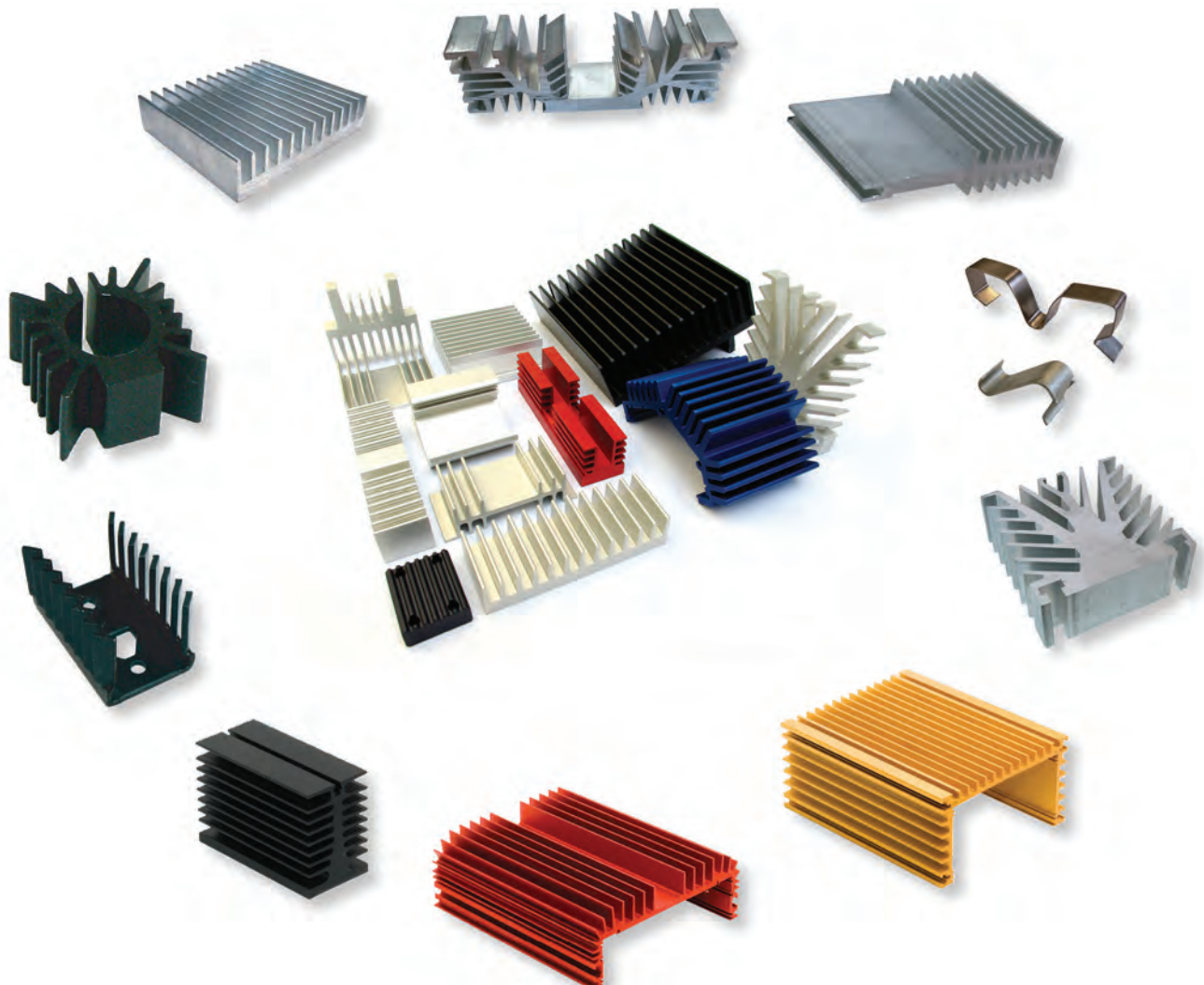
 GAMA ALUMINIUM sa nachádza v Žiari nad Hronom na Slovensku a sa zameriava na prevažne spracovanie hliníkových profilov. Firma ponúka hliníkové chladiče, profily a stavebné komponenty za veľmi priaznivú cenu.

GAMA Aluminium heatsinks range from miniature types for TO-220 and similar packaged components to relatively big heatsinks profiles suitable for high power applications. Company also offers custom modifications and surface treatment by anodizing in 4 colours (natural, black, red and blue).

- Over 130 standard types
- Heatsinks and heatsink profiles for semiconductors in various packages
- Heatsinks for LED lighting
- Custom designed profiles
- CNC drilling and machining

### Why GAMA ALUMINIUM?

- quality products with a very good price / value ratio
- wide portfolio, custom modification possible
- short delivery terms





# Passive Components

## Resistors and Resistor Networks 224



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Resistors can be found in almost every electronic device. Used as current limiters, components for setting operating conditions of semiconductors, voltage dividers, current sensors, in various filters and many other functions, in all these places we can find resistors in an innumerable amount of forms and versions.


 *Rezistory najde-  
me téměř v každém  
elektronickém zařízení.  
Jsou použity jako ome-  
zovače proudu, kom-  
ponenty pro nastavení  
pracovních podmínek  
polovodičů, napěťové  
děliče, proudové sen-  
zory, v různých filtrech  
a mnoha jiných aplika-  
cích, na všech těchto  
místech můžeme najít  
rezistory v bezpočtu fo-  
rem a verzí.*

 *Widerstände fin-  
den wir in nahezu je-  
dem elektronischen  
Gerät. Eingesetzt als  
Strombegrenzer, Kom-  
ponenten zum Einstel-  
len der Arbeitsbedin-  
gungen von Halbleit-  
tern, Spannungsteiler,  
Stromsensoren, in di-  
versen Filtern und zahl-  
reichen anderen Funk-  
tionen – überall hier fin-  
den wir Widerstände in  
enormer Formen- und  
Versionenvielfalt.*

 *Az ellenállások  
szinte minden elekt-  
romos berendezés-  
ben megtalálhatók.  
Számatalan formájuk és  
változatuk használa-  
tos félvezetők munka-  
pontjának beállítására  
szolgáló komponen-  
sekként, árammérőkelő-  
ként, áramkorlátkban,  
feszültségosztókban,  
különböző szűrőkben  
és még sok más alkál-  
mazásban.*

 *Rezistory znajdzie-  
my prawie w każdym  
urządzeniu elektronicz-  
nym. Zastosowane ja-  
ko ograniczniki prądu,  
elementy do ustawienia  
warunków roboczych  
półprzewodników,  
dzielniki napięcia, czuj-  
niki prądu, w różnych  
filtrach i wielu innych  
funkcjach, we wszyst-  
kich tych miejscach  
znaleźć możemy rezy-  
story, w niezliczonych  
formach i wersjach.*

 *Rezistoarele se  
regăsesc în aproape  
toate aparatele elec-  
tronice. Folosite ca  
limitatoare de curent,  
componente pentru  
setarea condițiilor de  
funcționare a semicon-  
ductorilor, divizor de  
tensiune, senzori de  
curent, în diverse filtre  
și cu multe alte funcții,  
în toate aceste locuri  
putem găsi rezistoare,  
în nenumărate forme și  
versiuni.*

 *Rezistory nájdeme  
v takmer každom elek-  
tronickom zariadení. Po-  
užitú ako obmedzovače  
prúdu, komponenty pre  
nastavenie pracovných  
podmienok polovodi-  
čov, napäťové deliče,  
prúdové senzory, v rôz-  
nych filtroch a mnohých  
iných funkciách, na všet-  
kých týchto miestach  
môžeme nájsť rezistory v  
nespočetnom množstve  
foriem a verzí.*

It can be said, that resistors are probably the most often used components in electronics. As a basic component representing Ohm's law, resistor can be used in all positions where its basic feature – resistance is useful.

### Classification

From the user and technological point of view, we can divide resistors to two main groups - SMT resistors and leaded resistors (incl. power types with screw terminals and other). While SMT resistors are mainly soldered to a PCB by a reflow process, leaded resistors (THT) are soldered by a solder wave or manually. Resistor networks (SMT or THT types) provide a convenience of space-saving packages and in many cases they also simplify a PCB design.

In all sizes and types, there is a wide range of values available. Typical standard values range from mili-Ohms to Mega-Ohms.

Because of a power loss appearing on every resistor which conducts a current, the first step is to choose the right power rating. Every product series also features a maximum allowed working voltage, which mustn't be exceeded. Similarly like all electronic components, neither resistors aren't ideal components – especially at HF applications it is necessary to consider also their parasitic capacitance and inductance.

SMT versions enable a much higher density on a PCB, thanks to their small size and a low profile. On the other side, combination of SMT components together with THT components enables to reach a high density of components even on a simple and cheap one-sided PCB.

There are some sizes, which are globally the most often used. From SMT types those are 0402, 0603, 0805 and 1206 sizes. In wire leaded axial types those are 0207 and 0204 sizes.

Resistor networks can be constructed as separate resistors in one package or as interconnected into a network – serial or parallel. A parallel combination is especially useful when it is necessary to connect more signals to one common signal, for example pins of an integrated circuit to a ground, through a defined resistance. The most common package is SIL (single in line).

### Terms

#### E series

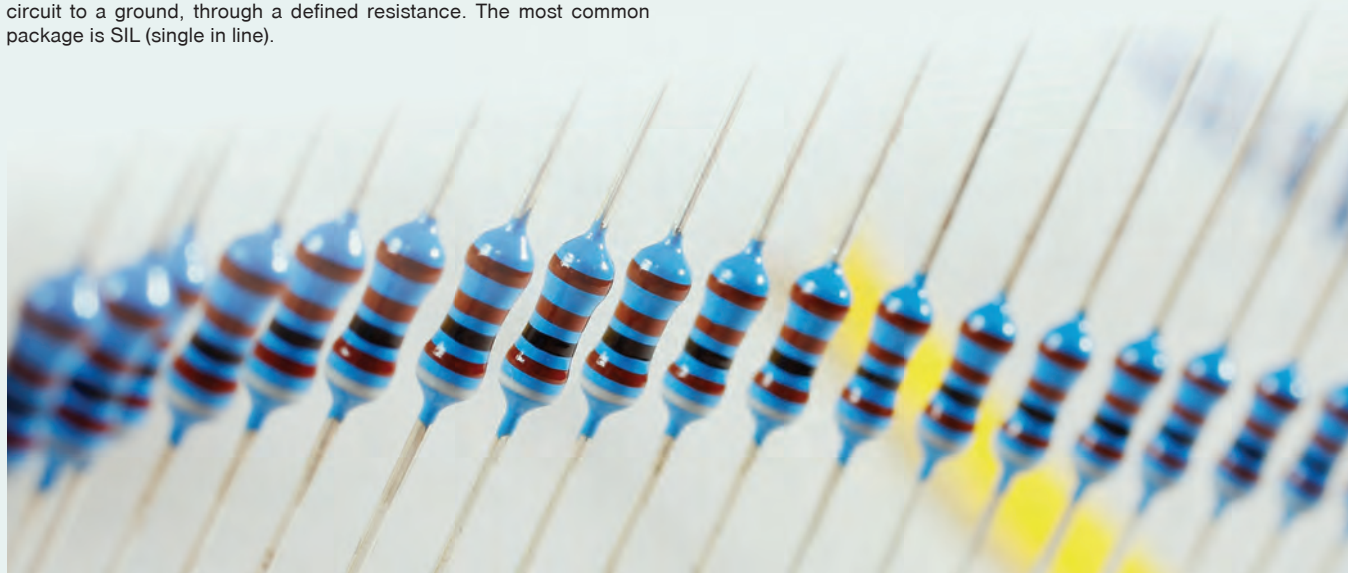
– term marking series of preferred values, according to IEC 60063. Most often used at resistors, capacitors and inductors. Typical series are E6, E12 and E24. For example E12 series contains 12 values in a decade, increasing in a geometric progression, so that so that each value is greater than its predecessor by a fixed multiplier or percentage, chosen to match the tolerance of the range.

#### Wire wound resistor

– one of the first types of resistors ever used and still often used thanks to a possibility to construct even very high power types. Typically made of a resistive wire wound around a ceramic core. These types also feature high peak power handling, especially in comparison to other film-type resistors.

#### Current sensing resistors

– special type of low value resistors, designed to handle relatively high currents. Available also in SMT versions, used for measuring of currents in various applications, very often in switch-mode power supplies. Their low values (typically tens of mili-Ohms) ensure negligible power losses.







Established in 1977, the YAGEO Corporation has become a world-class provider of passive components. Yageo currently ranks as the world No.1 in chip-resistors, No. 3 in MLCCs and No. 3 in ferrite products. Yageo products have excellent reputation in terms of quality and reliability.

**Společnost YAGEO Corporation byla založena v roce 1977 a stala se světovým dodavatelem pasivních součástek. V současnosti je jedničkou na trhu v oblasti čip - rezistorů a třetím nejdůležitějším výrobcem MLCC a feritových produktů. Produkty Yageo mají výbornou reputaci v oblasti kvality a spolehlivosti.**

**Das Unternehmen YAGEO Corporation wurde 1977 gegründet und wurde zum weltweiten Lieferanten passiver Bauelemente. Zurzeit gilt es auf dem Markt als Nr. 1 im Bereich der Chip-Widerstände und ist der dritt-wichtigste Produzent von Keramikvielschicht-Chip-kondensatoren (MLCC) und Ferrit-Produkten. Die Produkte von Yageo haben einen ausgezeichneten Ruf hinsichtlich Qualität und Zuverlässigkeit.**

**Az ellenállások szinte minden elektromos berendezésben megtalálhatók. Számtalan formájuk és változatuk használatos félvezetőkhöz, áramérzékelők, áramkorlátokban, feszültségosztókban, különböző szűrőkben és még sok más alkalmazásban.**

**Spółka YAGEO Corporation powstała w roku 1977 i stała się światowym dostawcą pasywnych części elektronicznych. Obecnie jest numerem jeden na rynku w dziedzinie chip-rezystorów, i trzecim najważniejszym producentem MLCC oraz wyrobów ferrytowych. Produkty Yageo cieszą się wyjątkową reputacją ze względu na jakość i niezawodność.**

**Iniintata in 1977, YAGEO Corporation a devenit un furnizor de talie mondială de componente pasive. In prezent Yageo se clasifică drept Nr. 1 mondial în rezistori cu cip, Nr. 3 în MLCCs și Nr. 3 în produsele de ferită. Produsele Yageo au o reputatie excelenta în ceea ce privește calitatea și fiabilitatea.**

**Spoločnosť YAGEO Corporation bola založená v roku 1977 a stala sa svetovým dodávateľom pasívnych súčiastok. V súčasnosti je jednotkou na trhu v oblasti čip - rezistorov, a tretím najdôležitejším výrobcom MLCC a feritových produktov. Produkty Yageo majú výbornú reputáciu ohľadom kvality a spoľahlivosti.**

As a shopping mega store, Yageo provides a complete product line of chip resistors, multilayer chip capacitors (MLCCs), electrolytic capacitors, inductors, leaded resistors and high frequency products.

Yageo's global deployment strategy is based on providing customers with comprehensive passive component solutions and an enhanced service. Yageo components are used in many top quality products of many global producers like Sony, Samsung and other.

### Why YAGEO?



- well renowned company with a big know-how
- excellent quality and reliability of products
- complete portfolio of passive components

### Did You Know?



In 1996, Yageo acquired Vohm and in 2000, Yageo acquired Phycomp and Ferroxcube - two passive components units from Philips Electronics. Ferroxcube and Vitrohm are part of Yageo group, who produce ferrites and leaded resistors.



### Chip Resistors

- Automotive grade thick film
- Anti-sulfuration
- Low TCR, low ohmic
- Array/Network
- Available in all the most popular sizes: 0402, 0603, 0805, 1206, 2010, 2512 and other

### Other Chip Resistors

- Automotive Grade
- Thick Film Precision Grade
- High Ohmic
- Low Ohmic
- Thin Film
- Current Sensor
- Array/Network
- Trimmable
- High Voltage
- R w/Ni/Au Terminations
- Surge
- Anti-Sulfurated
- RF Attenuator



### Leaded Resistors


- High temperature, high voltage & high power rating
- Anti-electrical arc and anti-explosion
- Miniature size & narrow tolerance


### Other Leaded Resistors


- Metal Film
- Metal Oxide Film
- Melf Metal Film
- Carbon Film
- Melf Carbon Film
- Biased Humidity
- Metal Glazed Film
- Pulse-Loading
- Zero Ohm
- Jumper Wires
- Low Ohmic Wire
- Wirewound
- Fusible Wirewound
- Power Wirewound
- Cement
- Aluminum Housed





A potentiometer, as a three-terminal resistor with a sliding contact, forms an adjustable resistive voltage divider. Many of us probably most often associate potentiometer with a volume control on many audio devices.


 *Potenciometr je elektronická součástka, která slouží jako regulovatelný odporový dělič. Mnozí z nás si pravděpodobně nejčastěji spojují potenciometr s ovladačem hlasitosti různých audio zařízení.*

 *Potentiometer, als ein Widerstand mit drei Anschlüssen und einem Schiebekontakt, bildet einen regelbaren Widerstandsspannungsteiler. Viele von uns verbinden das Potentiometer wohl am häufigsten mit dem Lautstärkeregler zahlreicher Audiogeräte.*

 *A potenciométer egycsúszó érintkezővel ellátott három kivezetésű ellenállás, mely egy szabályozható rezisztív feszültségosztót képez. A legtöbbszörnek valószínűleg elsőként az audio berendezések hangerőszabályzója jut róla eszünkbe.*

 *Potencjometr, opornik z 3 wyprowadzeniami z przesuwanym stykiem, stwarza ustawialny oporowy dzielnik napięcia. Wielu z nas prawdopodobnie najczęściej łączą potencjometr ze ustawianiem głośności różnych urządzeń audio.*

 *Un potențiomtru, ca rezistor cu trei terminale și un contact de alunecare, formează un divizor de tensiune rezistiv, reglabil. Probabil ca mulți dintre noi cel mai adesea asociem potențiomtrul cu un control al volumului pe multe aparate audio.*

 *Potenciometer, ako 3-vývodový rezistor s posuvným kontaktom, vytvára nastaviteľný rezistívny napäťový delič. Mnohí z nás si pravdepodobne najčastejšie spájajú potenciometer a ovládačom hlasitosti mnohých audio zariadení.*

Potentiometers comprise a resistive element, a sliding contact (wiper) that moves along the element, making good electrical contact with one part of it, electrical terminals at each end of the element, a mechanism that moves the wiper from one end to the other, and a housing containing the element and wiper. Because potentiometer is acting like two variable resistors in series, where their overall resistance stays constant, it can serve as a very convenient voltage divider, (theoretically) from 0 to 100%. Providing a possibility to easily change an output voltage or to attenuate an AC signal, they are very often used as controlling elements of various testing and measuring equipment, laboratory power supplies and audio equipment.

Trimming potentiometers, also called as trimmers, are in principle potentiometers, but usually of a smaller and simpler mechanical construction. They are designed to provide easy adjustment at production or servicing, that's why they can usually be operated only by a suitable tool, for example a screwdriver. Trimmers are usually not user-accessible. Some devices like older monitors and measuring equipment have trimmers accessible by a small screwdriver poked through a hole in the case to allow servicing without dismantling.

### Classification

Potentiometers and trimmers have their resistive element made of a resistive film or a resistive wire. Types with a resistive film typically feature a smoother movement, thus a possibility to set the desired value more precisely. Wire types are most often used when higher power handling is necessary. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat. Resistance of common potentiometers ranges from tens of Ohms to few MOhms. A very important parameter is the relationship between position and resistance, known as the "taper". In principle any relationship is possible, but for most purposes linear or logarithmic potentiometers are sufficient. A letter code (A, B, G, N, etc.) may be used to identify which taper is used, but the letter code definitions are variable over time and between manufacturers. Rotary types are mainly used for adjusting purposes, while linear slider types are typically used in audio equipment. Most of potentiometers and virtually all trimmers are designed for easy placing on a PCB. Both components are available in various sizes and various mechanical constructions.

### Terms

**Linear Taper Potentiometer** – most often used type of a potentiometer with a linear relationship between the position and the resistance of a potentiometer or trimmer.

**Logarithmic Taper Potentiometer** – a type with a logarithmic relationship between position and resistance. Used in audio amplifiers for volume control, because human perception of audio volume is approximately logarithmic.

**Multi-Turn Potentiometer** – types of precision instrumentation potentiometers with a gear mechanism or a helical resistive element. Similarly like simple rotary potentiometers, also these are operated by rotating a shaft, but these potentiometers feature for example 10 full 360° turns to travel through a whole adjustable range instead of only one turn (not covering 360°). They are very convenient for laboratory equipment and everywhere, where a fine adjustment is necessary.

**Cermet Types** – potentiometers and trimmers with a high quality resistive layer made of ceramics and metal parts, which is wear and corrosion resistant, durable and features low temperature coefficient.

### Trimmers

#### Surface Mount



TS53YL



PVZ3G

#### Cermet



PTC 10 LH



PTC 10 LV

#### Carbon

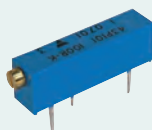


PT6H

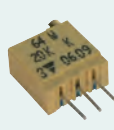


PT6V

#### Multi - Turn Cermet



43P



64W, 64Y

### Potentiometers

#### Single



PC16BU,  
PC20BU,  
POM16

#### High- Grade



RK27112, 534

#### Double



PC2G16BU,  
PC2G20BU,  
POS16

#### Wirewound



PD5WK

#### Multi - Turn



#### Knobs





PIHER Spain, a member of Meggitt group, is the company with a long-term experience in development and production of position sensors and control components like potentiometers, trimmers, encoders and rotary switches.

**PIHER Španělsko,** člen skupiny Meggitt, je společnost s dlouholetými zkušenostmi ve vývoji a výrobě polohových senzorů a součástí pro ovládání, jako jsou potenciometry, trimry, enkodéry a rotační spínače.

**PIHER Spanien,** Mitglied der Meggitt-Gruppe, ist ein Unternehmen mit langjähriger Erfahrung in der Entwicklung und Produktion von Positionssensoren und Steuerungskomponenten wie Potentiometer, Trimmer, Kodierer und Drehschalter.

**A PIHER Spanyolország** a Meggitt csoport tagjaként, hosszú távú tapasztalatokkal rendelkezik a helyzetérzékelők és a vezérlőalkatrészek, mint a potenciométerek, trimerek, kódolók és forgókapcsolók fejlesztésében és gyártásában.

**PIHER Hiszpania,** członek grupy Meggitt, jest spółką z długoletnimi doświadczeniami w opracowaniu i produkcji czujników pozycji i części do sterowania, jak potencjometry, trimery, enkodery i łączniki rotacyjne.

**PIHER Spania,** membră a grupului Meggitt, este o companie cu o vastă experiență în dezvoltarea și producerea de senzori de poziție și componente de control cum ar fi potenciometre, rectificatoare, decodoare și comutatoare rotative.

**PIHER Španielsko,** člen skupiny Meggitt, je spoločnosťou s dlhodobými skúsenosťami vo vývoji a výrobe polohových senzorov a súčiastok pre ovládanie ako sú potenciometre, trimre, enkodéry a rotačné spínače.

PIHER portfolio is very wide, consisting of rotary and slide controls, trimmers, potentiometers (incl. long life), laser trimmed potentiometers, rotary switches, incremental encoders, screened PCBs and other value added assemblies. Another big group of products is created by various position sensors – rotary, linear, single- and multi-turn, endless rotation, wide operating temperature components (-40 to +125°C) as well as custom made products.

### Why PIHER?


- company with long-term experience
- wide portfolio of high quality products


	Series	MRA	ERA	Life	Lin	SMD	Op.Temp
Rotary	PT-6 V/H	235 ±5	200 ±20	10K	-	N6	-25 to +70*
	PT-10V	235 ±5	220 ±20	10K	-	-	-25 to +70*
	PT-10H	235 ±5	220 ±20	10K	-	SOON	-25 to +70*
	PTC-10V	235 ±5	220 ±20	10K	-	-	-40 to +90
	PTC-10H	235 ±5	220 ±20	10K	-	-	-40 to +90
	PT-15V	265 ±5	240 ±20	up to 200K	±3	PS-15	-25 to +70*
	PT-15H	265 ±5	240 ±20	up to 200K	±3	-	-25 to +70*
	PTC-15V	265 ±5	240 ±20	10K	±2.5	-	-40 to +90
	PTC-15H	265 ±5	240 ±20	10K	±2.5	-	-40 to +90
	PS-15	265 ±5	240 ±20	10K	±3	YES	-40 to +85
	PT's w/detents	-	-	-	-	PS-15	-
	SM/SMC10	235 ±5	220 ±20	10K	-	-	-40 to +90
	SM/SMC15	265 ±5	240 ±20	up to 200K	±3	-	-40 to +90
	N-6RE	280 ±10	245 ±25	10K	±6.5	YES	-25 to +70*
	N-15	360	340 ±10	200K	±3**	YES	-40 to +120
	A-15	360	360	200K	±6*	YES	-40 to +120
	Z-15	360	110 ±10	2M	±3	YES	-40 to +120
	PC-16/PC16SC	300 ±5	280 ±20	25K	±3	-	-25 to +70*
T-16	300 ±5	280 ±20	25K	-	-	-25 to +70*	
T-18	255 ±5	220 ±20	25K	-	-	-25 to +70*	
T-21	310 ±5	290 ±20	25K	-	-	-25 to +70*	
CP-21	310 ±5	290 ±20	50K	-	-	-40 to +90	
Detented controls							
Linear	PCR	up to 360	up to 360	1M	±2	-	-40 to +120
	NPL	7.25-12mm	6-12mm	50K	±2	-	-40 to +105
	PL-40	40 ±1	37 ±1	25K	-	-	-25 to +70*


MRA: Mechanical rotation angle (degrees)  
 ERA: Electrical rotation angle (degrees)  
 Lin: Absolute linearity (percentage)  
 \*up to +85°C depending on the application  
 \*\* standard linearity





Encoders convert an angular position or a movement to an analog or a digital signal. Depending on a type, they serve for measuring of a position or of an amount of motion. That's why they are ideal control components for volume control, navigation menu, measuring of speed, distance and other parameters.


 *Enkodéry konvertují úhlovou pozici nebo pohyb (posuv) na analogový nebo digitální signál. V závislosti na typu slouží k měření pozice nebo množství pohybu. Proto jsou to ideální ovládací komponenty pro ovládání hlasitosti, navigačního menu, měření rychlosti, vzdálenosti a jiných parametrů.*

 *Kodierer konvertieren eine Winkelposition oder Bewegung (Verschiebung) in ein analoges oder digitales Signal. In Abhängigkeit vom Typ dienen sie zum Messen der Position oder Bewegungsmenge. Deshalb stellen sie ideale Steuerkomponenten für die Lautstärkeregelung, Steuerung des Navigationsmenüs, Geschwindigkeits-, Distanzmessung oder Messung anderer Parameter dar.*

 *Az enkóderek egy szögelfordulás értékét vagy elmozdulást konvertálnak analóg vagy digitális értéké. Típusától függően pozíció vagy elmozdulás mértekének mérésére szolgál. Ezért ideálisak vezérlőelemként hangerőszabályzóknak, menü navigációknak, továbbá sebesség, távolság vagy egyéb paraméterek mérésére.*

 *Enkodery przetwarzają pozycję kątową lub ruch (przesunięcie) na sygnał analogowy albo cyfrowy. W zależności od typu, służą do mierzenia pozycji lub prędkości ruchu. Dlatego są one idealnymi elementami do ustawiania głośności, nawigacji w menu, mierzenia prędkości, odległości i innych parametrów.*

 *Traductoarele convertesc o poziție unghiulară sau o mișcare într-un semnal analog sau digital. În funcție de tip, acestea servesc la măsurarea poziției sau a amplitudinii unei mișcări. De aceea, sunt componente ideale pentru controlul volumului, meniul de navigare, măsurarea vitezei, a distanței și a altor parametri.*

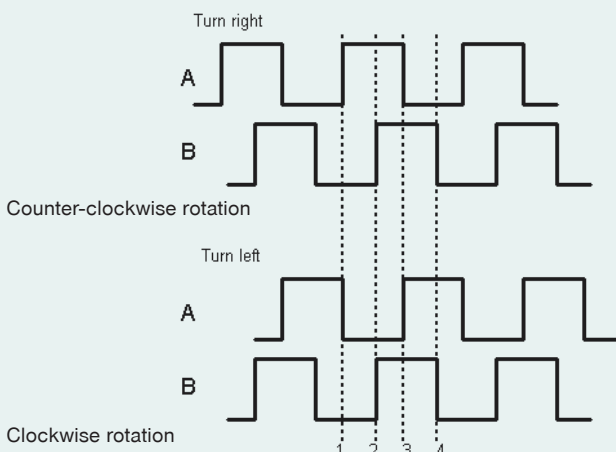
 *Enkodéry konvertujú uhlovú pozíciu alebo pohyb (posuv) na analogový alebo digitálny signál. V závislosti na type, slúžia pre meranie pozície alebo množstva pohybu. Preto sú to ideálne ovládacie komponenty pre ovládanie hlasitosti, navigačného menu, meranie rýchlosti, vzdialenosti a iných parametrov.*

In our offer you can find incremental rotary encoders with 2 outputs. They have a defined number of detents and pulses per one revolution. From the sequence of output pulses, it is easy to recognize the direction of rotation and from the output signal, it is easy to calculate the amount of motion (angular movement of a shaft). They have an "infinite" number of turns, that's why they can provide a very precise control of a desired parameter – for example adding/decreasing of a sound volume, tuning of a radio, controlling of various production parameters, etc.

### Classification

There are two main types of encoders – **absolute and incremental**. Absolute types provide a signal proportional to an absolute angular position of a shaft, i.e. they act like an angle transducers. They can be used everywhere, where a position of a shaft is important (not only a direction or an amount of movement).

Incremental types provide output signal proportional only to a direction and amount of movement. They can be either mechanical or optical, usually with two outputs called A and B. An incremental rotary encoder provides cyclical outputs (only) when the encoder is rotated. Signal of incremental types must be further processed in a suitable circuitry.




Coding for Clockwise Rotation		
Phase	A	B
1	0	0
2	0	1
3	1	1
4	1	0


Coding for Counter-Clockwise Rotation		
Phase	A	B
1	1	0
2	1	1
3	0	1
4	0	0








Varistors, also known as voltage dependent resistors, are non-linear electronic components with a characteristic similar to a diode. Varistors are mostly used to protect circuits against overvoltage spikes.


 Varistory, také známé jako napěťově závislé rezistory, jsou nelineární prvky s charakteristikou podobnou diodě. Varistory se nejčastěji používají na ochranu obvodů proti přepětovým špičkám.

 Varistoren, bekannt auch als spannungsabhängige Widerstände, sind nichtlineare Elemente mit diodenähnlicher Charakteristik. Varistoren werden am häufigsten zum Schutz der Schaltungen vor Überspannungen eingesetzt.

 A feszültségfüggő ellenállás néven is ismert varisztorok nemlineáris elektronikai alkatrészek, melyek karakterisztikája hasonló a diódákéra. Legjellemzőbb alkalmazásuk túlfeszültség elleni védőáramkörökben van.

 Warystory, znane też jako rezystory zależne od napięcia, to elementy nieliniowe o charakterystyce podobnej do diody. Warystory stosowane są najczęściej do ochrony obwodów przed impulsami przepięciowymi.

 Varistoarele, de asemenea cunoscute ca rezistori dependenți de tensiune, sunt componente electronice non-lineare, cu o caracteristică similară unei diode. Varistoarele sunt cel mai mult folosite pentru a proteja circuitele de vârfurile de supratensiune.

 Varistory, tiež známe ako napäťovo závislé rezistory, sú nelineárne prvky s charakteristikou podobnou dióde. Varistory sa najčastejšie používajú na ochranu obvodov proti prepätovým špičkám.

Varistor in a normal operation features a very high resistance and a small capacitance, thus it behaves as an inactive element. Protective effect of a varistor is, that it is able to clamp spikes exceeding its breakdown voltage. In other words, a varistor is incorporated into a circuit in such a way that, when triggered, it will shunt the current created by the high voltage spike. In case of a relatively small spike, a varistor absorbs energy of a spike, changing it into a heat. In case of a too large spike, a varistor can be damaged or completely destroyed. Varistors are inexpensive components able to provide a basic protection to many circuits. For more reliable protection, it is advisable to combine varistors with other components like TVS diodes (transils) and gas-tube suppressors.

### Classification

Important parameters are the varistor's energy rating in joules, operating voltage (AC and DC), response time, maximum current and breakdown (clamping) voltage. Energy rating is often defined using standardized transients such as 8/20 microseconds or 10/1000 microseconds, where 8 microseconds is the transient's front time and 20 microseconds is the time to half value. Most often used types have radial leaded packages, but SMT types are also available. A physical size of a varistor determines also varistor's ability to absorb energy, thus a physically larger varistor is usually able to absorb higher amount of energy, without a permanent damage.

We supply varistors from Epcos, Vishay and Joyin.

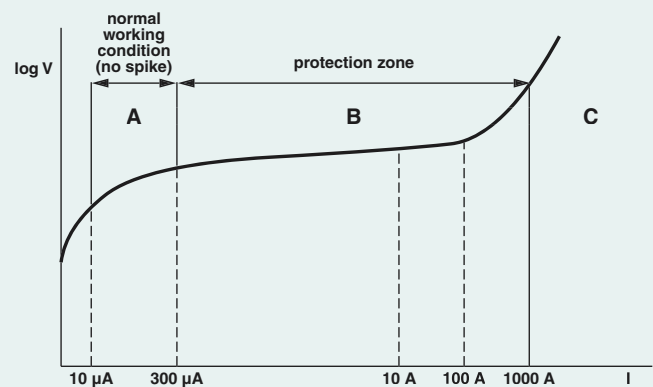
### Main series

592xxx, 593 xxx, 594 xxx, 595 xxx, JVR05, JVR07, JVR10, JVR14, SIOV-S07



### Features

- Low leakage current
- Wide voltage range and energy ratios
- Low stand-by power
- Very good surge current handling capabilities
- Very good clamping voltage characteristics



Definitions of the varistor curve


The points A, B and C shown on the curve are defined in the Varistor Curve Definitions table.


VARISTOR CURVE DEFINITIONS	
POINT	DESCRIPTION
A	Normal working zone: current is kept as low as possible in order to have low dissipation during continuous operation (between 10 µA to 300 µA).
B	Maximum clamping voltage: the maximum voltage for a given (class) current (peak current based upon statistical probability determined by standardization authorities).
C	Maximum withstanding surge current: the maximum peak current that the varistor can withstand (only) once in its lifetime.


### Applications


- Power supplies
- Electronic lamp ballasts
- Inductive load switching: motors, coils, actuators, transformers, etc.
- Spark suppression
- General protection against induced lightning transients


Capacitors, as one of basic passive components, deploy the ability of materials to store electric energy into an electric field between electrodes. Thanks to this feature, they are useful widely used components for energy storage, power supply filtering, creation of various filters and many other purposes.


 Kondenzátory jsou jedny ze základních pasivních součástí, využívají schopnost materiálů uložit elektrickou energii do elektrického pole mezi elektrodami. Díky této vlastnosti jsou to užitečné, široce používané komponenty pro uložení energie, filtrování napájení, vytváření různých filtrů a mnoho jiných účelů.

 Kondensatoren als elementare passive Bauelemente nutzen die Fähigkeit von Materialien zur Speicherung der elektrischen Energie im elektrischen Feld zwischen den Elektroden. Dank dieser Eigenschaft stellen sie nützliche, breit verwendete Komponenten zur Energiespeicherung, zum Filtern der Stromversorgung, zur Bildung verschiedener Filter sowie für zahlreiche andere Zwecke dar.

 Mint az egyik alapvető passzív alkatrész, a kondenzátor az anyagoknak azt a tulajdonságát használja ki, hogy képes elektromos energiát tárolni két elektróda közötti elektromos mezőben. Ennek a képességnek köszönhetően széles körben használják energiátárolásra (pufferként), tápfeszültség szűrésre, különböző szűrők építésére és számos egyéb célra.

 Kondensatory jako jedne z podstawowych elementów pasywnych, wykorzystują zdolność materiałów do magazynowania energii elektrycznej w polu elektrycznym pomiędzy elektrodami. Dzięki tej właśnie właściwości, są one użytecznymi, szeroko stosowanymi elementami do magazynowania energii, filtracji zasilania, budowy różnych filtrów i wielu innych celów.

 Condensatoarele, ca una din componentele pasive de bază, prezintă capacitatea materialelor de a stoca energia electrică în câmpul electric dintre electrozi. Datorită acestei trăsături, sunt componente utile, larg folosite, pentru stocarea de energie, filtrarea alimentării, crearea de diferite filtre și pentru multe alte scopuri.

 Kondenzátory ako jedny zo základných pasívnych súčiastok, využívajú schopnosť materiálov uložiť elektrickú energiu do elektrického poľa medzi elektrodami. Vďaka tejto vlastnosti sú to užitočné široko používané komponenty pre uloženie energie, filtrovanie napájania, vytváranie rôznych filtrov a mnoho iných účelov.

Capacitors together with resistors and inductors are the most important passive components. As an almost lossless element, capacitors are the key components in many applications enabling energy storage, power conditioning, power factor correction, coupling and decoupling. They also serve as noise filters and snubbers and motor starters.

Thanks to a vast usage and an intensive development during many decades, they are available in many types, versions, sizes and capacities.

## Classification

Basic capacitor consists of two electrodes with the air between them. Such capacitors have a high quality but a relatively very low capacity and big dimensions, that's why they are used only at some special applications like a tuning capacitor of older radio circuits for example. All commonly used capacitors have some solid or liquid dielectricum, which significantly increases their capacity and determines many other features like maximum operating voltage and temperature, leakage current and linearity.

Starting from their principle, we can divide capacitors to nonpolarised (with a plastic, ceramic or other dielectric) and polarized types (electrolytic, tantalum,...). Because electrolytic capacitors are polarized, they are mainly suitable mainly to DC applications (though special bipolar audio capacitors are also available). Ceramic and foil types are usable in DC and AC circuits. Foil types are high quality universally usable types suitable everywhere, where low losses, temperature stability, or a high linearity are important.

**Foil types** are also available in versions for high current, known as pulse capacitors.

**Ceramic capacitors** are also universally usable, available from few pF to hundred uF and they feature extremely low ESR. However, when choosing a suitable ceramic type, it is necessary to check properties of a given dielectric, because many ceramic types are non-linear, temperature- and even voltage-dependent (mainly high-capacity types).

**Electrolytic types** are available as leaded axial or radial, as well as SMT versions. Common types are available with a maximum operating temperature of 85°C and 105°C.

**Tantalum types** feature low ESR and a long lifetime. During past years, double-layer capacitors (EDLC, supercapacitors) are still more used thanks to their very high specific energy (W-h/kg). Small EDLCs are a very convenient replacement of batteries for memory backup purposes.

## Terms

### ESR

– equivalent series resistance. Represents behavior of a real capacitor in comparison to an ideal capacitor. In most cases a model of a real capacitor can be made of a resistor (with a value of ESR) connected with a given capacitor in series. ESR causes losses and heating of a capacitor, especially at higher frequencies and high currents. ESR also decreases filtering efficiency of a capacitor, that's why in circuits where a low ripple is necessary, it is advisable to use low ESR capacitors.

### Ripple Current

– the AC component of an applied DC source (for example a switched-mode power supply). Some types of capacitors, primarily tantalum and aluminium electrolytic capacitors, usually have a rating for maximum ripple current. Ripple current causes heat to be generated within the capacitor due to the ESR. Maximum allowed ripple current for a given type shouldn't be exceeded, because it can result to a capacitor destruction or a substantial shortening of its expected lifetime.

### Leakage

– equivalent to a resistor in parallel with the capacitor resulting in a leakage current. This causes self-discharge of capacitors and undesired power losses. Leakage is common at electrolytic, tantalum and other types of capacitors. In most of cases, it isn't a critical parameter, but it should be considered for example in battery operated circuits, where this phenomenon can cause an accelerated batteries discharge.



In order to ensure, that you'll receive a whole reel of given passive SMT components, you can order them in our webshop from product cards marked as "reel".



Established in 1977, the YAGEO Corporation has become a world-class provider of passive components. YAGEO currently ranks as the world No.1 in chip-resistors, No. 3 in MLCCs and No. 3 in ferrite products. Yageo products have excellent reputation in terms of quality and reliability.

**Společnost YAGEO Corporation** byla založena v roce 1977 a stala se světovým dodavatelem pasivních součástek. V současnosti je jedničkou na trhu v oblasti čip - rezistorů a třetím nejdůležitějším výrobcem MLCC a feritových produktů. Produkty Yageo mají výbornou reputaci v oblasti kvality a spolehlivosti.

**Das Unternehmen YAGEO Corporation** wurde 1977 gegründet und wurde zum weltweiten Lieferanten passiver Bauelemente. Zurzeit gilt es auf dem Markt als Nr. 1 im Bereich der Chip-Widerstände und ist der dritt-wichtigste Produzent von Keramikvielschicht-Chip-kondensatoren (MLCC) und Ferrit-Produkten. Die Produkte von Yageo haben einen ausgezeichneten Ruf hinsichtlich Qualität und Zuverlässigkeit.

**A YAGEO Corporation-t** 1977-ben alapították és a világ egyik nagy passzív alkatrész szállítója lett. Jelenleg chip - ellenállásaival piacvezető, és a harmadik legfontosabb az MLCC és ferrit alapú termékek gyártásában. Termékei méltán hírességek jó minőségűkről és megbízhatóságukról.

**Spółka YAGEO Corporation** powstała w roku 1977 i stała się światowym dostawcą pasywnych części elektronicznych. Obecnie jest numerem jeden na rynku w dziedzinie chip-rezystorów, i trzecim najważniejszym producentem MLCC oraz wyrobów ferrytowych. Produkty Yageo cieszą się wyjątkową reputacją ze względu na jakość i niezawodność.

**Iniintata in 1977, YAGEO Corporation** a devenit un furnizor de talie mondială de componente pasive. In prezent Yageo se clasifică drept Nr. 1 mondial în rezistori cu cip, Nr. 3 în MLCCs și Nr. 3 în produsele de ferită. Produsele Yageo au o reputatie excelenta în ceea ce privește calitatea și fiabilitatea.

**Spoločnosť YAGEO Corporation** bola založená v roku 1977 a stala sa svetovým dodávateľom pasívnych súčiastok. V súčasnosti je jednotkou na trhu v oblasti čip - rezistorov, a tretím najdôležitejším výrobcem MLCC a feritových produktov. Produkty Yageo majú výbornú reputáciu ohľadom kvality a spoľahlivosti.

As a shopping mega store, Yageo provides a complete product line of chip resistors, multilayer chip capacitors (MLCCs), electrolytic capacitors, inductors, leaded resistors and high frequency products.

Yageo's global deployment strategy is based on providing customers with comprehensive passive component solutions and an enhanced service. Yageo components are used in many top quality products of many global producers like Sony, Samsung and other.

### Why YAGEO?

- well renowned company with a big know-how
- excellent quality and reliability of products
- complete portfolio of passive components

### Did You Know?

Ferroxcube and Vitrohm are part of Yageo group, who produce ferrites and leaded resistors.

- NPO
- Ceramic Chip Capacitors
- GENERAL PURPOSE CAPACITORS
- Size: from 0402 to 1812
- Capacitance range: from 0,47pF to 33nF
- Capacitance tolerance: C<10pF: 0,1pF, 0,25pF, 0,5pF C>10pF: ±1%, ±2%, ±5%
- Max. rated voltage: 16Vdc up to 4000Vdc
- Operating temp. range: -55°C to +125°C

- Y5V
- Ceramic Chip Capacitors
- GENERAL PURPOSE CAPACITORS
- HIGH CAPACITANCE
- Size: from 0402 to 1210
- Capacitance range: from 10nF to 47uF
- Capacitance tolerance: ±20%, -20% to 80%
- Max. rated voltage: 6,3Vdc, 50Vdc
- Operating temp. range: -25°C to +85°C

- SMD Capacitor Arrays
- Size :0405, 0508, 0612
- Capacitance range: from 10pF to 100nF
- Capacitance tolerance: NPO: ±5%, ±10% X7R: ±10%, ±20% Y5V: -20% to 80%
- Max. rated voltage: 16Vdc up to 50Vdc

- X5R
- Ceramic Chip Capacitors
- HIGH CAPACITANCE
- Size: from 0402 to 1812
- Capacitance range: from 100nF to 100uF
- Capacitance tolerance: ±10%, ±20%
- Max. rated voltage: 6,3Vdc up to 25Vdc
- Operating temp. range: -55°C to +85°C

- X7R
- Ceramic Chip Capacitors
- GENERAL PURPOSE CAPACITORS
- HIGH CAPACITANCE
- LOW INDUCTANCE
- Size: from 0402 to 1812
- Capacitance range: from 100nF to 4,7uF
- Capacitance Tolerance: ±5%, ±10%, ±20%
- Max. rated voltage: 10Vdc up to 3000Vdc
- Operating temp. range: -55°C to +125°C

- Ultra Small
- Chip Capacitors
- Size :01005, 0201
- Capacitance range: from 1pF to 100nF
- Capacitance tolerance: NPO: ±2%, ±5% X5R/X7R: ±10%, ±20% Y5V: -20% to 80%
- Max. rated voltage: 6,3Vdc up to 50Vdc





SAMWHA Capacitor Group with a history dating from 1956/South Korea, produces a wide range of high quality passive components, like power capacitors, MLCCs, EMI filters, chip inductors, varistors and ultra high voltage MLCCs.

**CZ** SAMWHA Capacitor Group byla založena v roce 1956 v Jižní Koreji. Vyrábí širokou škálu vysoce kvalitních pasivních součástí, výkonové kondenzátory, čipové kondenzátory (MLCCs), EMI filtry, čipové indukty, varistory a ultra vysokonapěťové MLCCs.

**DE** SAMWHA Capacitor Group wurde 1956 in Südkorea gegründet. Das Unternehmen produziert eine breite Palette an qualitativ hochwertigen passiven Bauelementen, Leistungskondensatoren, Chipkondensatoren (MLCCs), EMI-Filtern, Chipinduktoren, Varistoren und Ultra-Hochspannungs-MLCCs.

**HU** A SAMWHA Capacitor Group-ot 1956-ban alapították Dél-Koreában. Jó minőségű passzív alkatrészek, nagy teljesítményű kondenzátorok, chip kondenzátorok (MLCCs), EMI szűrők, chipes induktorok, varisztorok és ultra magasfeszültségű MLCC-k széles skáláját gyártja.

**PL** SAMWHA Capacitor Group została założona w roku 1956 w Korei Południowej. Produkuje szeroką gamę wysokiej jakości elementów pasywnych, kondensatory mocy, kondensatory chipowe (MLCCs), filtry EMI, cewki chipowe, warystory i MLCCs ultra wysokonapięciowe.

**RO** SAMWHA Capacitor Group, cu o istorie datand din 1956/Coreea de Sud, produce o gamă largă de componente pasive de înaltă calitate, cum ar fi condensatoarele de putere, MLCCs, filtre EMI, inductoare chip, varistoare și MLCCs de tensiune ultra înaltă.

**SK** SAMWHA Capacitor Group bola založená v roku 1956 v Južnej Kórei. Vyrába širokú škálu vysoko kvalitných pasívnych súčastok, výkonové kondenzátory, čipové kondenzátory (MLCCs), EMI filtre, čipové indukty, varistory a ultra vysokonapätové MLCCs.

Samwha is the innovative company, initially pioneering electronic industry in South Korea and gradually expanding all over the world. Samwha components gained a very good reputation in terms of quality, reliability as well as excellent price/performance ratio. In our offer of Samwha components, you can find mainly various types of aluminium electrolytic capacitors in THT and SMT versions.

### Why SAMWHA?

- over 55 years of experience
- wide portfolio of high quality components
- excellent price / performance ratio

### Did You Know?

Samwha Capacitor Group was more times awarded by the South Korea President and government for the contribution to national industrial development and export.

## Surface Mount Aluminum Electrolytic Capacitors



SMD(V-chip type) Electrolytic Capacitors are designed for surface mounting on high density PCB(Printed Circuit Board). SMD capacitors being essential elements in miniaturization of electronic products, the getting-smaller trend is to deepen.

Series	Features	Temp. Range (°C)	Vol. Range (VDC)	Cap. Range (μF)	Load Life (hours)
SC	Standard	-40~85	4~450	0.1~2200	2000
RC	Standard, wide temp.	-55~105	6.3~50	0.1~1000	1000
NC	5.5mmL chip, non-polarized	-40~85	6.3~50	0.1~47	2000
UC	Chip type, high temp. for 125°C use	-40~125	10~50	10~1000	2000
CB	Chip type, long life	-55~105	4~50	0.1~100	5000
JC	Chip type, wide temp. high CV	-55(-40)~105	4~450	3.3~4700	2000
JH	Chip type, high ripple	-55~105	6.3~100	10~2200	2000
ZC	5.5mmL chip type, Low impedance	-55~105	6.3~35	1.0~100	1000
CK	Chip type, Low impedance, high CV	-40~105	6.3~100	10~1500	2000
CD	Chip type, extremely low impedance	-40~105	6.3~50	10~1500	2000
CM	Chip type, extremely low impedance, Long life	-55~105	6.3~50	10~1000	3000~5000
CN	5.5mmL chip type, wide temp. non-polarized	-55~105	6.3~50	0.1~47	1000
CA	Chip type, high CV, long life	-55~105	6.3~50	10~1000	5000
JL	Chip type, high reliability	-40~105	10~50	33~470	10000
CF	Chip type, high temp. for 130°C use	-40~130	10~50	22~1000	5000
CT	Chip type, high temp. for 130°C use, low impedance	-40~130	10~50	33~470	2000
CW	Chip type, high reliability	-40~150	10~50	33~1000	1000



### Polymer Aluminum Electrolytic Capacitors



A Solid Capacitor is an electrolytic capacitor that uses solid electrolyte(TCNQ, Polythiophene, Polypyrrole, Polyaniline) with high conductivity. Solid electrolyte application results in a high conductivity and low ESR at high frequency with very stable capacitance and ESR against temperature. High frequency SMPS, computer main board, graphic card, audio are major application examples.

Series	Features	Temp. Range (°C)	Vol. Range (VDC)	Cap. Range (µF)	Load Life (hours)	
SMD	FA	Chip type, with conductive polymer(Hi-CAP)	-55~105	2.5~25	3.3~1500	2000
	FH	Lead type, with conductive polymer(Hi-CAP), Large Capacitance, Low ESR	-55~105	2.5~16	39~3300	2000
	FT	Chip type, with conductive polymer(Hi-CAP), High temp.	-55~125	10~35	8.2~82	2000
	FZ	Chip type, with conductive polymer(Hi-CAP), Long life	-55~105	4~25	10~680	5000
	FN	Chip type, with conductive polymer(Hi-CAP), 4.5mmL	-55~105	2.5~25	15~150	1000
Lead Type	FJ	Lead type, with conductive polymer(Hi-CAP), Large Capacitance, Low ESR	-55~105	2.5~16	100~2700	2000
	FB	Lead type, with conductive polymer(Hi-CAP)	-55~105	2.5~25	6.8~3300	2000
	FV	Lead type, with conductive polymer(Hi-CAP), Long life	-55~105	2.5~16	100~820	5000
SMD	FC	Chip type, with conductive polymer(Hi-CAP)	-40~105	2~16	2.2~470	1000

### Large Aluminum Electrolytic Capacitors



Large aluminum capacitors are classified in three types, snap-in type, lug type and screw type by terminal shape. Snap-in type is mainly used for power supply stage like PCB mounting. Lug type and screw type is used for industrial machine. Large capacitors are suitable for smoothness on power supply and inverter circuit.

Series	Features	Temp. Range (°C)	Vol. Range (VDC)	Cap. Range (µF)	Load Life (hours)	
Snap-in Terminal	HC	Standard	-40(-25)~85	6.3~500	56~100000	2000
	HJ	Miniaturized	-40(-25)~85	160~450	56~3300	3000
	HE	Wide temp. range, standard	-40(-25)~105	6.3~500	47~68000	2000~3000
	HK	Wide temp. range, miniaturized	-40(-25)~105	160~450	47~2700	3000
	HV	Wide temp. range, miniaturized	-40(-25)~105	250~450	47~1500	3000
	HL	Wide temp. range miniaturized, long life	-40(-25)~105	160~450	47~1500	5000
	HY	Wide temp. range long life	-40(-25)~105	160~450	47~1800	7000
	HB	High temp. range, for 125 use	-40~125	10~250	100~15000	1000
	QA	Permissible abnormal voltage, snap-in terminal	-25~105	200, 400	47~1500	2000
Lug.	LM	For general use	-40(-25)~85	16~450	68~150000	2000
Screw Terminal	GT	Standard	-40(-25)~85	16~500	180~680000	2000
	GK	High ripple current	-25~85	350~450	180~10000	2000
	GM	High ripple current, miniaturized	-25~85	350~450	820~10000	2000
	CU	Wide temp. range, standard	-40(-25)~105	16~450	220~470000	2000
	GF	For inverter circuits, long life	-25~85	350~600	1000~12000	2000~5000
	GH	For inverter circuits, long life, high ripple	-25~85	400~500	1800~12000	2000~5000
	GN	For inverter circuits, long life, high ripple, miniaturized	-25~85	400~500	1800~12000	2000~5000
	GL	High ripple, long life	-25~85	350~450	1500~12000	20000
	EV	For inverter circuits, long life	-25~105	400~550	2200~6800	2000~5000
	EY	For inverter circuits, long life	-25~105	350~450	1500~12000	7000
Special Type	AM	For audio equipment	-40~85	16~100	470~33000	2000
	DF	For photo flash	-20~55	300, 360	200~1500	-
	LW,SW	For Welding Machine	-25~85	315, 475	225~2200	-
	AR,AH	For inverter Air-Conditioning system	-25~85(105)	-	-	-

### Miniature Aluminum Electrolytic Capacitors




Miniature aluminum electrolytic capacitors are small sized aluminum capacitors in lead wire type. The capacitance is lower than large aluminum capacitors, but with the better impedance characteristic. Various applications are possible with miniature capacitors in lead shape and auto insertion through taping method. The market trends reflect smaller size with lower internal resistance and lower impedance. Miniature capacitors are specifically fit for smoothing power supply and coupling and bypassing on circuits.


Series	Features	Temp. Range (°C)	Vol. Range (VDC)	Cap. Range (µF)	Load Life (hours)	
General Type (85°C)	SD	Standard	-40(-25)~85	6.3~500	1.0~22000	2000
	SS	Standard, height 7mm	-40~85	4~63	0.1~220	2000
	SE	Standard, height 5mm	-40~85	4~63	0.1~330	2000
General Type (105°C)	RD	Standard, wide temp.	-55(-40,-25)~105	6.3~500	2.2~22000	1000~2000
	RM	Wide temp. capacitance wide range, miniature	-55(-40,-25)~105	6.3~450	2.2~22000	1000~2000
	RK	Wide temp. range, height 7mm	-55~105	4~63	0.1~68	1000
Low Impedance	RE	Wide temp. range, height 5mm	-55~105	4~50	0.1~220	1000
	ZS	Height 7mmL, low impedance, high ripple	-40~105	6.3~50	2.2~330	2000
	ZL	Height 7mmL, low impedance, high ripple	-40~105	6.3~50	2.2~330	3000
	ZE	Height 5mmL, low impedance, high ripple	-55~105	6.3~35	1.0~100	2000
	RZ	Extremely low impedance, high reliability	-55~105	6.3~63	1.0~15000	2000~5000
	WL	Extremely low imp., miniaturized, wide voltage	-40~105	6.3~500	0.22~15000	2000~5000
	RP	Extremely low impedance, Long life	-55~105	6.3~50	1.0~15000	4000~10000
	WF	Extremely low imp., miniaturized, long life	-40~105	6.3~100	0.47~15000	5000~10000
	LK	Ultra low impedance	-55~105	6.3~100	1.0~6800	2000~5000
	MK	Ultra low impedance, miniaturized, high ripple	-40~105	6.3~100	0.22~15000	2000~5000
	MZ	Ultra low impedance, miniaturized, high ripple	-40~105	6.3~100	0.47~15000	2000~5000
	MN	Ultra low impedance, high ripple	-40~105	6.3~25	220~3300	5000
	MD	Ultra low impedance, high ripple	-40~105	6.3~16	470~3300	2000
	LZ	Ultra low impedance, long life	-40~105	6.3~50	10~8200	6000~10000
	ML	Ultra low impedance, long life	-40~105	6.3~100	10~15000	6000~10000
Ballast, Charger, Adapter	BA	For PSU applications, smaller case size	-40(-25)~105	160~450	1.0~220	2000
	RH	For PSU applications, high ripple current	-40(-25)~105	160~500	1.0~220	5000
	RU	For PSU applications, high ripple current	-40(-25)~105	160~500	3.3~150	5000
	BH	For PSU applications, high ripple current	-25~105	200~400	2.2~100	5000
	BL	For PSU applications, Long life	-25~105	160~450	4.7~150	10000
	BJ	For PSU applications, extremely long life	-40(-25)~105	160~500	4.7~220	12000
	BK	For ballast applications, high temp. for 125°C use	-25~125	160~450	2.2~47	5000
	BM	For ballast applications, high temp. for 150°C use	-25~150	160~400	2.2~47	2000
CS,CH	For charger, adapter	-25~85(105)	400, 450	2.2~68	2000	
High Reliability	LU	For slim PSU	-40(-25)~105	250, 350, 450, 500	16~150	2000
	LB	For slim PSU, long life	-40(-25)~105	250, 350, 450, 500	16~180	5000~10000
	RB	High temp. range, for 125°C use, miniaturized	-55(-40)~125	6.3~250	0.47~15000	2000
	WT	High temp. range, for 125°C use, Long life, low impedance	-40~125	6.3~35	22~3300	1000~5000
	VA	High temp. range, for 130°C use, low impedance	-40~130	10~35	220~4700	2000~4000
	VB	High temp. range, for 155°C	-40~155	10~100	1.0~4700	1000
	UT	For flame retardancy	-25~105	400,450	2.2~150	2000
Non-Polarized	RN	Wide temp. range	-40~105	6.3~100	0.1~10000	1000
	NP	Standard	-40~85	6.3~250	0.47~10000	2000
	NS	Height 7mm	-40~85	6.3~63	0.1~47	2000
	NE	Height 5mm	-40~85	6.3~50	0.1~47	1000
	BP	For crossover networks	-40~85	25, 50, 100, 200	1.0~100	2000
	BR	For crossover networks, wide temp.	-40~105	200	3.3~100	2000
	NF	For horizontal deflection current correction	-40~85	25, 50	1.0~10	2000
	NH	For horizontal deflection current correction	-40~105	25, 50	1.0~10	2000
Low Leakage	RL	Low leakage current, wide temp. range	-55~105	10~50	0.1~330	1000
	LL	Low leakage current, standard	-40~85	10~100	1.0~4700	2000
	LS	Low leakage current, height 7mm	-40~85	6.3~63	0.1~100	2000
	LE	Low leakage current, height 5mm	-40~85	4~50	0.1~100	1000


Resistors and Resistor Networks Potentiometers and Trimmers Encoders Varistors Capacitors Crystals and Oscillators Inductors and Transformers





Crystals and oscillators – basic components for “creating” of electric signals with stable precise frequencies with a very low temperature dependence. They deploy a mechanical resonance of a vibrating crystal made of piezoelectric material.


 Krystaly a oscilátory - základní komponenty pro "vytváření" elektrických signálů se stabilní a přesnou frekvencí, s velmi malou závislostí na teplotě. Využívají mechanickou rezonanci vibrujícího krystalu, vyrobeného z piezoelektrického materiálu.

 Quarze und Oszillatoren - Basiskomponenten zur "Erzeugung" elektrischer Signale mit stabiler und genauer Frequenz, mit sehr geringer Temperaturabhängigkeit. Sie nutzen die mechanische Resonanz von Schwingquarzen aus piezoelektrischem Material.

 Kristályok és oszcillátorok - stabil, precíz frekvenciájú, környezeti hőmérséklettől nagyon kis mértékben függő elektronikus jelek „előállításának” alapelemei. Működésük során a piezoelektromos anyagból készült rezgőkristály mechanikus rezonanciáját használnák ki.

 Kwarce i oscylatory - podstawowe elementy do "wytwarzania" sygnałów elektrycznych o stabilnej i dokładnej częstotliwości, z małą zależnością od temperatury. Wykorzystują mechaniczny rezonans wibrującego kryształu, wyprodukowanego z materiału piezoelektrycznego.

 Cristalele și oscilatoarele - componente de bază pentru "crearea" unor semnale electrice cu frecvențe stabile, precise, cu o dependență de temperatură foarte redusă. Acestea prezintă rezonanța mecanică a unui cristal vibrant realizat din material piezoelectric.

 Kryštály a oscilátory - základné komponenty pre "vytváranie" elektrických signálov so stabilnou a presnou frekvenciou, s veľmi malou závislosťou na teplote. Využívajú mechanickú rezonanciu vibrujúceho krystalu vyrobeného z piezoelektrického materiálu.

Crystals and oscillators are key components to ensure a stable frequency in all devices, where stable frequency (or timing) is of a big importance, like: clocks, RF devices – receivers and transmitters, processors, filters, signal generators and measuring equipment. Piezoelectric properties of crystals (usually quartz crystals) cause, that a crystal behaves like a circuit composed of an inductor, capacitor and resistor, with a precise resonant frequency. Crystals are used as a part of a resonant circuit, while crystal oscillators are already ready-made circuits which generate signal of a given frequency, after they are connected to a power supply. Ceramic oscillators are a cheaper alternative of crystals and they are a good choice for circuits where lower frequency stability is sufficient.

## Classification

The first step to select a right component is to choose whether you need crystal, ceramic resonator or a crystal oscillator. All types are available in various versions and sizes, and naturally – in a wide range of frequencies. You can also choose SMT, as well as THT types. Radial leaded crystals are the most common type offering very good quality at a reasonable price. Crystal oscillators usually have a rectangular or other “near sinusoidal” output waveform, that’s why they are generally suitable for every circuit or a component (like processor for example) which needs external timing and doesn’t require a signal with a precise sinusoidal waveform. There are also available crystal oscillators with a temperature compensation, providing exceptionally low temperature drift (for example 0.5 ppm).

## Terms

**TCXO** – temperature compensated crystal oscillator, providing exceptionally low temperature drift (for example 0.5 ppm).

**OCXO** – oven controlled crystal oscillator. High quality crystal oscillator encapsulated into a bigger package, heated by a heating element to a stable temperature (for example 60°C). This ensures that the crystal inside works at a stable temperature independently on the outer temperature, resulting in extremely stable frequency.

**VCXO** – voltage controlled crystal oscillator. An oscillator tunable in a certain frequency range by means of an external DC voltage. They provide a convenience of a variable frequency together with a low phase noise.





JAUCH QUARTZ Group, founded in 1964/ Germany, is a highly specialized company developing and producing crystals and crystal oscillators. Top quality crystals from Jauch are used all over the world, from simple to the most innovative high-tech applications.

**CZ** JAUCH QUARTZ Group, založena v roce 1964 v Německu, je vysoce specializovaná společnost, zabývající se vývojem a výrobou krystalů a oscilátorů. Vysoce kvalitní krystaly od společnosti Jauch se používají po celém světě, od jednoduchých až po nejnovatvňější high-tech aplikace.

**DE** JAUCH QUARTZ Group, gegründet im Jahr 1964 in Deutschland, ist ein hochspezialisiertes Unternehmen, das sich mit der Entwicklung und Produktion von Kristallen und Oszillatoren beschäftigt. Qualitativ hochwertige Kristalle des Unternehmens Jauch werden weltweit eingesetzt, von den einfachsten bis zu den innovativsten Hightech-Anwendungen.

**HU** A JAUCH QUARTZ Group-ot 1964-ben alapították Németországban. A cég kristályok és oszcillátorok fejlesztésére és gyártására szakosodott. kiváló minőségű kristályait az egész világon használják a legújabb high-tech berendezéseikig.

**PL** JAUCH QUARTZ Group, założona w roku 1964 w Niemczech, to wysoko wyspecjalizowana spółka zajmująca się rozwojem i produkcją kwarców i oscylatorów. Wysokiej jakości kwarce spółki Jauch stosowane są na całym świecie, od prostych aż po najbardziej innowacyjne aplikacje high-tech.

**RO** JAUCH QUARTZ Group, fondată în 1964/ Germania, este o companie înalt specializată în proiectarea și producerea de cristale și oscilatoare pe cristale. Cristalele de foarte bună calitate de la Jauch sunt utilizate în toată lumea, de la aplicațiile simple la cele inovatoare de înaltă tehnologie.

**SK** JAUCH QUARTZ Group, založená v roku 1964 v Nemecku, je vysoce špecializovaná spoločnosť zaoberajúca sa vývojom a výrobou kryštálov a oscilátorov. Vysoce kvalitné kryštály od spoločnosti Jauch sa používajú po celom svete, od jednoduchých až po najnovatvňejšie high-tech aplikácie.

Jauch provides a comprehensive range of quartz crystals, crystal oscillators, SAW filters and SAW resonators. Many products are also available in versions meeting automotive, military and space specifications. High quality range extends from frequency control products for standard operating conditions to high-stability, shockproof components that are capable of operating under the most extreme conditions. Jauch products provide high reliability even in the most demanding environments.

### Why JAUCH?

- top quality components
- quick deliveries
- long-term availability
- strong technical support





### Did You Know?

Siward Crystal Technology Group (Taiwan) and Jauch Quartz Group have reached a strategic alliance agreement to set up a joint venture company in Singapore, Jauch & Siward Holdings Pte. Ltd., in order to handle the future development needs of both companies.











#### SMD • Tuning Fork Crystals

Type	Frequency range	Size
 JTX310	32.768 kHz	3.2 x 1.5 x 0.9 mm
 JTX410	32.768 kHz	4.1 x 1.5 x 0.8 mm
 JTX520	32.768 kHz	4.8 x 1.9 x 0.8 mm
 SMQ32SL	32.768 kHz	8.0 x 3.8 x 2.4 mm
 SMQ32S	32.768 kHz	9.0 x 3.4 x 3.0 mm
 SMQ32	32.768 kHz	13.2 x 4.9 x 4.5 mm
 SM26F	32.768 kHz	6.0 x 2.0 x 2.0 mm



#### SMD • SMU Series

Type	Frequency range	Size
 SMU2 2 Pad Version	4.194 ~ 60.0 MHz	11.5 x 4.8 x 3.0 mm
 SMU3 2 Pad Version	3.277 ~ 60.0 MHz	11.5 x 4.8 x 4.0 mm
 SMU4 2 Pad Version	3.277 ~ 60.0 MHz	11.5 x 4.8 x 4.0 mm
 SMU5 4 Pad Version	3.579 ~ 60.0 MHz	13.1 x 5.0 x 5.0 mm

#### SMD • Tuning Fork Crystals

Type	Frequency range	Size
 SS2	8.0 ~ 70.0 MHz	11.3 x 4.7 x 2.5 mm
 SS3	3.276 ~ 70.0 MHz	11.3 x 4.7 x 3.6 mm
 SS4	3.276 ~ 64.0 MHz	11.3 x 4.7 x 3.6 mm
 HC49-U	0.921 ~ 250.0 MHz	10.8 x 4.5 x 13.0 mm
 HC49-U SMC SMD Version	0.921 ~ 250.0 MHz	17.5 x 10.8 x 5.3 mm
 MO1 (UM-1)	0.921 ~ 250.0 MHz	7.9 x 3.3 x 8.0 mm
 MO1 SMC SMD Version	0.921 ~ 250.0 MHz	11.7 x 7.8 x 3.4 mm
 MO5 (UM-5)	10.0 ~ 250.0 MHz	7.7 x 3.1 x 5.8 mm
 MO5 SMC SMD Version	10.0 ~ 250.0 MHz	9.7 x 7.7 x 3.4 mm
 MTF38	3.579 ~ 91.0 MHz	3.0 x 3.0 x 8.9 mm

#### Tuning Fork Crystals

Type	Frequency range	Size
 MMTF32	32.768 kHz	2.0 x 2.0 x 6.0 mm
 MTF32	32.768 kHz	3.0 x 3.0 x 8.0 mm



Inductors and transformers are one of the basic electronic components. Inductors store energy, while transformers serve to transfer energy from one circuit to another through inductively coupled transformer's coils.

**Induktory a transformátory** jsou jedny ze základních elektronických komponentů. Induktory dokáží uložit energii, zatímco transformátory slouží k přenosu energie z jednoho obvodu do druhého přes indukčně spojené cívky transformátoru.

**Induktivitäten und Transformatoren** zählen zu den elektronischen Basiskomponenten. Induktivitäten können Energie speichern, während Transformatoren der Energieübertragung von einem Stromkreis in einen anderen über induktiv verbundene Transformatorspulen dienen.

**Az induktívások és transzformátorok** alapvető elektronikai alkatrészek. Az induktívások energiát tárolnak, míg a transzformátorok energiát közvetítenek egyik áramkörből egy másikba, induktívan csatolt tekercsekkel.

**Cewki i transformatory** to jedne z podstawowych elementów elektronicznych. Cewki zdolne są do zmagazynowania energii, transformatory natomiast służą do przenoszenia energii z jednego obwodu do drugiego, poprzez indukcyjnie połączone cewki transformatora.

**Inductoarele și transformatoarele** sunt una din componentele electronice de bază. Inductoarele stochează energia, în timp ce transformatoarele servesc la transferarea energiei de la un circuit la altul prin bobinele transformatorului, cuplate inductiv.

**Indukčnosti a transformátory** sú jedny zo základných elektronických komponentov. Induktory dokážu uložiť energiu, zatiaľ čo transformátory slúžia na prenos energie z jedného obvodu do druhého cez indukčne spojené cievky transformátora.

Inductors are usually made of a copper wire wound in a form of a coil, that's why a „coil“ is a commonly used term, though the term „inductor“ is more technical.

Transformers reach a high efficiency of about 95% and are widely used mainly in power supplies. Another widely used feature of transformers is that they galvanically isolate primary circuit from a secondary one, thus serving as a safety component. Transformers also feature a very long lifetime, resulting from their construction without moving parts, resistance to surges and resistance to a short-time overload.

## Classification

Most important parameter of inductors is their inductance (L) in Henry (H). As a value 1 H is relatively high, more commonly smaller values are used - mH, uH and nH. A real inductor always has also resistance and parasitic capacitance (inter-turn and inter-layer). Main division is to inductors (coils) with an air-core and with a core from a high-permeability material (ferrite, iron, iron powder and other metals are also used). Air-core coils have a superior linearity and power handling (current is limited only by maximum allowed power dissipated, caused by serial resistance of wire). Ferrite-core coils have a much higher inductance at smaller dimensions, with less count of wire turns. From this reason they also usually have a high Q, but the material of a core also limits the maximum working frequency. Maximum usable current through ferrite-core coils is usually limited not by the serial resistance of windings but by a saturation of a core. Ferrite-core coils are mostly used as energy storage and filtering components (chokes).

Besides most common wire-leaded coils also coils in an SMT package are still more used. SMT coils offer benefit in very small dimensions and often also in a higher accuracy. SMT coils are produced as wire-wound (ww) or as a multi-layer chip (MLC).

There is a huge amount of various transformers according to their design and purpose of usage, like autotransformers, multi-phase, leakage, resonant, pulse, audio, RF, instrumentation and other transformers. In our offer we focus mainly on the most often used power supply transformers, used to convert a mains voltage (230 or 110V) to other - usually lower voltage. Further we can divide them into AC transformers for 50/60Hz net and transformers for switch-mode power supplies, working with frequencies of tens to hundreds of kHz. Most common are transformers with iron or ferrite core, in the shape of "EI" or toroidal. Advantage of toroidal transformers is their very small magnetic flux leakage, that's why they are very suitable to be built into sensitive devices (audio amplifiers, RF, measuring, ...).

## Terms

**DCR** - serial resistance of winding (Ohms). Contributes to power losses and limits maximum current through a coil.

**Q** - quality factor is the ratio of coil's inductive reactance to its resistance at a given frequency, thus it is frequency dependent. It represents the efficiency of an inductor.

**SRF** - serial resonant frequency, a frequency at which an inductor gets into a serial resonance, due to a parasitic capacitance.

**Choke** - a coil usually with a ferrite or iron core, used mainly for filtering and EMI suppression.

**Shielded Coil** - a coil designed for a minimum electromagnetic radiation. Usually made as encapsulated by a ferrite or other magnetic-conducting material. Shielding can also be reached by ferrite powder resin coating.

**Current Compensated Choke** - a common mode choke, usually on a toroidal core, with two the same windings. When connected to the DC power line, it acts like an efficient filtering element for in-phase signals of equal amplitude. At the same time this choke acts like practically no inductor for the power line DC current (magnetic fields of both windings act against each other), thus doesn't involve possible in-rush spikes in a power line.

**Wide Band Choke** - a special type of choke, designed for the best performance in a wide frequency range. Used for EMI suppression, RF decoupling. Consists of only few wire-turns to reach a low parasitic capacitance and a high Q.

**Transformer Ratio** - ratio of turns of primary / secondary winding

**Secondary Voltage** - voltage, which we gain on the secondary side if a rated voltage is applied on the primary side (e.g. 230V).

**Temperature Rise** - rising of transformer's temperature against ambient temperature when operated at nominal load.

**Voltage Drop** - drop of output (secondary) voltage (in %) at a nominal load in comparison to no-load conditions.

**Static Copper Shielding** - shielding between windings usually created by a copper foil. Used for eliminating inter-winding capacitance. Useful for example for audio and video devices.

**Center-Tapped Winding** - winding of primary or secondary (or both) coils, where in the center of winding a connection (tap) is made.

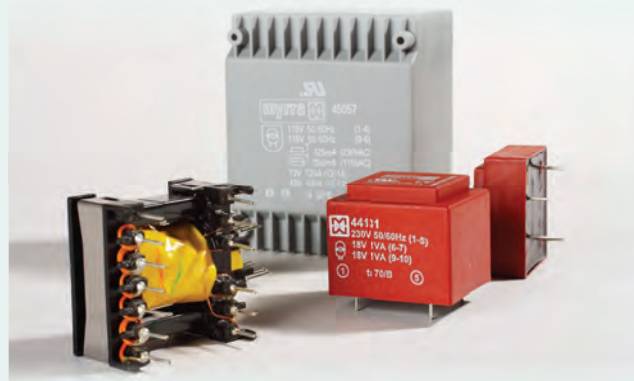
**Autotransformer** - transformer where primary and secondary winding is created by one winding with taps. Allows smaller dimensions and more economical design, but primary and secondary windings are not galvanically separated.

**Pulse Transformer** - transformer designed for high-voltage applications, for example in ignition systems in automotive industry or in photographic flashes.

**Current Sensing Transformer** - transformer (inductor) designed for inductive measuring of AC current flowing through a measured wire. Used for current sensing, overload protection and measuring purposes. Advantage of this method is a galvanic isolation from the measured circuit.

**Audio and Signal Transformer** - specially designed for a good linearity and balanced frequency response. Also used as impedance converter, for example for microphones.

**RF Transformer** - transformer with only few wire turns and a high frequency material core. Used for example to convert impedance of an antenna (for example 300 to 75 Ohms).










FASTRON, founded in 1978, is a Germany based company specializing on inductors. With a wide portfolio of inductors is Fastron a reliable partner for high quality and reliable inductors.

 **FASTRON**, založený v roce 1978, je německá společnost specializující se na indukčnost. Díky širokému portfoliu je Fastron spolehlivým partnerem pro vysoce kvalitní a spolehlivé indukčnosti.

 **FASTRON**, gegründet im Jahr 1978, ist ein deutsches Unternehmen, das sich auf Induktivitäten spezialisiert. Dank seinem breiten Portfolio ist Fastron ein zuverlässiger Partner im Bereich hochwertiger und zuverlässiger Induktivitäten.

 A **FASTRON**-t 1978-ban alapították. A német cég induktorokra specializálódott. Széles termékkatalógusának köszönhetően megbízható partner a jó minőségű és megbízható induktorokkal.

 **FASTRON**, założony w roku 1978, to niemiecka spółka specjalizująca się w produkcji elementów indukcyjnych. Dzięki szerokiej ofercie, Fastron jest niezawodnym partnerem w dziedzinie wysoko jakościowych i niezawodnych elementów indukcyjnych.

 **FASTRON**, fondată în 1978, este o companie cu sediul în Germania, specializată în producția de inductoare. Cu un portofoliu larg de inductoare, Fastron este un partener de încredere pentru inductoare de înaltă calitate și fiabilitate.

 **FASTRON**, založený v roku 1978, je německá společnost specializující sa na indukčnosť. Vďaka širokému portfóliu je Fastron spoľahlivým partnerom pre vysoko kvalitné a spoľahlivé indukčnosť.

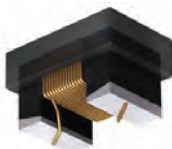
In a wide range of Fastron products can be found miniature SMT inductors, leaded inductors, chokes, power inductors, wide band chokes, RFID transponder coils and many other.

Among strengths of Fastron inductors belong wide portfolio, many specialized types for special applications (for example RFID transponders), stable parameters and a long-term availability.

### Why FASTRON?

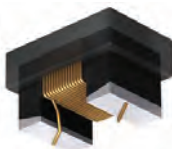
- wide portfolio
- excellent quality
- stable availability

#### 0805AS Series



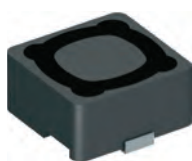
**Material:** Ceramic  
**DC-Current Range:** 60mA to 600mA  
**Inductance Range(L):** 2.7nH to 10000nH  
**Self Resonant Frequency:** 35MHz to 6000MHz  
**Dimensions:** 2,30 x 1,8 x 1,6 mm

#### 0805F Series



**Material:** Ferrite  
**DC-Current Range:** 97 mA to 450 mA  
**Inductance Range(L):** 0,68  $\mu$ H to 22  $\mu$ H  
**Self Resonant Frequency:** 30 MHz to 350 MHz  
**Dimensions:** 2,30 x 1,8 x 1,6 mm

#### PIS 2408, 2812, 4716, 4720 Series



**Material:** Ferrite  
**DC-Current Range:** 0.16 to 4.5A  
**Inductance Range(L):** 2.9  $\mu$ H to 1000  $\mu$ H  
**Dimensions:** standard SMT sizes

#### PISM Series



**Material:** Ceramic  
**DC-Current Range:** 0,65 A to 6,9 A  
**Inductance Range(L):** 1  $\mu$ H to 1000  $\mu$ H  
**Self Resonant Frequency:** 1,7MHz to 115MHz  
**Dimensions:** 13x9,55x5,35mm

#### SMCC Series



**Material:** Phenolic/Ferrite  
**DC-Current Range:** 25mA to 1600mA  
**Inductance Range(L):** 10000 $\mu$ H to 0.1 $\mu$ H  
**Self Resonant Frequency:** 0.35MHz to 380MHz  
**Dimensions:** D4xL9,5mm

#### 09P Series



**Material:** Ferrite  
**DC-Current Range:** 50mA to 5000mA  
**Inductance Range(L):** 33000 $\mu$ H to 1.0 $\mu$ H  
**Dimensions:** D9,5 x L14,0 mm

#### 06H Series



**Material:** Ferrite  
**Impedance:** ...1000 $\Omega$   
**Self Resonant Frequency:** ...500MHz  
**Dimensions:** 10,5 x 6,3 mm

#### 77A Series



**Material:** Ferrite  
**DC-Current Range:** 0.3A to 12A  
**Inductance Range(L):** 10000 $\mu$ H to 3.9 $\mu$ H  
**Dimensions:** D11xL26mm

Also available many other models



**FASTRON, the Inductor's Manufacturer offers a wide Portfolio in Inductors for industrial and commercial Application in our Product Catalogue and website.**

They provide a complete Range in **Chip Inductor** Series from 0402 to 1812 size. These series are copper wire wound Inductors. A goldflash pad-metallization allows an excellent SMT-Reflow soldering result. Core material Ceramic (AS-Type) or Ferrite (F-Type) for individual magnetic requirements.

RFID **Transponder-coil** models 4408AF, 4513FP and 1812AFTC are offered for Application in contactless data transfer, such as Tyre pressure monitoring , keyless entry, Car immobilizer. Therefore, many of the FASTRON Inductors are qualified reg. Automotive AEC-Q200 Requirements.

An attractive Range of **SMD-Power Inductors (PIS )** is available in magnetically shielded and non-shielded version. The **1212FPS** Chip Power Inductor extends the Range by a tiny shielded Model in case size 3x3mm, only 1,5mm hight.

For EMI/ EMV Requirements, there are **Ferrite-BEAD** in SMD (SMB ) and THT (BEAD 4, 8, 10, 92, 06H ) for wideband suppression.

The **CCSH and CCSS-** molded Series in SMD offer the same performance for RF-Inductors than the basic Inductor Family SMCC and HBCC.

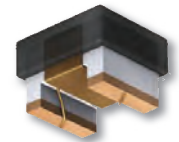
The 10 leaded Models **MICC to XHBCC** with a washable Epoxy coating, content Phenolic Cores (MICC, SMCC) and Ferrite Cores for Application in RF-Filter, Sensor, Circuit protection, LED-Lighting and EMI/ EMV.

The 9 Models **MISC to 77A**, made in a single Layer winding with Insulation Foil, provide a huge component range for UKW-Suppression as well in Power-Line 230Volt.

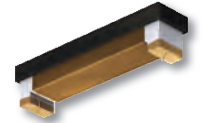
Radial Inductors **07P, 07HCP, 09P, 11P, 11PHC** ( 07P, 09P come in Tube and Cap /F- version) cover a high power range at smallest base.

A Toroid-Inductor series **TLC** with 7 different rated current up to 10Amp., completes the Product Range.

**0805AS**



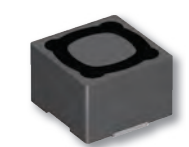
**4408AF**



**PISM**



**PIS4728**



**1212FPS**



**SMB/001**



**BEAD/92**



**CCSH**



**HBCC**



**MESC**



**09P**





Established in 1975, NUVOTEM TALEMA has grown rapidly as a manufacturer of leading-edge toroidal transformers, current transformers and chokes. Over the years, Nuvotem Talema has succeeded in designing, producing and delivering to its customers in excess of 35 million Transformers.

**CZ** NUVOTEM TALEMA byla založena v roce 1975 a působí jako výrobce špičkových toroidních transformátorů, aktuálně transformátorů a tlumivek. Během let si společnost upevnila svoji pozici na trhu v oblasti designování, výroby a dodávky transformátorů.

**DE** NUVOTEM TALEMA wurde 1975 gegründet und ist als Hersteller von Ringkerntransformatoren tätig, aktuell Transformatoren und Drosseln. Im Laufe der Jahre hat das Unternehmen seine Marktposition im Bereich Design, Herstellung und Lieferung von Transformatoren gestärkt.

**HU** Az 1975-ben alapított NUVOTEM TALEMA gyorsan az élvonalba került a toroid transzformátorok, áramátalakítók és fojtótekercek gyártása területén. Az évek során sikeresen tervezett, gyártott és szállított ügyfeleinek több mint 35 millió transzformátort.

**PL** Założona w roku 1975, spółka NUVOTEM TALEMA szybko rozwinęła się jako producent najwyższej klasy transformatorów toroidalnych, transformatorów prądu i dławików. Z biegiem lat, Nuvotem Talema kontynuowała projektowanie, produkcję i dostawy dla swoich klientów i obecnie osiągnęła już ponad 35 milionów wyprodukowanych transformatorów.

**RO** Întințată în 1975, NUVOTEM TALEMA s-a dezvoltat rapid ca producător de transformatoare toroidale de înaltă tehnologie, transformatoare de curent și bobine. Odată cu timpul, Nuvotem Talema a reușit să proiecteze, să producă și să livreze clienților săi peste 35 de milioane de transformatoare.

**SK** NUVOTEM TALEMA bola založená v roku 1975 a pôsobí ako výrobca špičkových toroidných transformátorov a tlumiviek. Počas týchto rokov sa spoločnosť upevnila svoju pozíciu na trhu v oblasti dizajnovania, výroby a dodávky transformátorov.

Today Talema group has more than 1000 employees. Beyond the production of toroids, and various transformers, Nuvotem Talema has developed comprehensive product ranges in telecommunications and network magnetics, such as ISDN, xDSL, 10BaseT, 10/100BaseT. European headquarter, design and administrative centre is in Ireland. Main R&D and production plants are in Czech Republic and India. Production portfolio consists of power transformers, chokes and inductors, SMPS transformers and inductors, Currents sense magnetics, Communication and LAN magnetics.

Talema products are known to be carefully designed for a full load, remaining high efficiency and low power losses even at 100% specified load or current.

### Why TALEMA?

- huge experience and know-how of company
- high-quality and durable components
- carefully designed for a full load (transformers and coils)

### CAB, CAF, CAV, CAX Series

**CA Series** common mode toroidal chokes provide an efficient means of filtering supply lines having in-phase signals of equal amplitude thus allowing equipment to meet stringent electrical radiation specifications. Wide frequency ranges can be filtered by using high and low inductance Common Mode toroids in series. Differential mode signals can be attenuated substantially when used together with input and output capacitors.



#### Features

- Separated windings for minimum capacitance
- Meets requirements of EN138100, VDE 0565, part2: 1997-03 and UL1283
- 1500 VAC, 50 Hz withstanding voltage for 60 seconds min., exceeding requirements of EN60335
- Competitive pricing due to high volume production
- Manufactured in ISO-9001 approved facility

### DPO Series

**DPO Series** Power Inductors provide an excellent, low cost alternative to conventional chokes or inductors. Used in EMI filtering and energy storage, these compact, low radiation inductors are extremely effective in controlling AC output ripple of Switch Mode Power Supplies.



#### Features

- Broad range of inductance values and current ratings
- Low cost, no radiation design
- Hot Solder, pre-tinned leads for easy PC board mounting
- Operating frequency to 100kHz
- Competitive pricing due to high volume production
- Manufactured in ISO-9001:2000, TS-16949:2002 and ISO-14001:2004 certified Talema facility
- Fully RoHS compliant

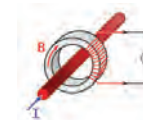
### ASM Series

**ASM Series** current sensors operate as the sealed secondary of a current transformer while the conductor carrying the current to be measured functions as a one turn primary. Measurement accuracy can be improved by increasing the number of primary turns. Applications include detection of branch circuit overload and load drop or shutdown.



#### Features

- Fully encapsulated for optimal PC board mtg.
- Mains frequency of 50/60 Hz
- Primary current ratings from 1 to 100 Amps
- Primary to secondary isolated to 2500 VAC
- Operating temperature range: -40° C to +120°C



### Toroidal Transformers

#### Available in:

- Power: 1.6VA - 7.5kVA per phase
- Special sizes; extremely flat or small diameter, i.e., up to 250VA with 96mm O.D. for European P.C. formats
- Electrostatic copper shielding
- Operating frequencies up to 20kHz
- Assembled 3 phase sets
- Magnetic shielding
- Potting in special housings for sizes up to 1.2kVA
- Secondary voltages available up to 1kV







MYRRA is the France based company founded in 1987 with production plants in France, Poland and China. Myrra specialises on safety plastic moulded transformers, transformers for switch-mode power supplies, inductors, EMI suppression chokes and common mode chokes.

**MYRRA je francouzská společnost, která byla založena v r. 1987. Výrobní závody se nacházejí ve Francii, Polsku a Číně. Myrra se specializuje na bezpečnostní transformátory zalité v plastu, transformátory pro spínané zdroje, indukctory, tlumivky a odrušovací cívky.**

**MYRRA ist ein französisches Unternehmen, das im Jahr 1987 gegründet wurde. Die Produktionsstätten befinden sich in Frankreich, Polen und China. Myrra spezialisiert sich auf in Kunststoff eingegossene Sicherheitstransformatoren, Transformatoren für Schaltnetzteile, Induktivitäten, Drosseln und Entstörspulen.**

**A MYRRA egy francia cég, melyet 1987-ben alapítottak. Gyárai Franciaországban, Lengyelországban és Kínában találhatóak. Műanyagba öntött biztonságos transzformátorok, kapcsolóüzemű tápokra, induktivitásokra, inductívitasokra, fojtó- és szűrőtekercecsekre specializálódtak.**

**MYRRA to spółka francuska, która została założona w roku 1987. Zakłady produkcyjne znajdują się we Francji, Polsce i Chinach. Myrra specjalizuje się w produkcji transformatorów bezpieczeństwa zatopionych w plastiku, transformatorów dla zasilaczy impulsowych, dławików i cewek przeciwzakłóceńowych.**

**MYRRA este o companie cu sediul în Franța fondată în 1987 cu fabrici în Franța, Polonia și China. Myrra este specializată în transformatoare cu plastic turnat de siguranță, transformatoare pentru sursele de alimentare switch-mode, inductoare, bobine EMI scadere șocuri și șocuri în mod comun.**

**MYRRA je francúzska spoločnosť, ktorá bola založená v r. 1987. Výrobné závody sa nachádzajú vo Francúzsku, Poľsku a Číne. Myrra sa špecializuje na bezpečnostné transformátory zaliate v plastu, transformátory pre spínané zdroje, indukctory, tlumivky a odrušovacie cievky.**

Myrra transformers are carefully designed for a given power range, offering low losses, high reliability and safety. In the production range we can find transformers of EI type, as well as low profile UI type. All transformers are vacuum-filled with self-extinguishing UL-94 V0 resin.

### Why MYRRA?

- company specialized on transformers and coils
- high reliability and safety of products

### Moulded Transformer for PCB

#### 44000 Series

- Vacuum filling
- Two compartments bobbins
- Self-extinguishing plastics UL 94 VO
- Degree of protection IP 00
- 40 grams weight
- Resin class B CEI 85 (20 000 h testing to CEI 126)
- Inherently short-circuits proof
- Insulation voltage 4 KV (6 KV MYRRA test)
- 100% tested production
- Certification: CCA procedure on request
- Available powers 0.6VA - 30VA



### Flat Core Transformers

#### 45000 Series

- 115V/230V supply voltage by series/parallel
- Vacuum filling
- One compartment housing
- Degree of protection IP 00
- 50 grams weight
- Resin UL 94 VO
- Design protection against short-circuits
- Insulation voltage 4 KV (6 KV MYRRA test)
- 100% tested production

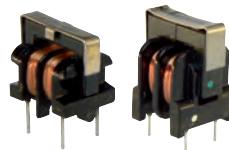


Many other types available...



### Common mode chokes

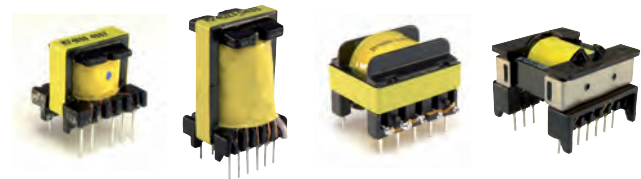
74330, 74332 74311



Common mode chokes range for EMI suppression. Mainly used to reduce noise conducted through power or signal lines. The common mode inductance filters symmetrical noise, associated with Y-type safety capacitors connected to ground. The differential mode inductance filters asymmetrical noise, associated with X-type capacitor connected between Line and Neutral.

- ambient temperature 3/4 50°C
- dielectric strength „ 1.5 kV between windings
- electrical characteristics at 25°C

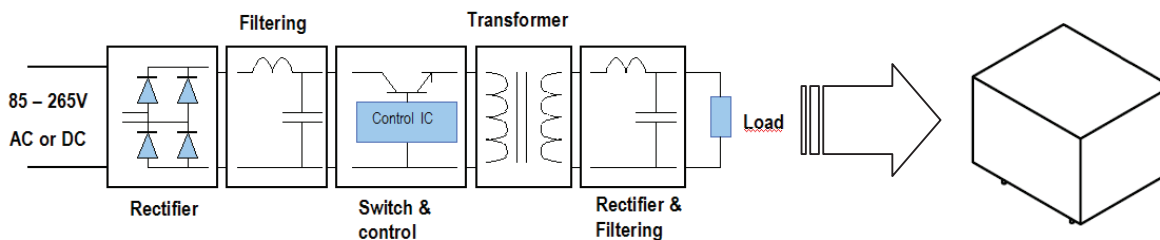
### Transformers for Power Switching Supplies



Transformers of the 740xx series from company Myrra offer advantage in a fact, that they are optimized directly for usage with a certain control circuit (chip). That's why they eliminate a necessity of relatively demanding design of custom transformer, or extensive comparing of parameters according to which you'd have to choose a suitable type. Transformers provide a high level of safety - they are made of exclusively UL94-V0 listed materials and they feature a high primary/secondary insulation of more than 4000V.

Type	Core	Max. power	Rated output voltage V <sub>DC</sub>				Control IC P/N	
74000	E16	5W	5V	12V			VIPer20	
74001	E16	6W	5V				TDA16831	
74010	E16	12W	5V	12V			TDA16831	
74023	EL19	16W	3.3V	5V	12V	18V	30V	TOP243P
74030	E25	30W	5V	12V	12V			TDA16832
74040	ETD29	60W	5V	12V	5V	12V		TDA16834
74050	ETD34	90W	5V	12V	5V	12V		TDA16834
74080	EF20	24W	12V	12V				TOP243P

### Switching Power Supplies

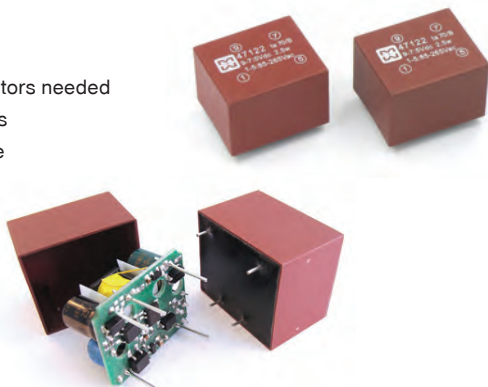


### 47000 Series

Dimensionally compatible case of standard EI30 transformer can provide more power performance to DC output voltage. The main advantage is the replacement of rectifier, capacitor filter and linear regulator with large heatsink, which significantly reduce PCB space and eliminates the overheating problems with your device. Versions are produced by a power performance from 2.5 to 5W output voltage of 3 to 24Vdc.

Available are models with single output (regulated or non-regulated), as well as with dual common or isolated output (also 2 different voltages available)

- high efficiency
- lower weight
- no filter capacitors needed
- low heat losses
- profitable price



### One Output 2.5 & 5W - Regulated

Reference	Output voltage (DC Volts)	Output current (DC mA)	Output Power (W)	Ta (°C)
47121	3.3	750	2.5	+70
47122	5	550	2.75	+70
47123	9	270	2.5	+70
47124	12	210	2.5	+70
47125	15	170	2.5	+70
47126	24	110	2.5	+70
<hr/>				
47151	3.3	1350	4.2	+50
47152	5	900	4.5	+50
47153	9	550	5	+50
47154	12	420	5	+50
47155	15	320	5	+50
47156	24	220	5	+50

### One Output 3.2 & 5W Non Regulated

Reference	(DC Volts)	Output current (DC mA)	Output Power (W)	Ta (°C)
47114	12	200	2.4	+70
<hr/>				
47133	9	360	3.2	+70
47134	12	270	3.2	+70
47136	24	130	3.2	+70
<hr/>				
47163	9	560	5 *	+50
47164	12	420	5 *	+50
47166	24	210	5 *	+50

\* Power up to 5.4W is possible with input voltage  $\geq 97$  Vac

- Increased power. 3 x compared to standard EI30 transformer
- Better energetic efficiency: 70% typical compared to 40% for the conventional supply
- Very low Standby Power consumption: meets requirements of Energy Star or EC Code of Conduct
- Same footprint as EI30 transformer : Upgrade your application without redesign of PCB
- Wide input voltage range (85 to 265 Volts AC, 85 to 370 Volts DC)
- Operating ambient temperature:  $-25^{\circ}\text{C} / +T_a$  (See table)
- Prepared for Class II – reinforced insulation
- Input / Output Isolation test voltage: 4000 Vac
- Output short circuit protection: automatic restarts when fault condition is removed
- Thermal shutdown with automatic recovery if internal temperature exceeds allowable value

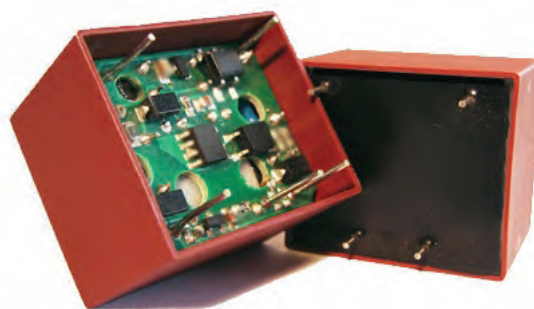
### Two Common Outputs 3 to 5W - Regulated

Reference	Output 1 Output 2 (DC Volts)	Output 1 Output 2 (DC mA)	Output Power (W)	Output 1 Output 2 accuracy	Ta (°C)
47243	+10.5 +7	380 max 100 max	4 *	$\pm 3\%$ $\pm 15\%$	+60
47244	+15 +7	300 max 70 max	4 *	$\pm 3\%$ $\pm 15\%$	+60
47245	+12 +5.5	130 max 300 max	3.2	$\pm 5\%$ $\pm 10\%$	+70
47246	+5 +12	400 (600max) 170 max	4	$\pm 3\%$ $\pm 15\%$	+60
47247	+15 -15	130 max 130 max	4	$\pm 8\%$ $\pm 8\%$	+60

\* Power up to 5W is possible with input voltage  $\geq 97$  Vac and  $T_a \leq 50^{\circ}\text{C}$


### Two Isolated Outputs 3 to 5W - One Output Regulated


Reference	Output 1 Output 2 (DC Volts)	Output 1 Output 2 (DC mA)	Output Power (max W)	Output 1 Output 2 accuracy	Ta (°C)
47252	5 5	350 (600max) 350 max	3.5	$\pm 3\%$ $\pm 15\%$	+60
47254	12 12	165 (300max) 165 max	4	$\pm 5\%$ $\pm 15\%$	+60
47255	15 15	135 (200max) 135 max	4	$\pm 5\%$ $\pm 15\%$	+60
47257	5 12	400 (600max) 170 max	4	$\pm 3\%$ $\pm 15\%$	+60
47258	18 8	150 (200max) 150 max	4	$\pm 5\%$ $\pm 15\%$	+60








RFI filters protect devices from interference and also they prevent leakage of noise or other disturbances from the device to a power line or to other devices. As these components ensure a proper function of devices, they should be used in almost every device.


 RFI filtry chrání zařízení před rušením a také zabraňují průniku rušení ze zařízení do napájecí sítě nebo do jiných zařízení. Vzhledem k tomu, že tyto komponenty zajišťují správnou funkci zařízení, měly by být použity v téměř každém zařízení.

 Funkentstörfilter schützen Geräte vor Störungen und hindern die Störungen zugleich an deren Durchdringung vom Gerät ins Versorgungsnetz oder in andere Geräte. Zumal diese Komponenten die richtige Gerätefunktion sicherstellen, sollten sie in fast allen Geräten zum Einsatz kommen.

 Az RFI szűrők védik a berendezéseket az interferenciától valamint megelőzik a zaj és egyéb zavarjelek kikutását a tápfeszültség vezetékekre vagy másik berendezésekre. Alkalmazásuk szinte minden berendezésben ajánlott, mivel a helyes működés általuk biztosított.

 Filtry RFI chronią urządzenia przed zakłóceniami, jak również ograniczają przenikanie zakłóceń z urządzenia do sieci elektrycznej, lub też do innych urządzeń. Ponieważ elementy te zapewniają poprawną funkcję urządzeń, powinny być stosowane prawie w każdym urządzeniu.

 Filtrele RFI protejează dispozitivele de interferență și de asemenea, previn eliberarea zgomotului sau a altor perturbații de la aparat la o linie de alimentare sau la alte aparate. Intrucât aceste componente asigură o funcționare corectă a aparatelor, ele ar trebui folosite la aproape toate dispozitivele.

 RFI filtre chránia zariadenia pred rušením a tiež zabraňujú prieniku rušenia zo zariadenia do napájacej siete alebo do iných zariadení. Keďže tieto komponenty zaisťujú správnu funkciu zariadení, mali by byť použité v takmer každom zariadení.

RFI (radio frequency interference), also called EMI (electromagnetic interference) is disturbance that affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source. As RFI is able to interrupt, obstruct or otherwise degrade or limit the proper function of the device, it is always unpleasant and undesired phenomenon. With still more electric devices used in all segments of our lives, there are still more possible sources of interference. From this reason a new developed device can work in your laboratory conditions, but may not function in real conditions. The only solution is to use proper form of filtering in a form of RFI filters. These filters also contribute to a good electromagnetic compatibility (EMC) of devices, ensuring a trouble-free function of even bigger units.

## Classification

Essential components of the most of RFI filters are passive components – inductors, capacitors, and sometimes also resistors. The most of RFI filters are created by a combination of inductors and capacitors, creating simple or more complex filters. Because the biggest portion of RFI energy is usually situated in relatively higher frequencies, are RFI filters

the most often constructed as low-pass filters. Every filter has its spectral characteristics, which can be found in datasheets, which determine the best suitable way of use. From the construction point of view, we can divide RFI filters to leaded (THT) filters, SMD filters and filters for the 230V power line.







SCHURTER is an internationally leading innovator and manufacturer of fuses, connectors, circuit breakers, input systems and EMC products. The company was founded by Heinrich Schurter in 1933. All activities are centralized into the Schurter Holding AG based in Lucerne/Switzerland since 1990.

**CZ** SCHURTER je přední inovátor a výrobce pojistek, konektorů, jističů, vstupních systémů a EMC produktů. Společnost založil v r. 1933 Heinrich Schurter. Od r. 1990 jsou všechny aktivity centralizovány do Schurter Holding AG s centrálou v Luzernu / Švýcarsko.

**DE** SCHURTER ist der führender Innovator und Produzent von Sicherungen, Konnektoren, Schutzschaltern, Eingabesystemen und EMV-Produkten. Das Unternehmen wurde 1933 von Heinrich Schurter gegründet. Seit 1990 sind sämtliche Aktivitäten unter dem Dach der Schurter Holding AG mit Sitz in Luzern/Schweiz zusammengefasst.

**HU** A SCHURTER biztonságtechnik, csatlakozók, kioldók, beléptető rendszerek és EMC termékek vezető gyártói és fejlesztői közé tartozik. A céget 1933-ban Heinrich Schurter alapította. 1990-től minden tevékenységük a Schurter Holding AG-ban központosul a svájci Lucerne-ben található központban.

**PL** SCHURTER to wiodący innowator i producent bezpieczników, konektorów, bezpieczników automatycznych, systemów wejściowych oraz produktów EMC. Spółkę założył w roku 1933 Heinrich Schurter. Od r. 1990 wszystkie działalności zostały zcentralizowane do Schurter Holding AG, z centralą w Lucern / Szwajcaria.

**RO** SCHURTER este un producător internațional inovator de siguranțe, conectoare, întrerupătoare, sisteme de intrare și produse EMC. Compania a fost înființată de către Heinrich Schurter în 1933. Toate activitățile sunt centralizate în Schurter Holding AG cu sediul în Lucerne/Elveția din anul 1990.

**SK** SCHURTER je vedúci inovátor a výrobca poisťiek, konektorov, ističov, vstupných systémov a EMC produktov. Spoločnosť založil v r. 1933 Heinrich Schurter. Od r. 1990 sú všetky aktivity centralizované do Schurter Holding AG, s centrálou v Lucerne/Švajčiarsko.

Schurter produces a wide range of fuses and protective components like telecom fuses, resettable fuses, varistors, fuseholders, power entry modules with and without filters, over- and under-voltage protection.

### Why SCHURTER?

- highly specialised company with a big experience
- top quality products
- components meet applicable international safety standards

### Did You Know?


The MGA-S type fuse complies with ESA/ESCC generic specification No. 4008 for use in space.


### Short Overview of RFI 230V Filters from SCHURTER


	5500	FPP-02	FMLB-41	FMW-52	FMAB
<b>Technical parameters</b>					
Operating current/voltage	1-6A/250V AC		0.5-6.5A/250V AC	1-10A/250V AC	2-6A/250V AC
Breakdown voltage L-N, L/N-PE	1.7kVAC, 2.7kVAC		2.7kVAC, 1.7kVAC	2.7kVAC, 1.7kVAC	2.7kVAC, 1.7kVAC
Filter stage	1		1	1	2
Type of terminals	in PCB		in PCB	FASTIN 6,3x0,8 mm	FASTIN 6,3x0,8 mm
Operating temperature range	-25°C up to 85°C		-25°C up to 85°C	-25°C up to 100°C	-25°C up to 100°C
Dimensions WxLxH	26,6x30x23,2 mm		24x45x17,5 mm	46x67x25 mm	46x77x31 mm


	KFS; KFX	KFA	EF12	FKHD; FKID	Felcom 54
<b>Technical parameters</b>					
Max. current/voltage	10A/250V AC	10A/250V AC	10A/250V AC	10A/250V AC	6A/250V AC
Breakdown voltage L-N, L/N-PE	4kVAC, 5kVAC (KFX)	1,7kVAC, 2,7kVAC	1,7kVAC, 2,7kVAC	1,7kVAC, 2,7kVAC	1,7kVAC, 2,7kVAC
Type of terminals	FASTIN 6,3x0,8 mm	FASTIN 6,3x0,8 mm	FASTIN 6,3x0,8 mm	FASTIN 6,3x0,8 mm	FASTIN 3,5x0,8 mm
Operating temperature range	-25°C up to 85°C	-25°C up to 85°C	-10°C up to 55°C	-25°C up to 85°C	-25°C up to 85°C
Front panel protection	IP40	IP40	IP40	IP40	IP40
Mounting hole dimensions	21,5x28,5 mm	33x36 mm	33,9x81 mm	29,5x61 mm	111x30 mm

Thermistors are passive components, whose properties change according to ambient temperature. There are available types with a positive and negative temperature characteristics (PTC and NTC).


 *Termistory jsou pasivní součástky, jejichž vlastnosti se mění v závislosti na jejich teplotě. Dostupné jsou typy s pozitivní a negativní teplotní závislostí.*

 *Thermistoren sind passive Bauelemente, deren Eigenschaften in Abhängigkeit aufgrund von der Temperatur variieren. Erhältlich sind Modelle mit positiver sowie negativer Temperaturabhängigkeit.*

 *A termistorok passzív alkatrészek, melyek a hőmérsékletüktől függően változtatják tulajdonságaikat. Léteznek pozitív és negatív hőmérsékleti együtthatójú változatok (PTK és NTK).*

 *Termistory to elementy pasywne, których właściwości zmieniają się zależnie od ich temperatury. Dostępne są typy z pozytywną lub negatywną zależnością od temperatury.*

 *Termistoarele sunt componente pasive, ale căror proprietăți se schimbă în funcție de temperatura lor. Sunt disponibile tipuri cu caracteristici de temperatură pozitivă și negativă (PTC și NTC).*

 *Termistory sú pasívne súčiastky, ktorých vlastnosti sa menia v závislosti na ich teplote. Dostupné sú typy s pozitívnou a negatívnou teplotnou závislosťou.*

Thermistors are used in electronic circuits already for many decades. As their resistance depends on their temperature, they can be used as relatively cheap and reliable temperature sensors. Because a temperature of a thermistor can also be increased by a heat generated by a current flowing through a thermistor, these components are also often used for an effective circuit protection - inrush current limiters or on the opposite side - as overcurrent limiters and overload protection.

## Classification

There are two main groups of thermistors - with positive temperature characteristics (PTC) and with negative temperature characteristics (NTC). As already their names say, PTCs increase their resistance with increasing temperature and NTCs decrease their resistance with a decreasing temperature. Though principally you can sometimes use the same thermistor for sensing a temperature, as well as for circuit protection purposes, there are some differences between them.

Thermistors designed for temperature sensing are usually physically smaller, available with resistance from tens or hundreds of Ohms to hundreds of kOhms. Very important parameter of these thermistors is the curve of dependency on temperature. The accuracy of a circuit using thermistor for measuring of temperature can be further increased by a calibration (storing values to a microprocessor's memory). As a sensing element, they are operated with a minimum current, so that the current through a thermistor wouldn't cause an undesired increase of thermistor temperature.

Thermistors designed for circuit protection purposes are usually physically bigger and mainly - they are designed in such a way, that when properly used, they shouldn't influence a circuit powered through a thermistor. In other words, at a normal operation is their resistance relatively very small (milliOhms to tens of Ohms), thus the voltage drop on them is negligible.

**NTC circuit protectors** act at a circuit power-up, when a higher initial resistance prevents too high inrush currents. Within a very short time after switch-on of a circuit, a temperature of an NTC will rise what will cause a substantial decreasing of an NTC's resistance. Continuous operating current of a circuit will keep an NTC at an increased temperature, thus in a low resistance statement.

**PTC circuit protectors** act as overcurrent limiters. They are produced in various values with a specified operating current. At normal operating conditions (below a max. specified current) a PTC has a low temperature, thus a low resistance. In case of an overcurrent, an excess current causes temperature rise resulting in a rapid increase of thermistor resistance.

## Terms

**B value** - The B value is determined by the ceramic material and represents the slope of the R/T curve. The specifications refer in most cases to resistance values at temperatures of 25 °C (T1) and 100 °C (T2); i.e. B25/100. For SMD NTCs B25/50 and B25/85 values are usually given for information in datasheets. Figure below illustrates the dependence of the R/T characteristic on the B value.

Polyswitch resettable fuses can be found in chapter 6 (Electromechanics and Assembly / Fuses)

## PTC Thermistors

Positive temperature coefficient thermistors designed for over current and short-circuit protection applications

FEATURES: lead-free terminals, manufacturer's logo and type designation stamped on in white, low resistance, for rated currents of up to 1,8 A, UL approval and VDE approval.

Technical parameters	PTC30	PTC265
Max. operating voltage	30 V	265 V
Temperature	120°C	80 °C
Switching Time	< 10 s	< 6 s
Resistance Tolerance	25 %	25 %



## NTC Thermistors

### 640 Series

These thermistors have a negative temperature coefficient. The device consists of a chip with two tinned solid copper-plated leads. It is grey lacquered and colour coded, but not insulated. FEATURES: accuracy over a wide temperature range, high stability over a long life, excellent price/performance ratio. APPLICATIONS: temperature sensing and control.

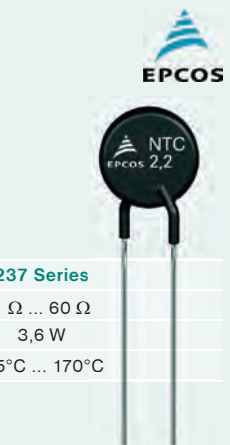
Technical parameters	640 Series
Resistance value at 25 °C	680 Ω ... 470 kΩ
Maximum dissipation	0,5 W
Operating temperature range	-40°C ... 125°C
Response time	1,2 s



### 237 Series

NTC thermistors for inrush current limiting, as all NTCs, are made of polycrystalline mixed oxide ceramics. They suppress high inrush current surges, which occur when, for example, low impedance smoothing capacitors are charged.

Technical parameters	237 Series
Resistance value at 25 °C	1 Ω ... 60 Ω
Maximum dissipation	3,6 W
Operating temperature range	-25°C ... 170°C





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# Automation


Industrial Automation 248





Components for industrial automation serve, as already their name says, for use in various devices serving for automation of production processes, ensuring their function and also their safety.


 Komponenty pro průmyslovou automatizaci slouží, jak říká již jejich název, k použití v různých zařízeních pro automatizaci výrobních procesů, zajišťující jejich funkci a také jejich bezpečnost.

 Komponenten für die industrielle Automatisierung dienen, wie der Name schon sagt, zur Verwendung in verschiedenen Vorrichtungen zur Automatisierung von Produktionsprozessen, wobei sie deren Funktion sowie Sicherheit sicherstellen.

 Ahogyan a nevükből is kiderül, ezek az alkatrészek különböző termelési folyamatok automatizálására során látnak el működési és biztonsági funkciókat.

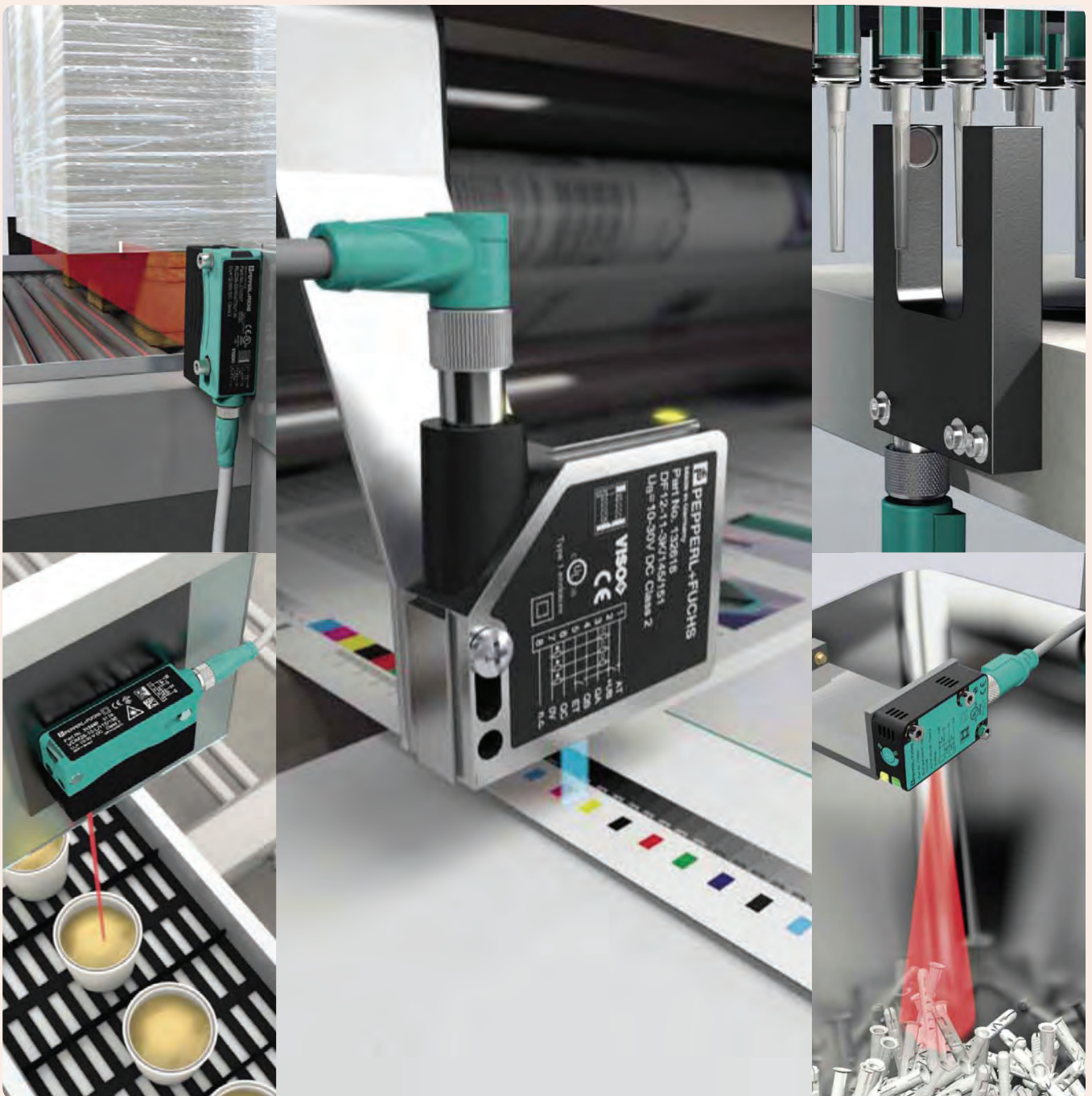
 Podzespoły do automatyzacji przemysłowej służą, jak wynika z nazwy, służą do zastosowania w różnych urządzeniach dla zautomatyzowania procesów produkcyjnych, zapewniając ich funkcję oraz bezpieczeństwo.

 Componentele pentru automatizarea industrială servesc, după cum le spune și numele, pentru a fi utilizate la diferite dispozitive folosite la automatizarea proceselor de producție, asigurându-le funcția și siguranța.

 Komponenty pre priemyselnú automatizáciu slúžia, ako hovorí už ich názov, na použitie v rôznych zariadeniach pre automatizáciu výrobných procesov, zaisťujúc ich funkciu a tiež ich bezpečnosť.

In this category you can find proximity sensors, control components like for example counters and timers, indicators, energy meters, panel meters and temperature controllers and various limit switches.

Proximity sensors are usually inductive, capacitive and photoelectric. Each type has its own advantages and different range of working distances and detected materials. Inductive sensors belong thanks to their reliability to the most often used proximity sensors. Inductive sensors are sensitive mainly to ferrous materials, but also non-ferrous materials can be detected (on a smaller distance). In general, photoelectric sensors can provide detection up to relatively longest distance, but they are more sensitive for a pollution of their transparent cover, thus not suitable to extremely dusty environment.







Since its establishment in 1933 as Tateisi Electric Manufacturing Co., OMRON has supported industry with innovative solutions and advanced technologies. Omron's electronic component business makes full use of state-of-the-art technology.

**CZ** Od svého založení v roce 1933 jako Tateisi Electric Manufacturing Co podporuje společnost OMRON průmysl inovativními řešeními a pokročilými technologiemi. Elektronické součástky od společnosti Omron plně využívají nejmodernější technologii.

**DE** Seit seiner Gründung im Jahr 1933 als Tateisi Electric Manufacturing Co. unterstützt das Unternehmen OMRON die Industrie mit innovativen Lösungen und fortgeschrittenen Technologien. Elektronische Bauelemente des Unternehmens Omron nutzen vollständig die modernste Technologie.

**HU** Az 1933-as alapítása óta a Tateisi Electric Manufacturing Co. támogatja az OMRON iparát innovatív megoldásokkal és haladó technológiával. Az Omron elektronikai alkatrészei teljes mértékben kihasználják a legújabb technológiákat.

**PL** Od swego założenia w roku 1933 jako Tateisi Electric Manufacturing Co, spółka OMRON wspiera przemysł poprzez innowacyjne rozwiązania i zaawansowane technologie. Elementy elektroniczne spółki Omron w pełni wykorzystują najnowocześniejszą technologię.

**RO** De la înființarea sa în 1933 ca Tateisi Electric Manufacturing Co., OMRON a sprijinit industria cu soluții inovatoare și tehnologii avansate. Afacerea cu componente electronice a companiei Omron face uz deplin de tehnologia cea mai modernă.

**SK** Od svojho založenia v roku 1933 ako Tateisi Electric Manufacturing Co, podporuje spoločnosť OMRON priemysel inovatívnymi riešeniami a pokročilými technológiami. Elektronické súčiastky od spoločnosti Omron plne využívajú najmodernejšiu technológiu.

With over 35 000 employees Omron supplies the world with innovative electronic and mechanical components that create smooth interfaces between people and machines, supporting ubiquitous computing. To Omron products belong for example switches, solid state relays (SSR), electromechanical relays, inductive and capacitive proximity sensors, photoelectric sensors, timers and many other programmable devices for industry automation.

## Why OMRON?

- innovative Japan company with over 85 years history
- globally known widely used components
- top quality and reliable components

## Did You Know?

In 1960, Omron invented World's first non-contact (solid state) proximity switch.

## Sensors

OMRON Sensing Components detect, measure, analyze, and process various changes that occur on production sites, such as changes in position, length, height, displacement, and appearance.



### Photoelectric Sensors

OMRON provides many varieties of Sensor, including diffuse-reflective, through-beam, retro-reflective, and distance-settable Sensors, as well as Sensors with either built-in or separate amplifiers and Fiber Units.

### Proximity Sensors

Proximity Sensors are available in models using high-frequency oscillation (INDUCTIVE) to detect ferrous and non-ferrous metal objects and in CAPACITIVE models to detect non-metal objects. Models are available with environment resistance, heat resistance, resistance to chemicals, and resistance to water.

## Microswitches - Unsealed and Sealed



Range of high quality precision microswitches including industry standard V switches which are compact and highly reliable. Range of fully sealed microswitches to IP67 specification. Protect against ingress of water and dust. Range includes the D2HW with extra long stroke and the extra small D2JW. Also available are the DC types with built-in magnetic blowout, extinguishing a possible arc.

## Safety Limit Switches

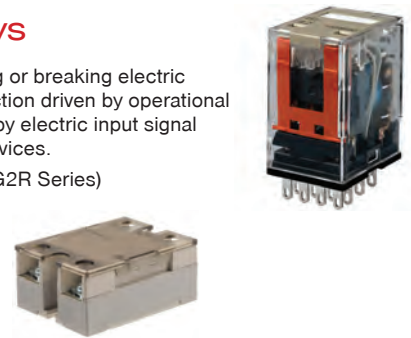


Limit Switch are basic switches that have been encased to protect them from external forces, water, oil, and dirt. Many models are available, such as those resistant to head, cold, or corrosion, as well as high-precision models.

## Industrial Relays

Relays are devices making or breaking electric circuits by their output section driven by operational signal, which is triggered by electric input signal controlled by switching devices.

- General purpose (MY, G2R Series)
- Plug-in Relays
- Interface Relays
- Safety Relays
- Solid State Relays (G3PE, G3NA Series)



## Control Components and Indicators

Control Components provide ideal control at production site through counters, cam positioners, Timers, Timer Switches, Digital Temperature Controllers, and other input, control, and output components.

- Temperature controllers
- Counters (H3CR Series)
- Timers
- Programmable Relays (ZEN Series)
- Digital Panel Indicators (K3HB Series)



## Power Supplies


OMRON provides many types of general-purpose power supplies, such as the type mounted to DIN rail or the type built into equipment. OMRON also provides types like S8VS, providing notification of replacement timing and the buffer block that handles momentary power interruptions and other highly reliable power supplies.











PEPPERL+FUCHS is a leading developer and manufacturer of electronic sensors and components for the industrial automation. Continuous innovation, enduring quality, and steady growth guarantees continued success already for more than 60 years.


 PEPPERL+FUCHS je přední výrobce elektronických senzorů a součástek pro průmyslovou automatizaci. Neustálé inovace, kvalita a trvalý růst jsou zárukou úspěchu již více než 60 let.

 PEPPERL+FUCHS ist ein führender Hersteller von elektronischen Sensoren und Komponenten für die industrielle Automatisierung. Ständige Innovationen, Qualität und Wachstum sind Garantie des fortschreitenden Erfolgs seit mehr als 60 Jahren.

 PEPPERL+FUCHS az elektronikus érzékelők és alkatrészek egyik vezető gyártója az ipari automatizálás számára. Folyamatos fejlesztés, minőség és tartós növekedés a garancia a folyamatos sikerre már több mint 60 éve.

 PEPPERL+FUCHS to jest liderem wśród producentów czujników elektronicznych oraz elementów dla automatyzacji przemysłowej. Ciągłe innowacje, jakość i trwały rozwój są gwarancją sukcesu już od ponad 60 lat.

 PEPPERL+FUCHS este un dezvoltator și producător de frunte de senzori electronici și componente pentru automatizarea industrială. Inovația continuă, calitatea durabilă și dezvoltarea constantă garantează continuarea succesului deja de peste 60 de ani.

 PEPPERL+FUCHS je popredný výrobca elektronických senzorov a súčiastok pre priemyselnú automatizáciu. Neustále inovácie, kvalita a trvalý rast, sú zárukou pokračujúceho úspechu už viac ako 60 rokov.

Pepperl+Fuchs employs 5,200 people worldwide and has manufacturing facilities in Germany, USA, Singapore, Hungary, Indonesia and Vietnam, most of them ISO 9001 certified. The company consists of two Divisions:

The Factory Automation Division is a leading manufacturer of industrial sensors designed to address specific market needs on a global basis, with a full range of inductive, capacitive, photoelectric, and ultrasonic sensors as well as identification systems, barcode and camera systems, rotary encoders, position measurement systems, cordsets, and other accessories.

The Process Automation Division is the undisputed market leader in intrinsically safe explosion protection components and protection of hazardous area applications. Pepperl+Fuchs products enable you to combine a wide range of electronic equipment into complete, application-oriented system solutions. You can choose from many modules of various product lines: isolated barriers, signal conditioners, fieldbus

## Why PEPPERL+FUCHS?

- global leader in factory and process automation
- wide range of complete solutions for a variety of industry segments

infrastructure solutions, remote I/O systems, HART interfaces, level measurement devices, purge and pressurization systems, industrial monitors and HMI solutions, power supplies, alarm systems for oil separators, signaling equipment, lighting as well as emergency shutdown equipment and accessories.

## Inductive Sensors

Inductive proximity sensors are the preferred choice for the majority of applications requiring accurate, non-contact detection of metallic objects in machinery or automation equipment. As a pioneer and market leader, Pepperl+Fuchs offers innovative, high quality inductive sensors.

### Series:

- BT
- CBN
- NBN
- NBB
- NCB
- NCN
- NJ
- RJ



## Ultrasonic Sensors

Ultrasonic sensors present the ideal solution for non-contact position and distance measurement in all industrial areas where environmental conditions such as dust, smoke or steam may affect the sensors. Objects consisting of a variety of materials can be detected to within millimeters regardless of color or shape.

### Series:

- LUC4T
- UB
- UBE
- UDB
- UDC



## Photoelectric Sensors

Pepperl+Fuchs offers a wide range of photoelectric sensors, fiber optic cables, & accessories. Pepperl+Fuchs with the brand VISOLUX is an innovator of photoelectric sensing technologies for precise, optical control of positioning, sorting, and counting processes and for custom non-standard applications.

### Series:

- BB10
- G12
- GA18
- GD18
- KS
- GLK
- GLV
- RL
- MLV



## Capacitive Sensors

Capacitive sensors allow for the detection of both, conductive and non-conductive materials, but are most commonly used for sensing materials such as plastics, liquids, powders and granular materials.

### Series:

- CBB
- CBN
- CCB
- CCN
- CJ
- FTK
- PB





TRUMETER founded in 1937 in Manchester/ UK, is a global designer, manufacturer and distributor of sophisticated distance and length measurement instruments, electronic counters, panel meters, automotive lighting systems and LED lighting applications.

**CZ** TRUMETER byl založen v roce 1937 v Manchesteru / Velká Británie, je globální designér, výrobce a distributor měřicích přístrojů pro měření vzdálenosti a nástrojů pro měření délky, elektronických čítačů, panelových měřicích přístrojů, automobilových osvětlovacích systémů a aplikací LED osvětlení.

**DE** TRUMETER, gegründet im Jahr 1934 in Manchester/UK, ist ein globaler Designer, Hersteller und Distributor von hoch entwickelten Instrumenten zur Entfernungs- und Längenmessung, elektronischen Zählern, Panel-Messgeräten, Automobil-Beleuchtungssystemen und LED-Beleuchtungsanwendungen.

**HU** A TRUMETER céget 1937-ben, az angliai Manchesterben alapították. A cég kifizető távolság- és hossz mérő műszerek, elektronikus számlálók, panelműszerek, gépjármű világítási rendszerek és LED világítási megoldások globális tervezője, gyártója és forgalmazója.

**PL** TRUMETER założony w roku 1937 w Manchester/ UK, jest całościowym projektantem, producentem i dystrybutorem zaawansowanych urządzeń do pomiarów odległości i długości, liczników elektronicznych, panelowych przyrządów mierniczych, systemów oświetleniowych dla branży samochodowej oraz aplikacji oświetlenia LED.

**RO** Societatea TRUMETER înființată în 1937 în Manchester/ UK, este un proiectant, producător și distribuitor global de instrumente sofisticate de măsurare a distanței și a lungimii, cantare electronice, contoare pentru panouri, sisteme de iluminare pentru automobile și aplicații LED.

**SK** TRUMETER, založený v r. 1934 v Manchesteri/ UK, je globálnym dizajnérom, výrobcom a distribútorom sofistikovaných prístrojov pre meranie vzdialenosti a dĺžky, elektronických čítačov, panelových meradiel, systémov automobilových svetiel a aplikácií LED osvetlenia.

Trumeter's heritage is founded on three core products, which Trumeter has manufactured and supplied all over the world. The three core products are Distance Measurement, Length Measurement, Electronic Counter and Measurement. Trumeter is acknowledged as a world leader in these markets.

Deriving from Trumeter's considerable experience in the management & measurement of a diverse range of applications, Trumeter is one of the world's leading designers and manufacturers of mechanical and electronic counting and measuring products, featuring low power consumption and miniature design.

## Why TRUMETER?

- one of the world leaders in measurement of distance, length, electronic counters and panel meters
- wide portfolio of quality products

## Did You Know?

Trumeter designed the world's first fully electronic water jug timer, predicting when the filter should be changed to optimise water quality, initially based upon time, but later with increasing sophistication incorporating water hardness and volume – all this in a tiny module that could run for 7 years on a standard watch battery.

## Electronic Totalising Counters

7000

**Miniature, 6 digit LCD PCB mount totalising counter designed for minimal-power requirement.**

These miniature 6 digit totalising counters are suitable for either direct PCB mounting, or panel mounting with bezel supplied.

- Uses the latest CMOS circuitry to achieve quiescent current consumption of less than 5µA
- 6mm black character high contrast LCD display
- Counts pulses up to 10kHz frequency
- External reset input

**Typical application:**

- Event counting
- Position, length and distance measuring applications
- Direct PCB mounting where limited space is available
- Low power battery applications
- Portable equipment

7016

**Miniature, low cost 6 digit LCD self-powered totalising counters.**

Counter comes ready for fitting and feature flying leads for connection to remote contact closure input devices.

- Self powered for 3 - 4 years using a single standard 1.5V button cell
- 6 digit 6mm character high contrast LCD display
- Simple to install
- Integral de-bounce circuitry



Self Powered

**Typical application:**

- Applications where no power is available
- Event counting
- Portable equipment
- Suitable for either direct PCB mounting, or panel mounting with bezel supplied
- Drinks optics, Luggage lockers

7111 7111 HV

**8 digit self powered electronic LCD counter**  
The 7111 series counter is feature packed and with a price performance ratio unrivalled, suitable for thousands of applications.

- Use of the latest CMOS circuitry achieves an expected battery life of 10 years
- Connection using built in screw terminals
- 9mm high contrast LCD display
- Counting up to 10kHz
- Contact closure/open collector low speed count input with integral de-bounce circuitry
- 7111HV permits triggering from any voltage between 10-240VAC or 10-110VDC ±10%.
- Choice of mounting available, front panel with supplied bezel or rear mounting clip
- Front panel can be sealed to IP65



10 Years Battery Life



Count Input up to 240V

**Typical Applications:**

- Position, length, rotation and distance measuring applications
- Event counting
- Installation is simplified - all models have screw connections on rear for quick and simple connection

## Electronic Totalling Counters (continued)

### HED 251

#### 4 Digit panel mount counter.

24 x 48mm 4 digit totalling counter suitable for many OEM applications. Ideal for contact closure and reed switch signal inputs.

- Uses the latest CMOS circuitry to achieve very low quiescent current consumption
- 10mm black character high contrast LCD display
- Counts pulses up to 10Hz frequency
- External reset input
- UL and cUL/CSA approved
- Count Range: 0-9999
- Count Input: Contact closure open collector input. 10Hz max, negative edge triggered, 0.7V threshold 1.8V max, 25mS min pulse width
- Reset Input: Negative edge triggered, 0.7V threshold, 15mS minimum pulse length, TTL/CMOS Compatible



### HED 261

#### 8 Digit panel mount counter

24 X 48mm 8 digit totalling counter suitable for many OEM applications. Ideal for contact closure and reed switch signal inputs. panel mounted or PCB mounted and with high speed input 10kHz or a slow speed debounced input 30Hz.

- Uses the latest CMOS circuitry to achieve very low quiescent current consumption
- 8mm black character high contrast LCD display
- Counts pulses up to 10kHz frequency
- External reset input
- UL and cUL/CSA approved
- Count Range: 0-99999999
- Count Input: High speed input (pin3) 10kHz max positive edge triggered, 0.7V threshold 18V max, 50uS min pulse width
- Contact closure open collector input (pin2). 30Hz max, negative edge triggered, 0.7V threshold 18V max, 15mS min pulse width
- Reset Input: Negative edge triggered, 0.7V threshold, 15mS minimum pulse length, TTL/CMOS Compatible



### 7932

#### 6 digit predetermining counter/timer with prescaler and EEPROM data storage in an IP65 DIN case.

This versatile count up or count down predetermining counter/timer with prescaler has a wide range of innovative and attractive features. Designed with imagination and built to the highest standards it offers both counting and timing functions in one unit.

- Simple programming via menu driven display
- High visibility supertwist LCD display can be viewed from any angle
- Backlight programmable ON, OFF or AUTO
- 40 years data retention with no power
- Programmable decimal point up to 3 places
- Operates from 85-265VAC or 10-26VDC
- 12VDC output to drive a sensor (when AC powered)
- Opto-isolated inputs
- Wide range of prescaling
- Output relay contacts rated at 5A
- Output can be set to latch or pulse with programmable pulse duration
- Environmental protection to IP65
- Standard DIN housing



### 7511 and 7511HV

#### 8 digit self powered LCD electronic timer.

A compact LCD timer designed for many applications, screw terminals ensure fast wiring. Features include backlighting (external 5VDC supply required), 4 timing modes, timing direction indication and 9mm high digits.

- Use of the latest CMOS circuitry achieves an expected battery life of 10 years
- 9mm high contrast LCD display
- Minimum contact closure time 1 second
- 4 timing modes
- Times up or down
- External reset input
- CE, UL and cUL/CSA approved
- IP65 front panel protection
- Standard DIN bezel 48mmx24mm



## Time Relays

### 7956

#### Digital LCD DIN-rail mountable multi-function time relay.

This versatile time relay has a three digit black on silver LCD readout and two pushbuttons, Program (P) and Reset (R). The display carries a wide range of internationally understood annunciators to indicate all the modes, direction of timing and the status of the output at all times.

- Simple programming via menu driven display.
- 8 timing ranges from 0.2 second to 999 hours.
- 8 timing modes: ON DELay, OFF DELay, One Shot, Single Shot, Repeat Cycle DELay, Repeat Cycle, and Symmetrical repeats.
- 3 digit black on silver LCD display with Internationally understood annunciators for operating modes, time units, low battery, relay output state.
- Self powered with 6 year battery life
- Opto-isolated inputs 12-260VAC or DC.
- SPDT relay contacts rated at 8A..



### DPM 951-TG and DPM952-TG

#### 3 1/2 digit LCD digital panel meter.

Panel mount digital meter with a 200mV full scale input. Annunciators for common engineering units and suitable for operation with either 5VDC or 9VDC power.

- Low power consumption
- Green backlight
- 24mm x 48mm bezel, 10 mm character (951TG)
- 36 mm x 72 mm bezel, 14mm character (952TG)
- 5 or 9VDC operation
- 200mV full scale
- Scaleable



In 5V mode each module generates its own -5V supply which enables it to measure signals with the same common zero as the supply. Connections are brought out to enable the module to operate in various modes including single ended, ratio measurement and differential. Different modes are selected by linking PCB solder pads which are provided for the purpose.

#### Typical application:

- Indication of DC voltage or current in vehicles, boats etc.
- Indication of industrial process parameters such as temperature, humidity, speed etc.



# Tools

## Soldering Equipment 254



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Soldering and desoldering equipment is probably the part of every designer's workshop. In our offer you can find many types meeting various requirements, from simple soldering irons to sophisticated microprocessor-controlled soldering stations and a lot of accessories.

**Pájecí a odpájecí technika je součástí pravděpodobně každého vývojového pracoviště. V naší nabídce můžete nalézt mnoho typů, plnicích různé požadavky, od jednoduchých pájecích ruček po inteligentní mikroprocesorem řízené pájecí stanice a mnoho příslušenství.**

**Löt- und Entlöttechnik ist Bestandteil wahrscheinlich eines jeden Entwicklungsarbeitsplatzes. In unserem Angebot können Sie viele Typen finden, die verschiedene Anforderungen erfüllen, von einfachen LötKolben bis hin zu intelligenten mikroprozessorgesteuerten Lötstationen, sowie jede Menge Zubehör.**

**A ki-és beforrasztó berendezések valószínűleg minden fejlesztő műhelyében megtalálhatók. Kínálatunkban minden igénynek megfelelő típus megtalálható az egyszerű forrasztópákától a nagy tudású, processzorvezérelt forrasztóállomáskig, számos kiegészítővel együtt.**

**Sprzęt do lutowania i rozlutowywania jest prawdopodobnie częścią każdej pracowni projektanta. W naszej ofercie można znaleźć wiele typów spełniających różne wymagania, od prostych opravek grzałkowych po inteligentne stacje lutownicze sterowane mikroprocesorowo, jak również mnóstwo akcesoriów.**

**Echipamentul de lipire și dezlipire este probabil o parte din atelierul fiecăruia proiectant. In oferta noastră puteți găsi mai multe tipuri care îndeplinesc diferite cerințe, de la simplul fier de lipit la stațiile sofisticate de lipire controlate de microprocesor și cu o mulțime de accesorii.**

**Spájkovacia a odspájkovacia technika je súčasťou pravdepodobne každého vývojového pracoviska. V našej ponuke môžete nájsť mnoho typov spájajúcich rôzne požiadavky, od jednoduchých spájkovacích rúčiek po inteligentné mikroprocesorom riadené spájkovacie stanice ako aj mnoho príslušenstva.**

Though a skilled technician can handle many works with a simple soldering equipment, it is far easier and more reliable to use a suitable equipment. The choice of an appropriate equipment will strongly influence the resulting quality and effectivity of your work.

## Classification

There are more methods how to heat the desired soldered place – infrared rays, direct contact (by a soldering tip), hot air, wave, hot vapors and other. For the use in the development, prototype production and service, two types are mainly used – contact types (with soldering tips) and hot air types. Hot air soldering stations are very suitable for soldering of SMT components in a solder paste, as well as for desoldering of many kinds of components. A great advantage of a hot air soldering is a gentle rising of component's temperature, minimizing the temperature stress. On the other side, the disadvantage of a hot air soldering is a big heating of surrounded components, which don't have to withstand such temperatures (for example plastic connectors). Hot air soldering tools are, from this reason, generally not suitable to be as the only soldering tool on the technician's table.

The most simple soldering irons have a pre-set soldering temperature

and they don't allow manual setting of temperature by user. They are intended for simple soldering of bigger joints. For a precise work it is always necessary to use a soldering equipment with adjustable temperature of a soldering tip. The temperature sensing element is usually placed near the soldering tip for a precise control of its temperature. A good stability of soldering tip's temperature is very important to ensure reliable joints and to minimize the risk of component damage at soldering. When choosing a soldering equipment, it is also advisable to check the range of available soldering tips – to some types it is possible to buy even unusual kinds of tips, which significantly improve some kinds of soldering. Top quality soldering tips feature a very good heat transfer and an extended lifetime – especially important at today's lead-free soldering. In this category you can also find desoldering equipment able to melt and suck off the solder from the joint.





WELLER, a brand of Apex Tool Group, with history dating from 1959 Besigheim/ Germany, is one of the most famous brands producing top quality soldering equipment and accessories. We can find Weller products in professional workplaces of many global producers.

**WELLER je značka skupiny Apex Tool, která byla založena v roce 1959 v Německu. Je jedním z nejznámějších výrobců, zabývajícím se výsoce kvalitními pájecími přístroji a příslušenstvím. Produkty značky Weller najdeme na profesionálních pracovištích mnoha výrobců elektroniky.**

**WELLER ist eine Handelsmarke der Gruppe Apex Tool, die 1959 in Deutschland gegründet wurde. Sie zählt zu den berühmtesten Handelsmarken, die sich mit qualitativ hochwertigen Lötgeräten und Zubehör befassen. Produkte der Weller-Marke finden wir auf professionellen Arbeitsplätzen zahlreicher Elektronikhersteller.**

**A WELLER az Apex Tool márkanéve, melyet 1959-ben alapítottak Németországban. Forrasztás-technikában az egyik legismertebb név, mely jó minőségű forrasztó készülékeket és tartozékokat gyárt. Termékeit számos elektronikával foglalkozó gyártó munkasztaín megtalálhatjuk.**

**WELLER to marka grupy Apex Tool, która założona została w roku 1959 w Niemczech. Jest jedną z najbardziej znanych marek, które zajmują się wysokiej jakości urządzeniami lutowniczymi oraz ich akcesoriami. Produkty marki Weller znajdziemy w profesjonalnych miejscach pracy wielu producentów elektroniki.**

**WELLER, o marcă a grupului Apex Tool Group, cu o istorie datând din 1959 Besigheim/ Germania, este una din cele mai renumite mărci care produce echipamente de sudură de cea mai bună calitate și accesorii. Putem găsi produse Weller la sediile multor producători internaționali.**

**WELLER je značka skupiny Apex Tool, ktorá bola založená v roku 1959 v Nemecku. Je jednou z najznámejších značiek zaoberajúcou sa výsoce kvalitnými spajkovacími prístrojmi a príslušenstvom. Produkty značky Weller najdeme v profesionálnych pracoviskách mnohých výrobcov elektroniky.**

Among Weller products we can find soldering and desoldering stations, accessories, dispensers, fume extractors, precise electronic screwdrivers and many hand tools used in electronics. Weller soldering and desoldering stations are known for their high reliability, very good ergonomics, precise temperature adjustment and other excellent features, including low power consumption thanks to the use of standby modes.

## Why WELLER?

- top quality soldering equipment
- excellent soldering properties and reliability

## Did You Know?

Apex Tool Group was formed in July 2010 as a joint venture combining two premier tool manufacturers: Danaher Tool Group and Cooper Tools. Together, the two businesses offer industrial, commercial, and do-it-yourself customers an unparalleled selection of over 30 leading brands, including Crescent, GearWrench, Armstrong, and Weller.

## Soldering Stations

### WX series

#### WX 1

The base of the versatile repair device is the WX 1 station with a possibility to connect one 200W tool. Control interface is done via a touch panel display. WX1 enables communication with other devices like control of WFE fume extracting station and a WHP preheating device.



Technical Parameters	WX 1
Max. Power	200W
Temperature Range	50°C - 550°C
Power Supply	230VAC
Output Voltage	12VDC

#### WX 1011 Set

WX 1 Power unit 200 W, 230 V with WXMP soldering iron (40 W, 12 V) Active Tip Technology and safety rest WDH 50 with dry cleaner.



#### WX 1012 Set

WX 1 Power unit 200 W with WXP 65 soldering iron (65 W, 24 V) Fast Response Technology and safety rest WDH 10 with dry cleaner.



#### WX 2

The base of the versatile repair device is the WX 2 station with a possibility to connect two 120W tools or one 200W tool. Control interface is done via a touch panel display. WX2 enables communication with other devices like control of WFE fume extracting station and a WHP preheating device.



Technical Parameters	WX 2
Max. Power	200W (255W)
Temperature Range	50°C - 550°C
Power Supply	230VAC
Output Voltage	12VDC

#### WXD 2010 Set

Soldering and desoldering station, 2 channels 200 W (255 W), including WXDP 120 desoldering iron with WDH 70 safety rest.



#### WX 2020 Set

Power unit WX 2, 200 W, 2x soldering iron WXP 120, 120 W, 24 V, with Fast Response Technology, 2x soldering tip XT B and 2x safety rest WDH 10.



#### WX 2021 Set

Power unit WX 2, 200 W, soldering iron WXMP, 55 W, 12 V, with Active Tip Technology, soldering tip RT 3, safety rest WDH 51, micro tweezers WXMT, 2 x 44 W, 12 V, with Active Tip Technology, standard tip RTW 2 and safety rest WDH 60 with dry cleaner.





WR 2 Series

WR 2

Want a station that will allow you to work on both soldering and desoldering operations at the same time or soldering and hot air tasks - then the WR 2 is for you. This new repair station from Weller is based on our highly successful WR 3M product range and with its 2 channel design it represents a great price / performance package.



Technical Parameters	WR 2002
Max. Power	300W
Temperature Range	50°C - 550°C
Power Supply	230VAC
Output Voltage	24VDC
Vacuum Pump	
Max. Vacuum	0,7bar
Air Volume	18l/min.
Hot Air	
Air Volume	10l/min.

WR 2000A Set

Power unit, 300 W, 2 channel digital station with hot air iron HAP 1 (100 W, 24 V), hot air nozzle R06, safety rest WDH 30 and power cable.



WR 2000D Set

Power unit, 300 W, 2 channel digital station with DSX 80 desoldering iron.



WR 2002 Set

Power unit, 300 W, 2 channel digital station with hot air iron HAP 1 (100 W, 24 V), hot air nozzle R06, safety rest WDH 30 and power cable.



WR 3 Series

WR 3

The versatile repair station, specifically tailored to the needs and requirements of professional repairs of state-of-the-art electronic sub-assemblies in industrial production, engineering and in the repair and laboratory fields.



- 3 tool channels with automatic tool detection
- large LCD display
- own vacuum channel for pick-up
- USB port
- comprehensive PC software
- all high-speed micro tools can be connected- new powerful hot air pencil

Technical Parameters	WR 3
Max. Power	420W
Temperature Range	50°C - 550°C
Power Supply	230VAC
Output Voltage	24VDC
Vacuum Pump A	
Max. Vacuum	0,7bar
Air Volume	15l/min.
Vacuum Pump B	
Max. Vacuum	0,5bar
Air Volume	1,7l/min.

WR 3000M Set

Desoldering station with multi-digital 420 W, 230 V with soldering iron DSX 80 and internal pump



WR 3000M Set

Desoldering station for vertical applications with multi-digital 420 W, 230 V with soldering iron DXV 80 and internal pump.



WD 1 Series

WD 1

- an extra small footprint to free valuable bench space
- 3-digit programmable lockout code
- programmable temperature offset, settable auto-off time
- ESD safe



Technical Parameters	WD 1000
Max. Power	95 W
Temperature Range	50 - 450°C
Power Supply	230V AC
Voltage	24VDC

WD 1000 Set

Soldering station, 1 channel, 80 W / 230 V including WP 80 with Silver Line Technology soldering iron, soldering tip LT B and WDH 10 safety rest with dry cleaner.



WD 1000T Set

Soldering station, 1 channel, 80 W / 230 V including WP 80 with Silver Line Technology, soldering iron, soldering tip LT B and WDH 10T safety rest with Stop & Go function and dry cleaner.



WHA 900

700W Hot Air Station - easy to use and extremely robust this is a highly versatile rework tool.

- closed-loop temperature feedback control
- maintenance-free brush-less motor
- integrated and individually programmable standby-modes for both air volume and temperature
- fully ESD compliant



Technical Parameters	WHA 900
Max. Power	700W
Temperature Range	50°C - 550°C
Power Supply	230VAC
Air Volume	5 - 50 l/min

WSD 80

Soldering bath

- connectable to all Weller 80 W digital stations
- 80 W/ 24V
- inner Ø 20 mm
- temperature range 50°C - 450°C



### WS 81

#### Electronically controlled soldering station with analogue display

- temperature accuracy  $\pm 2\%$  of maximum temperature
- temperature set by rotary potentiometer
- temperature condition indicator by LED
- potential balance socket

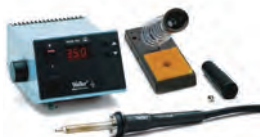


Technical Parameters	WS 81
Max. Power	80W
Temperature Range	150 - 450°C
Power Supply	230VAC
Output Voltage	24VDC
Set contains	Power station, antistatic soldering pencil WSP80 with soldering tip LT B (Chisel 2,4x0,8mm), Safety Rest KH20

### WAD 101

#### Multi purpose single channel hot air station for operation from compressed air or inert gas.

- microprocessor controlled hot air station with HAP1 hot air pencil
- manual control of air volume
- digital display shows set and actual temperatures
- temperature setting by Up-Down push buttons
- ESD safe



#### Consist of:

WAD 101	Control Unit 230 V
HAP 1	Hot Air Pencil 100 W, 24 V with Hot Air Nozzle Round R 06 R 3,0 mm
KH 27	Safety Rest

Technical Parameters	WAD 101
Max. Power	105W
Temperature Range	50°C-550°C
Power Supply	230VA
Inlet Pressure	400 KPa (58 psi) oil-free

### WHS 40

#### Temperature Controlled Soldering Station

- The temperature range can be controlled between 200°C and 450°C. The WHS 40 soldering station rules out the risk of temperature shocks which can occur with conventional soldering bits.
- Desired temperatures can be set precisely in such a way that you no longer have to worry about overheating sensitive areas.



Technical Parameters	WHS 40
Max. Power	40W
Temperature Range	200 - 450°C
Power Supply	230VAC
Output Voltage	18VDC
Set contains	Station, Soldering pencil, 3,5mm straight nickel tip, stand and sponge

## Soldering Tips and Irons



## Other Accessories



## Fume Extractors

The WFE is a fume extraction unit suitable for applications with a high demand for gas and particle filtration, e.g. soldering, adhesives, clean room work and laser. It can be placed on a trolley and be moved easily between different work places. Variable speed and the alarm function for filter exchange can be set also via the remote control. For applications which produce a large quantity of particles, e.g. lead-free soldering, an external pre-filter can be fitted to increase the lifetime of the main filter. To make cleaning easier, the WFE can be suspended under the work table with special fittings.

### WFE 2S



### WFE 4S



Technical Parameters	WFE 2S	WFE 4S
Electrical Power	275VA	450VA
Power Supply	230V / 50Hz	230V / 50Hz
Max. pressure	2700 Pa	2800 Pa
Max. airflow	230 m3/h	615 m3/h
Max. capacity	3 work places	8 work places
Weight	19kg	21 kg
Dimensions L x W x H	320 mm x 320 mm x 395 mm	450 mm x 450 mm x 650 mm

### WFAN 50

Fume Extraction Arm With Nozzle End, l=1000mm d=100mm.



### WFAN 50

Fume Extraction Arm With Round Funnel End l=800mm.



### WFAS 50

Fume Extraction Arm With Flat Nozzle End l=1000mm 210x20mm.



### 005 36 321 99

Branch, 2 x 45°, 1 m, with 2 seals, d=50mm plastic, black.



### WE 87 353 27

Extraction hose d=50mm, plastic



### WE 87 358 47

Hose connection for Extraction hose d=50mm plastic.



Replacement soldering Tips  
- ET, LT, LHT, PT, RT, CT series





ERSA / Germany, is Europe's largest manufacturer of soldering systems with the world's largest product range for the PCB manufacturing industry including reflow, wave and selective soldering machines, rework & inspection systems, as well as soldering hand tools.

**ERSA / Německo** je největší evropský výrobce pájecích systémů s nejširším sortimentem pro výrobu a osazování DPS včetně pájecích přístrojů pro pájení cínovou vlnou, opravárenských a kontrolních systémů, jakož i ručních nářadí pro pájení.

**ERSA / Deutschland** ist der größte europäische Hersteller von Lötssystemen mit dem breitesten Sortiment für die Herstellung und Bestückung von Leiterplatten, einschließlich Wellenlötgeräten, Reparatur- und Kontrollsystemen sowie Löt-Werkzeugen.

**A németországi ERSA** a forrasztórendszer-ek legnagyobb európai gyártója. Legnagyobb berendezés kínálattal rendelkezik a NYAK-ok gyártására és beültetésére, beleértve az ónhullámmal forrasztó berendezéseket, javító és ellenőrzőrendszereket, valamint a kézi forrasztóeszközöket.

**ERSA / Niemcy**, to największy europejski producent systemów lutowniczych z najszerszym asortymentem do produkcji i montażu płytek PCB, włącznie z urządzeniami lutowniczymi do lutowania „na falę”, systemami serwisowymi i kontrolnymi, jak również ręcznych narzędzi do lutowania.

**ERSA / Germania**, este cel mai mare producător al Europei de sisteme de sudură cu cea mai largă gamă de producție a lumii pentru industria producătoare PCB, inclusiv mașini de sudură prin refluxiune, unde și selective, sisteme de demontare & inspecție, precum și unelte de mână de lipit.

**ERSA / Nemecko**, je najväčší európsky výrobca spájkovacích systémov s najširším sortimentom pre výrobu a osadzovanie DPS vrátane spájkovacích prístrojov spajkujúcich cínovou vlnou, opravárenských a kontrolných systémov, ako aj ručných náradí pre spájkovanie.

Ersa production range covers a complete range of soldering equipment and accessories for virtually all types of soldering and desoldering processes.

Ersa products are used by many global producers like Honeywell, Omron, Asus, Bosch, Hyundai, Nokia, Samsung, Siemens and many other.

## Why ERSA?

- top quality soldering equipment
- company specialized on soldering equipment with over 90 years experience
- very good price/ performance ratio
- wide range of soldering tips and accessories

## Did You Know?

In 1921, ERSA's founding father, Ernst Sachs invented the world's first electric soldering iron for production use in his home in Berlin, Germany. He created the company's title from the first letters of his own two names and ERSA was born.

## Soldering Stations



### i-CON

#### ERSA Icon Soldering System:

- 150W Micro Heating Element
- Ultra fast heat-up: 30° C to 350°C in approx. 9 sec. , Stand-by to 350°C in approx. 3 sec.
- Ultra fast heat recovery time
- Process Window Alarm Function alerts operator if tip temp is out of window.
- Three power level settings to control overshoot
- ASM- Automatic Standby Motion Sensor
- Ultra short tip-to-grip: 45mm
- Thinnest & lightest cable for maximum comfort
- Dual material grip with "Soft Pad" stays cool during use
- "One Touch" easy-to-use operation with new i-Op control
- Ultra large, multi-functional display
- Small footprint
- W: 150mm x L: 175mm x H: 100mm
- Automatic tool detection of 6 different soldering & desoldering tools Lowest Running Costs
- Long-life, quick
- Lowest maintenance, station programming and calibration cost
- Highest productivity in hand soldering

Technical Parameters	i-CON	i-CON 2
Max. Power	80W	150W
Temperature Range	150 - 450°C	
Power Supply	230VAC	
Output voltage	24VAC	2x240VAC
Set contains	i-CON: Power station, Soldering Pencil, Safety rest.	i-CON2: Power station, 2xSoldering Pencil, 2xSafety rest.

### i-CON2 AC

#### with i-Tool soldering iron with patent pending heating technology and Chip Tool

i-CON2 offers all the valueadded features of the revolutionary i-CON in a double iron digital station with multiple soldering and / or desoldering tools for maximum flexibility.

The Chip Tool offers a wide range of SMT desoldering tips for safe and fast removal of the smallest chips (0201,0402, etc.) up to medium size PLCCs.



### i-CON2 AXT

#### with i-Tool soldering iron with patent pending heating technology and X-Tool

i-CON2 offers all the valueadded features of the revolutionary i-CON in a double iron digital station with multiple soldering and / or desoldering tools for maximum flexibility.

The X-Tool is a high powered desoldering iron designed for the toughest through hole desoldering applications which must be used in combination with the CU compressor unit.





### i-CON NANO

The electronically temperature controlled soldering station.

- Fully antistatic according to MIL-SPEC/ESA standards
- Small footprint (145 x 80 mm) – saves valuable workbench space
- Ultra light and ergonomically designed i-TOOL NANO with max. 80W of power
- Automatic stand-by function and non-operative mode saves energy & tip life
- Three selectable energy levels
- Calibration function for exact tip temperatures
- Complete system parameterization via simple PC software and micro SD card



Technical Parameters	i-CON NANO
Max. Power	80W
Temperature Range	150 - 450°C
Power Supply	230VAC
Output voltage	16,5VDC
Set contains	i-CON NANO soldering station with i-TOOL NANO soldering iron

### DIG 20 A 84

with Power tool soldering iron and ERSA SENSOTRONIC control system

Top-class microprocessor-controlled soldering station distinguished by its flexibility and multifunctionality. Designed for industrial use where high quality is demanded and for repairs and laboratory applications. The device can alternatively be operated with various soldering and desoldering tools. The tools are automatically detected when inserted and the control characteristics accordingly adapted.



Technical Parameters	DIG 20 A 84
Max. Power	80W
Temperature Range	50 - 450°C
Power Supply	230VAC
Output voltage	24VDC
Set contains	Soldering station DIG203A, Soldering Pencil 840CDJ, Safety Rest A29 antistatic.

### DIG 20 A XT

with ERSA SENSOTRONIC control and X-Tool desoldering iron

The ERSA DIGITAL 20 is an intelligent, microprocessor controlled soldering station. Outstanding flexibility and multi-functionality sets this system apart from others. Included compressor unit.



Technical Parameters	DIG 20 A XT
Max. Power	80W
Temperature Range	50 - 450°C
Power Supply	230VAC
Output voltage	24VDC
<b>Compressor</b>	
Max. Vacuum	0,8bar
Power	45W
Set contains	Soldering Station DIG203A, Compressor CU100A with X-Tool 720ENJ desoldering iron, Safety Rest A36 antistatic.

### RDS 80

Microprocessor-controlled Digital 80 Watt Soldering Station

- Unique temperature control technology, the ceramic PTC heating element replaces the function of the thermocouple.
- Very fast preheating due to high initial power and fast heat recovery for a stable soldering process.
- Great flexibility in handling all applications.
- The newly constructed ergonomic handle



Technical Parameters	RDS 80
Max. Power	80W
Temperature Range	150 - 450°C
Power Supply	230VAC
Output voltage	24VDC
Set contains	Power Station, soldering iron RT80, long-life tip 842CD (2,2mm), safety rest A39

### ANA 60

The electronically temperature controlled soldering station.

- Temperature adjustable between 150°C and 450°C
- LED indicator
- Heat up time 60s
- Multifunctional iron stand



Technical Parameters	ANA 60
Max. Power	60W
Temperature Range	150 - 450°C
Power Supply	230VAC
Output voltage	24VDC
Set contains	Soldering station, soldering iron Basic Tool, long-life tip 842CD (2,2mm), Safety Rest.

## Gas Soldering Irons

### Independent 75 Basic

The ergonomic, antistatic gas soldering iron with piezo ignition is ideal for service and maintenance work, especially if there is no power supply available! The continuously adjustable output of 15 - 75W (compared with electrical soldering irons) allows maximum soldering tip temperatures of up to 580 °C. The Independent is powered by ordinary butane as used in gas lighters. Operating time per gas filling is about 60 min.



## Soldering Tips and Irons

### 212, 832 and other series



## Holders

### A39

RH-80 Iron Holder for RT-80 irons





### A48


Iron Holder for i-Tool irons





In this category you can find lead-free and lead solders, many types of chemistry and sprays for production, maintenance and service, testing boards and various PCBs with and without a photosensitive layer for development and production of prototypes.


 V této kategorii můžete najít bezolovnaté a olovnaté pájky, mnoho druhů chemických přípravků a sprejů pro výrobu, údržbu a servis, testovací desky a různé DPS s a bez fotocitlivé vrstvy k vývoji a výrobě prototypů.

 In dieser Kategorie finden Sie bleifreie sowie bleihaltige Lötlmittel, viele Typen von chemischen Mitteln und Sprays für die Herstellung, Wartung und Service, Testplatinen und verschiedene Leiterplatten mit und ohne fotoempfindliche Schicht für die Entwicklung und Herstellung von Prototypen.

 Ebben a kategóriában megtalálhatók ólom-tartalmú és ólommentes forrasztóórn, gyártáshoz, javításhoz és karbantáshoz használatos vegyszerek és spray-k számos típusa, prototípusok fejlesztéséhez és gyártásához szükséges próbapanelek, különböző NYÁKok fotóérzékeny felülettel vagy anélkül.

 W kategorii tej można znaleźć spoiwa ołowiowe i bezolowiowe, mnóstwo rodzajów środków chemicznych i sprayów do produkcji, utrzymania ruchu i serwisu, płytki testownicze i różne PCB z i bez warstwy światłoczułej do zaprojektowania i produkcji prototypów.

 In această categorie puteți găsi suduri cu plumb și fără plumb, multe tipuri de substanțe chimice și spray-uri pentru producție, întreținere și reparații, panouri de testare și diferite PCBs cu și fără un strat fotosensibil pentru proiectarea și producerea de prototipuri.

 V tejto kategórii môžete nájsť bezolovnaté a olovnaté pájky, mnoho druhov chemických prípravkov a sprejov pre výrobu, údržbu a servis, testovacie dosky a rôzne DPS s a bez fotocitlivej vrstvy pre vývoj a výrobu prototypov.

Solders are available as cored solder wires in a wide range of diameters and fluxes used. You can choose from mild-flux types suitable for sensitive SMT components, universal types and also higher-activated types able to make good-quality joints even on surfaces with poorer solderability.

Appropriate chemical products and sprays enable effective production and a long lifetime of products. Here you can also find many specialized sprays for cleaning, lubrication, humidity and rust protection, EMI protection and other purposes.

With the Printed circuit boards from our offer, you can make boards for prototypes, but they are also suitable for low-volume production purposes. Various testing boards will further help you to simply and effectively evaluate your design.

## Chemical Products for Electronics

### SMA 10 SL

- A heat curable, one-part thixotropic adhesive surface mount adhesive
- Suitable for surface mount devices
- Resistant to PCB cleaning solvents
- Available in an easy-to-use lock syringe
- Long term stability after cure cycle



### Elektropol

ELEKTROPOL is an electrically conductive adhesive designed for electroconducting joints. It replaces soldering and is suitable for any repair of electric and electronic equipment. ELEKTROPOL forms an electroconducting link between different materials especially in the cases when the soldering is impossible to use. ELEKTROPOL can be used within the temperature range -30°C up to +80°C.



### Soldering Colophony

Adipic acid (2,5%) activated colophony. No cleaning is needed after soldering because the acid is "bounded" in set colophony. The colophony exhales nice pine fragrance. Packaging - metal container. Weight: 30g.



### FEW 10

Developer positive 10g, - caustic soda developer (NaOH), sufficient quantity for 1 litre, about 10 g., for dissolving in water at 20°C.



### FK100

Caustic ammonium persulfate - white crystalline caustic, about 220 g per litre water. For dissolving in water at about 60 up to 70°C (glass or plastic vessel). Etching solution.

Packaging: 220g (per 1l water)



### B-Foil (Blue Foil)

Press-n-peel blue PCB transfer paper produces high quality prototype PCB resist layouts making your design ready to etch. PnP Blue is a Mylar (Polyester) backed material in which several layers of release agents and resist coatings are applied. An image is printed or photocopied onto this film, using a laser printer or photocopier (dry toner based), and subsequently ironed or pressed onto a cleaned copper clad board. The image area applied to the film is subsequently transferred to the copper board, along with the high quality resist (blue). The film is removed and resulting board is ready to etch in ferric chloride.



### ERSA 0FMKANC32-005

- no-clean flux cream
- EN 29454/1.1.3 C, F-SW 32, DIN 8511
- ideal for rework, desoldering and hand soldering of fine-pitch components

### PCM 250ml

Peelable coating mask is a flexible solvent resistant latex. Used for masking components, connectors and other items during a conformal coating process.

#### Features:

- Completely hand-peelable, leaves no residue
- High film strength does not break
- Suitable for use with dip, spray or brush applied conformal coatings
- Suitable for use in wave soldering applications

Drying Time: 2hours (at 25°C) or 30min.(at 60°C, 2mm Thickness)

Quantity: 250ml.



### FSE140S, FSE141F, FSE8300

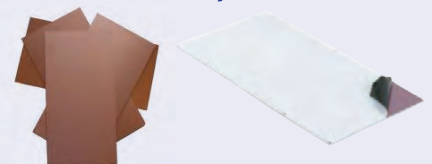
Permanent Marker  
0,3/0,6/1,5mm

#### Features:

- Especially made for use on transparent acetate film, plastics, glass, overhead projectors etc.
- High transparency
- Water-resistant ink
- Black
- Metal based plastic tip



### PCBs with and without a Photosensitive Layer




...and many other chemistry





[www.soselectronic.com/stannol](http://www.soselectronic.com/stannol)





STANNOL/ Germany, is a renowned name in the world of soldering and soldering technology. With a rich history dating from 1920, Stannol offers a wide range of high quality materials for effective and reliable soldering.


 STANNOL Německo je známé jméno ve světě pájení a pájecích technologií. S bohatou historií sahající až do roku 1920 Stannol nabízí širokou škálu vysoce kvalitních materiálů pro efektivní a spolehlivé pájení.

 STANNOL Deutschland ist ein bekannter Name in der Welt des Lötens und der Löttechnik. Mit seiner reichen Geschichte, die bis ins Jahr 1920 zurück reicht, bietet Stannol ein breites Spektrum an qualitativ hochwertigen Materialien für effizientes und zuverlässiges Löten.

 A németországi STANNOL neve a forrasztás és forrasztástechnika területén vált híressé. A cég gazdag történelme 1920-ig nyúlik vissza. Kiváló minőségű anyagok széles skáláját kínálja a hatékony és megbízható forrasztáshoz.

 STANNOL Niemcy, to nazwa znana w świecie lutowania i technologii lutowniczych. Z bogatą historią sięgającą aż do roku 1920, Stannol oferuje szeroką gamę wysokiej jakości materiałów do efektywnego i niezawodnego lutowania.

 STANNOL / Germania, este o denumire celebră în lumea sudării și a tehnologiei sudării. Cu o bogată istorie datând din 1920, Stannol oferă o gamă largă de materiale de înaltă calitate pentru o sudare eficientă și fiabilă.

 STANNOL Nemecko, je známe meno vo svete spájkovania a spájkovacej technológie. S bohatou históriou siahajúcou až do roku 1920, Stannol ponúka širokú škálu vysoko kvalitných materiálov pre efektívne a spoľahlivé spájkovanie.

Stannol produces a wide range of solder pastes and wires, fluxes, bars and ingots, accessories and also offers a test service and technical support for soldering materials.

## Why STANNOL?

- company specialized on soldering materials from 1920
- wide portfolio of solders and fluxes

## Lead Free Solder Wires

### 2630 Series

This solder wire is used for applications requiring a higher activity, for components with poor solderability, especially for soldering operations on transformers, soldering on cooper cables with large diameters, where a stronger flux is needed to cope with a high thermal capacity of the components to be soldered. It is also used for soldering of nickel surfaces, critical components and robotic soldering with short cycle times.

**Flux Type:** TYP 1.1.2  
**Alloy:** Sn95,Ag4Cu1  
**Flux Content:** 2%  
**Melting Temperature:** +217°C



### HS10 Series

is very efficient by its high activity, which results in quick spread of solder and electrical safe residues. Halide activated rosin flux with following properties:

- save soldering even at low soldering temperatures
- solid and dry residues, pin testable
- fast soldering, high spread speed

Can be used for hand and robot soldering

- high reliability

**Flux Type:** TYP 1.1.2  
**Alloy:** Sn95,5Ag3,8Cu0,7/ Sn99Cu1  
**Flux Content:** 2,5%  
**Melting Temperature:** +217°C



### Solder Bar LZ 1000

For solder bath. Suitable for dip, selective and wave soldering. 4 x cca 250g.

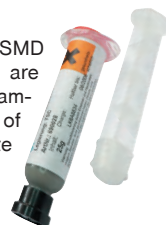
**Flux Type:** F-SW32  
**Alloy:** Sn99Cu1  
**Flux Content:** 0%  
**Melting Temperature:** 227°C



### Solder Paste SP15TSC

Lead free soldering pastes designed for soldering SMD electronic components. The soldered connections are characterised by good electrical and mechanical parameters. The paste composition eliminates the effect of lifting SMD components during soldering. The paste is available in 10ml/25g syringe.

**Flux Type:** TYP 1.1.2.C  
**Alloy:** Sn95,5Ag3,8Cu0,7



## Lead solders

### 2630 Series

This solder wire is used for applications requiring a higher activity, for components with poor solderability, especially for soldering operations on transformers, soldering on cooper cables with large diameters, where a stronger flux is needed to cope with a high thermal capacity of the components to be soldered.

**Flux Type:** TYPE 1.1.2  
**Alloy:** Sn60Pb38Cu2  
**Flux Content:** 2,2%  
**Melting Temperature:** +183°C to +190°C



### HS10 Series

is very efficient by its high activity, which results in quick spread of solder and electrical safe residues. Halide activated rosin flux Can be used for hand and robot soldering.

**Flux Type:** TYPE 1.1.2  
**Alloy:** Sn60Pb40  
**Flux Content:** 2,5%  
**Melting Temperature:** +183°C to +190°C



### HF32 Series

HF-32 is a no-clean flux cored solder wire. The activated, halide-free flux meets DIN EN 29454 Type 1.1.3 standard. HF-32 can be used for hand-soldering and automatic wire feed operations. Flux spatter from the formulation is minimal.

**Flux Type:** TYPE 1.1.3  
**Alloy:** Sn60Pb38Cu2  
**Flux Content:** 3,5%  
**Melting Temperature:** +183°C to +190°C



### HF32SMD Series

No-clean flux, can be used for hand-soldering and automatic wire feed operations.

- low flux content
- reduced rosin content
- high organic acid content - appropriate to SMT applications
- halide free

**Flux Type:** TYPE 1.1.3B  
**Alloy:** Sn60Pb40  
**Flux Content:** 1%  
**Melting Temperature:** +183°C to +190°C







### STANNOL® Solder - Overview

Stannol Solder	Product Code	Alloy	Melting Point °C	Application
Standard Alloys	STRATOLOY®			W
	STANNOLOY®	S-Sn63Pb37 S-Sn60Pb40	183 183 - 190	W
	WSL3			W
Lead-Free Alloys	ECOLOY® T	Sn99,9	232	S
	ECOLOY® TC	S-Sn99Cu1	227	W, H
	ECOLOY® TC300	S-Sn97Cu3	227 - 310	T, S
	ECOLOY® TS	S-Sn96Ag4	221	W, H
	ECOLOY® TS300	S-Sn97Ag3	221 - 224	T
	ECOLOY® TSC	S-Sn95Ag4Cu1	217	W, H
	ECOLOY® TSC305	S-Sn96Ag3Cu1	217 - 220	W, H
	ECOLOY® TSC263	Sn97,1Ag2,6Cu0,3	217 - 224	W, H
Lead-Free Alloys with Micro-Alloy-Additives	FLOWTIN® TC	Sn99Cu1+ML	227	W, H
	FLOWTIN® TC300	Sn97Cu3+ML	227 - 310	T, S
	FLOWTIN® TSC	Sn95Ag4Cu1+ML	217	W, H
	FLOWTIN® TSC305	Sn96Ag3Cu1+ML	217 - 220	W, H
De-Oxidised Alloys	DX10	Sn60Pb40P	183 - 190	W, T
	DX10 - HT	Sn63Pb37CuP	183	T
		Sn60Pb40CuP	183 - 190	T
High Melting Alloys	HMP	S-Pb92Sn5Ag3	296 - 305	H, T
	Sn8	Pb92Sn8	280 - 305	T
Low Melting Alloys	L-Lot 139	S-Bi58Sn42	139	W, S
	L-Lot 46		46	S

W = Wave soldering  
T = Dip soldering

H = Manual soldering  
S = Special applications

### Liquid Fluxes

Flux	DIN EN ISO 9454-2	DIN EN 61190-1-1	F-SW	Application	lead-free	VOC-content	Acid Value [mg KOH]	Solid Content [%]	Density [g/cm <sup>3</sup> ]
500-3445	2.2.3.A	ORL0	34	S, F	bedingt limited	h	22,0	2,1	0,811
X33-08i	2.2.3.A	ORL0	23	S, F		h	17,0	2,0	0,805
EF330	2.2.3.A	ORL0	23	S, F		h	26,5	3,3	0,811
EF350	2.2.3.A	ORL0	34	S, F		h	27,0	3,5	0,811
500-3431BF	2.2.3.A	ORL0	34	S, F		h	34,4	4,4	0,814
500-6B	1.1.3.A	ROL0	32	S, F, D, B		h	23,0	6,0	0,801
450-13	1.1.2.A	ROM1	26	S, F, D, B		h	45,0	13,0	0,826
HW139	2.2.3.A	ORM0	23	S		g	21,0	2,5	0,914
WF300S/F	2.1.3.A	ORM0	23	S, F		f	37,0	4,6	S=1,012 S=1,016
900-7/1H	2.1.3.A	ORM1	25	S, F		h	10,0	1,7	0,806

S = Spray  
F = Foam

D = Dipping  
B = Brush

h = high  
g = low  
f = free



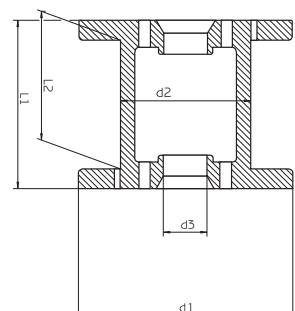
**STANNOL® Solder Wire - Overview**

Flussmittel Flux	Beschreibung Description	DIN EN ISO 9454-2	DIN EN 61190-1-1	F-SW	S-Sn60Pb40	Sn60Pb38Cu2	S-Sn62Pb36Ag2	S-Pb92Sn5Ag3	FLOWTIN® TSC Sn95Ag4Cu1+ML	FLOWTIN® TSC 305 Sn96Ag3Cu1+ML	FLOWTIN® TC Sn99Cu1+ML	ECOLOY® TSC S-Sn95Ag4Cu1	ECOLOY® TSC305 S-Sn96Ag3Cu1	ECOLOY® TC S-Sn99Cu1	Bemerkungen Notes
KS100	Elektronik-Lötdraht, halogenfrei, synthetische Harze <i>solder wire for electronics, halide-free, with synthetic resins</i>	1.2.3	RELO	33					•	•	•	•	•	•	Flussmittel auf Basis von Kunstharzen, halogenfrei, spritzarm <i>resin flux, halide-free, low spitting</i>
HF32	Elektronik-Lötdraht, halogenfrei <i>solder wire for electronics, halide-free</i>	1.1.3	ROLO	32	•	•	•					•		•	kolophoniumhaltiger Lötendraht, erfüllt erhöhte Anforderungen an elektrische Sicherheit <i>rosin-based solder wire, meets highest demands for electrical safety</i>
Kristall 400	Elektronik-Lötdraht, halogenfrei, synthetische Harze <i>solder wire for electronics, halide-free, synthetic resins</i>	1.2.3	RELO	33	•		•					•	•	•	farblose Rückstände, Flussmittelgehalt 2,2% <i>clear residues, flux content 2,2%</i>
HF34	Lötendraht, halogenfrei, geringer Harzanteil <i>solder wire, halide-free, low resin content</i>	2.2.3	ORM0	34	•										hochaktiv, in der Elektronik bedingt einsetzbar, gut auf Eisen, Nickel und Messing <i>highly active, limited use in the electronics, good wettability on iron, nickel and brass</i>
KS115	Elektronik-Lötendraht, halogenaktiviert, synthetische Harze <i>solder wire for electronics, halide-activated, with synthetic resins</i>	1.2.2	REM1	28					•	•	•	•	•	•	Flussmittel auf Basis von Kunstharzen, optimal aktiviert, spritzarm <i>resin flux, optimum activation, low spitting</i>
HS10	Elektronik-Lötendraht, halogenhaltig <i>solder wire for electronics, halide-activated</i>	1.1.2	ROM1	26	•	•	•	•				•	•	•	kolophoniumhaltiger Lötendraht, universell einsetzbar <i>rosin-based solder wire, perfect for a wide range of applications</i>
2630	Elektronik-Lötendraht, halogenhaltig <i>solder wire for electronics, halide-activated</i>	1.1.2	ROM1	26	•							•	•	•	stärker aktiviert als HS10 <i>higher activation level than HS10</i>
Kristall 511	Elektronik-Lötendraht, halogenaktiviert, synthetische Harze <i>solder wire for electronics, halide-activated, with synthetic resins</i>	1.2.2	REM1	26	•							•	•	•	farblose Rückstände, stark aktiviert <i>clear residues, high activation level</i>
S321	Lötendraht für Blechlötungen, Handwerk und Hobby <i>solder wire for soldering metal plates for handcrafts and hobby</i>	2.1.2	ORH1	24	•										für schlecht lötbare Oberflächen, wasserlöslich <i>for poorly solderable surfaces, watersoluble</i>

Wir verwenden hauptsächlich Spulen angelehnt an IEC 264-2-2. Die Spulenabmessungen können Sie der folgenden Tabelle entnehmen:


We mainly use reels similar to IEC 264-2-2. Please find the reel dimensions in the following chart:


Spule Reel	Bezeichnung Code	d1 (mm)	d2 (mm)	d3 (mm)	L1 (mm)	L2 (mm)
250g	L250	63	37	11	37,5	27,5
500g	L500	63	37	11	63	49
1000g	L1000	73	34	30	77	67








ALPHA, a brand of Cookson electronics, is one of the world leaders in the development, and manufacturing of innovative materials used in the electronic assembly process.


 ALPHA, značka Cookson electronics, je jedním ze světových lídrů v oblasti vývoje a výroby inovativních materiálů, používaných v procesu výroby elektroniky.

 ALPHA, eine Marke von Cookson electronics, ist eines der weltweit führenden Unternehmen im Bereich der Entwicklung und Produktion von innovativen Materialien, die im Prozess der Elektronikproduktion eingesetzt werden.

 Az ALPHA a Cookson electronics márkaneve, mely a világ egyik vezető fejlesztője és gyártója az elektronikai gyártásban használatos innovatív anyagoknak.

 ALPHA, marka Cookson electronics, jest jednym z światowych liderów w dziedzinie rozwoju i produkcji innowacyjnych materiałów stosowanych w podczas produkcji elektroniki.

 ALPHA, o marcă a Cookson electronics, este unul din liderii mondiali în crearea și producerea de materiale inovatoare utilizate în procesul de asamblare electronică.

 ALPHA, značka Cookson electronics, je jedním ze světových lídrů v oblasti vývoje a výroby inovativních materiálů, používaných v procesu výroby elektroniky.

With its history dating from 1872 as a metals smelter and refiner, Alpha is a full line supplier of Solder Paste, Stencils, Squeegee Blades, Stencil and PCB Cleaners, Solder, Cored Wire Solder, Soldering Fluxes, SMD Adhesives, Semiconductor Packaging Materials and Sphers for BGA and ChipScale Applications. In the list of products, which we keep in stock, you can find cored solder wires and bars.

## Why ALPHA?

- one of the world leading producers of solder materials
- globally used innovative products

## Lead Free Solder Wires



### 1532 Series

Universal lead-free solder. Activated rosin flux. Good thermal stability in poor soldering conditions. Clear, hard residues can be left on the board.

**Flux Type:** F-SW26  
**Alloy:** Sn96,5Ag3Cu0,5  
**Flux Content:** 3,3%  
**Melting Temperature:** +217°C to +227°C

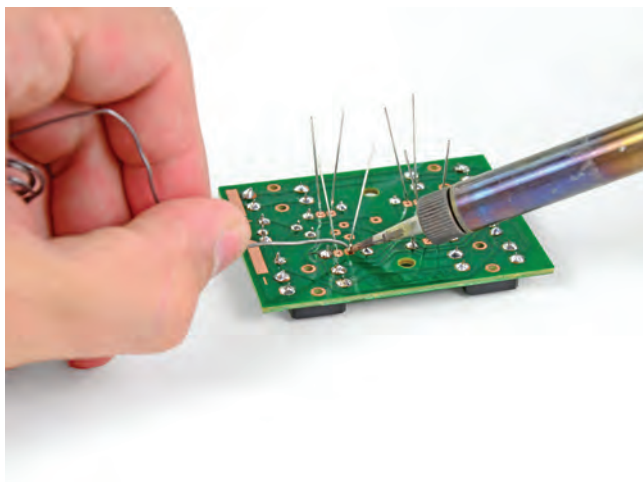


### AS Series

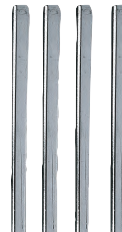
Fluitin AS is an activated rosin cored solder wire developed for general hand soldering applications where halide free flux has been specified.

**Flux Type:** F-SW32  
**Alloy:** Sn99Ag0,3Cu0,7  
**Flux Content:** 3,3%  
**Melting Temperature:** +217°C to +228°C

Available in 100g, 250g, 500g and 1kg packages.



## Lead solders



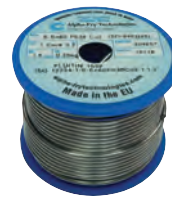
### Triangular Stick Solder

Alpha Cleanwave 63/37 is manufactured using only high purity metals in its formulaion together with proprietary dross reducing technology.

Creating low oxide formation and excellent wetting.

4x cca 250g

**Flux Type:** F-SW32  
**Alloying:** Sn63Pb37P  
**Flux Content:** 0%  
**Melting Temperature:** +183°C



### 1532 Series

Activated rosin cored solder wire developed for general hand soldering applications. The unique activator system offers good thermal stability at pre-soldering temperatures ensuring that Fluitin 1532 performs extremely well on parts and surfaces which present poor or difficult soldering conditions. Fluitin 1532 leaves post-soldering residues that are hard and which can be safely left without the need to remove them.

**Flux Type:** F-SW26  
**Alloying:** Sn60Pb38Cu2  
**Flux Content:** 2,2%  
**Melting Temperature:** +183°C to +190°C



### AS Series

Fluitin AS is an activated rosin cored solder wire developed for general hand soldering applications where halide free flux has been specified.

**Flux Type:** F-SW32  
**Alloying:** Sn60Pb38Cu2  
**Flux Content:** 1,5% (0,5mm) / 3,5% (1mm)  
**Melting Temperature:** +183°C to +190°C





KONTAKT CHEMIE a brand of CRC Industries, produces specialized chemicals for electronics. Kontakt Chemie products are made of highly clean substances and sprays feature a high active substance content.

**CZ** KONTAKT CHEMIE je značkou CRC industries, která se zabývá specializovanými chemikáliemi pro elektroniku. Produkty Kontakt Chemie jsou vyrobeny z vysoce kvalitních substancí a spreje mají vysoký obsah účinné látky.

**DE** KONTAKT CHEMIE ist eine Marke von CRC industries, die sich mit speziellen Chemikalien für die Elektronik beschäftigt. Produkte von Kontakt Chemie werden aus hochwertigen reinen Substanzen hergestellt und die Sprays zeichnen sich durch einen hohen Wirkstoffgehalt aus.

**HU** A KONTAKT CHEMIE a CRC industries márkanéve, mely speciális vegyszereket készít az elektronika számára. Termékei jó minőségű, tisztán alkotóelemekből készülnek, a sprayek magas hatóanyag tartalommal rendelkeznek.

**PL** KONTAKT CHEMIE jest marką CRC industries, która zajmuje się specjalistycznymi chemikaliami dla elektroniki. Produkty Kontakt Chemie wyprodukowane są z wysokiej jakości czystych substancji a spraye mają wysoką zawartość substancji czynnej.

**RO** KONTAKT CHEMIE o marcă a CRC Industries, fabrică produse chimice specializate pentru electronică. Produsele Kontakt Chemie sunt realizate din substanțe foarte curate și sprayuri cu un conținut ridicat de substanță activă.

**SK** KONTAKT CHEMIE je značkou CRC industries, ktorá sa zaoberá špecializovanými chemikáliami pre elektroniku. Produkty Kontakt Chemie sú vyrobené z vysokokvalitných čistých substancí a spreje majú vysoký obsah účinnej látky.

Cleaning and maintenance sprays, protective coatings for PCBs, lubricating and protecting, all these products can be found in Kontakt Chemie portfolio. At the same time, among Kontakt Chemie products you can also find many special products. For example soldering flux, cleaners intended for fine and sensitive devices, antistatic and conductive coatings (EMI), cooling agent for a thermal fault location and many other.

### Why KONTAKT CHEMIE?

- top quality chemistry for electronics
- many specialized products available
- environmental-friendly products

### Did You Know?

In 1984 CRC acquired Kontakt Chemie, a German electronics specialty chemical supplier. As they would do with all acquisitions, CRC retained the company's well-established trade name.

### Surface Treatment



**SCREEN 99**  
Anti-static screen cleaner

Effective anti-static foam cleaner to remove dust, grease, nicotine and fingerprints from screens.



**SURFACE 95**  
Office equipment cleaner

A highly active cleaner ideal for housings, keyboards, copiers, furniture and other office equipment. Removes grease, dirt and stains from plastic and metal surfaces, leaving antistatic film.



**ZINK 62**  
High-purity zinc coating

Actively fights rust and corrosion by its galvanic properties. Excellent corrosion resistance of ferrous metals through cathodic protection, even when scratched or damaged. Forms a tough, flexible zinc coating.

Most of types available in 200ml, 400ml and 1l packages.



**LABEL OFF 50**  
Paper label remover  
For removal of self-adhesive paper labels from office equipment, cables, boxes, components, household articles, etc... Test plastics compatibility prior to use.



**EMI 35**  
Electromagnetic shielding  
A highly conductive coating for shielding against electro-magnetic interference and protecting against electrostatic discharge. Offers an effective solution for plastic housings and non-conductive materials.

### PCB's & Components



**POSITIV 20**  
Photo-sensitive lacquer

To copy transparencies directly onto coated circuit boards, providing high resolution. Also usable for making heliogravures and to transfer photographic elements.



**TRANSPARENT 21**  
Transparent transfer spray

Wiring diagrams and drawings can be made transparent and translucent to UV-light, enabling the direct transfer onto surfaces treated with Positiv 20.



**GRAPHIT 33**  
Conductive coating  
A graphite-based coating, providing a conductive layer to non-conductive media. Used to avoid electrostatic build-up in packaging materials and housings of electronic equipment, to repair damaged shields and as pre-coat for galvanopating of non-conductive materials.



**ANTISTATIK 100**  
Against electrostatic charge  
Surface-active product preventing accumulation of static electricity on various surfaces. Leaves ultra-thin invisible anti-static film. ESD-protection for worktable and packaging.



**FLUX SK 10**  
Solder-active varnish  
High-grade soldering varnish manufacturing, repair and service purposes. Prevents oxidation on printed circuit boards during intermediate storage.



**URETHAN 71**  
Conformal coating  
Single component, urethane based, insulating and protective coating, providing a long-lasting flexible seal to protect against moisture and environmental influences.



**KONTAKT PCC**  
Flux residues desolver

Removes flux residues from electronic assemblies, equipped with applicator brush attached for mechanical support. Compatible with solder resist coatings and commonly used printed circuit board base materials and components..



**PLASTIK 70**  
Universal conformal coating for printed circuit boards

A quick drying, transparent acrylic resin based, transparent insulating coating. Protects against normal atmospheric influences. Fixes vibrating components. Plastik 70 Red : Also available in red coloured version to visualise the protected parts.



**KONTAFLO 85**  
PTFE-based dry lubricant

A grease- and silicone-free PTFE-based dry lubricant and release agent. Lubrication of rotating, sliding and turning surfaces exposed to low friction and heavy load.



**FLUID 101**  
De-watering fluid

A high performance and fast action moisture displacer, providing a high surface resistance. Instantly eliminates leakage currents and short circuits.



**CLEANER 601**  
Mild multi-purpose cleaner

Cleaning of electronic components, PC-boards and precision mechanics, especially when sensitive plastics such as polystyrene and polycarbonate are involved.



**FREEZE 75**  
Instant cooling of parts

Cooling agent for thermal fault location. Provides an instant solution by cooling down circuitry to -49°C. Intermittent short circuits or interruptions in condensers, resistors, integrated circuits are quickly discovered.



**KONTAKT-GOLD2000**  
Protective lubricant for metal-plated contacts

For long-lasting lubrication and protection of connectors and other electromechanical contacts, coated with gold, silver, tin, rhodium, palladium, etc.



**KONTAKT 60**  
Contact de-oxidiser

Dissolves corrosion layers, restoring the metal contact. Optimum contact conditions are reached when residues dissolved using Kontakt 60, are rinsed off with Kontakt WL prior to protection with Kontakt 61.

**Mechanics**



**VIDEO 90**  
Magnetic-head cleaner

Special cleaner for tape recording equipment whenever abraded tape, dirt or other contaminants affect the sound and picture quality. Compatible with all commonly used materials in video and tape-recorders.



**TUNER 600**  
Cleaner for consumer electronics

Especially designed to clean electrical equipment, electronic components and PC-boards of high frequency equipment with sensitive plastic parts.



**KONTAKT WL**  
Wash-spray

Washes away dissolved oxides, grease and dirt (after usage of Kontakt 60). Effective agent for cleaning and degreasing electrical equipment, circuit boards and electronic components.



**KONTAKT 61**  
Contact lubricant & corrosion inhibitor

Builds a thin protective film, preventing corrosion and wear. Provides a low, stable contact resistance, without leakage currents or short circuits between the contact surfaces.



**PRINTER 66**  
Printer-head cleaner

Dissolves ink residues, grease soiling and paper-dust. Cleans rubber rollers. Antistatic additives help to prevent damage due to electrical discharge.



**DEGREASER 65**  
Cleaner for electrical & mechanical equipment

Heavy duty cleaner and degreaser to be used whenever dirt, grease and oil-based substances interfere with the smooth running of electrical and mechanical equipment.



**JET CLEAN 360**  
Precision air duster

The spray-nozzle with screw fitting allows a precise flow control required to remove dust and other dry contaminants from precision mechanics and fine optics. Non-flammable\*. Can be used upside-down.



**DUST OFF 67**  
Universal air duster

Non-flammable\* pressurised gas to remove dust even from the most inaccessible corners of optics and fine mechanics. Combines powerful pressure and high density to achieve an intensive blowing action.



**LUB OIL 88**  
Precision lubricant

High-grade lubricating oil to lubricate instruments and equipment in precision mechanics. Totally acid and silicone free. Does not resinify, resulting in longer lubrication intervals.



**SILICONE 72**  
For insulation, lubrication & protection

A high-quality, silicone-based and viscous insulating and lubricating oil. Prevents spark discharge, stops leakage current and eliminates corona effect. Excellent dielectric properties. Ideal lubricant for plastic parts.



**BLAST OFF HF**  
Heavy-duty air duster

The high flow rate valve ensures a powerful blowing action. Especially designed for industrial heavy-duty applications.



**CRC 5-56**  
Multi-purpose lubricating and protective spray

Excellently penetrates into finest pores, loosens locked parts and protects against corrosion, fabulous lubrication properties, displaces humidity. Suitable also for electric contacts.



**KONTAKT 40**  
Service spray

Multi-purpose lubricant preventing electrical and electronic malfunctioning caused by humidity, condensation and corrosion. Kontakt 40 is a very reliable penetrating oil, lubricant, water displacer and corrosion inhibitor. Restores low contact resistance and stops leakage currents. Equipped with 360° spray-valve facilitating up-side-down usage.



**KONTAKT IPA**  
Universal Isopropanol cleaner

High purity isopropanol-spray to clean magnetic heads, disk drives, rubber rollers, fine mechanics, optics, printed circuit boards and to remove water resistant inks.


**Contact Maintenance**


**Cleaning and Maintenance Sprays**


Full range of Kontakt Chemie Products on [www.soselectronic.com/kontaktchemie](http://www.soselectronic.com/kontaktchemie)





Multimeters, oscilloscopes, testers, counters, generators and many other measuring equipment can be found in our portfolio. From simple ones for hobby usage up to sophisticated top quality devices that meet stringent requirements for professional use.


 *Multimetry, osciloscopsy, testery, čítače, generátory a mnohé ďalšie mēřící přístroje můžete nalézt v našem portfoliu. Od jednoduchých po špičkové, vysoce kvalitní přístroje, které plní přísné požadavky pro profesionální použití.*

 *Multimeter, Oszilloskope, Prüfgeräte, Zähler, Generatoren und zahlreiche weitere Messgeräte finden Sie in unserem Portfolio. Von einfachen zur Hobby-Anwendung bis hin zu qualitativ hochwertigen Spitzengeräten, die die strengen Anforderungen für den professionellen Einsatz erfüllen.*

 *Multiméterek, oszcilloszkópok, teszterek, számlálók, generátorok és számos más mérőberendezés fellelhető kínálatunkban az egyszerű, hobbicélútól a professzionális alkalmazás szigorú követelményeinek is megfelelő nagy tudású, csúcsmínőségű műszerekig.*

 *Multimetry, oscyloskopy, testery, liczniki, generatory i wiele innych urządzeń pomiarowych można znaleźć w naszym portfolio. Od prostych, do zastosowania „hobby”, po wyjątkowe urządzenia najwyższej klasy, spełniające rygorystyczne warunki do użycia profesjonalnego.*

 *Multimetrele, osciloscopapele, testerele, contoarele, generatoarele și multe alte aparate de măsurat pot fi găsite în portofoliul nostru. Sunt de la cele simple, pentru utilizarea ca hobby până la aparatele sofisticate de cea mai înaltă calitate, care satisfac cerințele stricte ale utilizării profesionale.*

 *Multimetre, osciloscopsy, tester, čítače, generator a mnohé ďalšie meracie prístroje môžete nájsť v našom portfóliu. Od jednoduchých pre hobby použitie po špičkové vysoko kvalitné prístroje, ktoré spĺňajú prísne požiadavky pre profesionálne použitie.*

As measuring and testing devices are irreplaceable assistants in our work, we keep in our offer a wide portfolio of these devices, including clamp multimeters, special measuring devices, thermometers, panel meters and a wide range of accessories.

## Classification

Probably the most important parameter of every measuring device is its accuracy (or accuracy class). Another important parameter is the long-term stability. Mechanical construction and overall rigidity is also important at portable devices. It is possible to measure the same value with devices of a various quality, but the use of a precise and a more accurate type guarantees more consistent and reliable measurement.

Many modern types also support connection with a PC, enabling a data transfer or direct displaying of measured values. When choosing from two or more types, it is advisable to thoroughly compare their features including their ergonomics. Very important feature is also a simple and intuitive operation – especially at highly complex devices like oscilloscopes.





# Value Instruments from Rohde & Schwarz

## **T&M instruments that meet your needs**

Whether you work in a major electronics R&D facility or a small service lab, you are not always performing complex measurements and do not always need the ultimate in high-end T&M equipment. What you need

are precise, reliable, universal measuring instruments. That's exactly what you get with value instruments from Rohde&Schwarz: instruments that combine practical features with excellent measurement characteristics, instruments that are easy to use and easy on the budget.



Oscilloscopes | Spectrum analyzers | Network analyzers | EMC precompliance | Signal generators



# ROHDE & SCHWARZ

## Service that puts you first

As an electronics company with a successful history spanning almost 80 years, we've built a strong global presence that includes a worldwide service and sales network, 24-hour support and R&D centers at technology locations

around the globe. No matter how you buy our products – through direct sales channels, from a distributor or from our R&S®Surf-In web store that is now available in numerous countries – there's always a personal contact partner ready to help you. Worldwide at all times.



Power sensors | Power meters | Voltmeters | Power supplies | LCR bridges and meters | Frequency counters

For more details contact your authorised distributor [SOS electronic europe](#).



HAMEG, founded in 1957/ Germany, a member of the Rohde & Schwarz Group since April 2005, develops and manufactures top quality electronic measuring instruments with excellent price/ performance ratio.

HAMEG, založen v roce 1957 v Německu, je členem Rohde & Schwarz Group od dubna roku 2005. Vytváří a vyrábí vysoce kvalitní elektronické měřicí přístroje s vynikajícím poměrem cena / výkon.

HAMEG, gegründet im Jahr 1957 in Deutschland, ist seit April 2005 Mitglied der Gruppe Rohde & Schwarz. Es entwickelt und produziert qualitativ hochwertige elektronische Messgeräte mit einem ausgezeichneten Preis-/Leistungsverhältnis.

A HAMEG-et 1957-ben alapítottak Németországban. 2005 április óta tagja a Rohde & Schwarz csoportnak. Minőségi elektronikus mérőműszereket gyárt és fejleszt kitűnő ár/érték aránnyal.

HAMEG, założony w roku 1957 w Niemczech, jest częścią Rohde & Schwarz Group od kwietnia 2005 roku. Rozwija i produkuje wysokiej jakości elektroniczne urządzenia pomiarowe z wyjątkowym stosunkiem cena / wydajność.

HAMEG, fondată în 1957/ Germania, este membră a Rohde & Schwarz Group din aprilie 2005, proiectează și produce instrumente electronice de măsurare de primă calitate, cu un excelent raport preț / performanță.

HAMEG, založený v roku 1957 v Nemecku, je členom Rohde & Schwarz Group od apríla roku 2005. Vytvára a vyrába vysoko kvalitné elektronické meracie prístroje s vynikajúcim pomerom cena / výkon.

Since the company's foundation, the name Hameg stands for innovation, user friendliness, longevity and high quality of workmanship. The product portfolio includes analog, digital and mixed-signal oscilloscopes, spectrum analyzers, power supplies, instruments which can be integrated in measurement systems (such as counters, LCR bridges, power analyzers, RF and arbitrary generators) as well as the popular modular system. All Hameg instruments conform to the standard width of 285 mm, so stacks of several instruments are possible, due to this feature and the compact sizes they require little space in the working area.

Hameg customers come from industry, science, service, small businesses, schools and universities and hobbyists.

### Why HAMEG?

- top quality, user friendly products
- excellent price/ performance ratio
- high sensitivity and accuracy
- simple and intuitive operation

### Oscilloscopes



- Analog
- Analog-Digital
- Digital

### Counters, Generators



### Special Measuring Devices



- Spectrum Analyzers
- Multimeters
- Power Meters
- LCR-Bridge

### Modular System Series 8000



### Laboratory Power Supplies



### Accessories





**Oscilloscopes**

HM03524	350 MHz 4 Channel Digital Oscilloscope
HM03522	350 MHz 2 Channel Digital Oscilloscope
HM02524	250 MHz 4 Channel Digital Oscilloscope
HM02024	200 MHz 4 Channel Digital Oscilloscope
HM02022	200 MHz 2 Channel Digital Oscilloscope
HM01524	150 MHz 4 Channel Digital Oscilloscope
HM01522	150 MHz 2 Channel Digital Oscilloscope
HM01024	100 MHz 4 Channel Digital Oscilloscope
HM01022	100 MHz 2 Channel Digital Oscilloscope
HM0724	70 MHz 4 Channel Digital Oscilloscope
HM0722	70 MHz 2 Channel Digital Oscilloscope
H0011	Serial Bus (Analog Channel)
H0010	Serial Bus (Analog & Digital Channel)
HM400	40 MHz Analog Oscilloscope

**Spectrum Analysis**

HMS3010	3 GHz Spectrum Analyzer with Tracking-Generator
HMS3000	3 GHz Spectrum Analyzer
HMS1010	1 GHz Spectrum Analyzer with Tracking-Generator
HMS1000	1 GHz Spectrum Analyzer
HMS1000E	1 GHz Spectrum Analyzer
HM6050-2	Line Impedance Stabilization Network
HZ540/HZ550	EMV Near-Field Probe Set up to 3 GHz
HZ530	EMV Near-Field Probe Set up to 1 GHz

**Power Supplies**

HMP4040	Programmable 4 Channel High-Performance Power Supply
HMP4030	Programmable 3 Channel High-Performance Power Supply
HMP2030	Programmable 3 Channel High-Performance Power Supply
HMP2020	Programmable 2 Channel High-Performance Power Supply
HM7042-5	Triple Power Supply 2x0-32V/0-2A and 1x0-5.5V/0-5A
HM8143	Arbitrary Power Supply 2x0-30V/0-2A and 1x5V/0-2A

**Programmable Measuring Instruments Series 8100**

HMF2550	50 MHz Arbitrary Function Generator
HMF2525	25 MHz Arbitrary Function Generator
HM8112-3	6"-Digit Precision Multimeter
HM8115-2	8 kW Power Meter
HM8118	200kHz LCR-Bridge
HM8123	3 GHz Programmable Counter
HM8134-3	1.2 GHz RF-Synthesizer
HM8135	3 GHz RF-Synthesizer
HM8150	12.5 MHz Arbitrary Function Generator

**Modular System Series 8000**

HM8001-2	Mainframe
HM8012	4-Digit Programmable Multimeter
HM8018	25 kHz LCR-Meter
HM8021-4	1.6 GHz Universal Counter
HM8030-6	10 MHz Function Generator
HM8040-3	Triple Power Supply (Module) 2x0-20V/0.5 A and 1x5V/1A
HM800	Blank Module 41

**Options**

H0118	Binning Interface
H03508	Logic Probe
H03011	Preamplifier
H0011	Serial Bus (Analog Channel)
H0010	Serial Bus (Analog & Digital Channel)
H0730	Dual Ethernet/USB Interface
H0740	IEEE-488 (GPIB) Interface
H0880	IEEE-488 (GPIB) Interface

**Accessories**

Test Cables
Test Cables/Adapter
Adapter/Interfaces/Cables
Probes
Converter/Sensors/Test fixtures
HM8118/Test Adapter
Spectrum Analyzer
Rackmount Kits
Rackmount Kits/Carrying Cases





	HMO3522 [HMO3524]	HMO2524	HMO2022 [HMO2024]	HMO1522 [HMO1524]	HMO1022 [HMO1024]	HMO722 [HMO724]
<b>Vertical</b>						
Number of Channel	2 [4]	4	2 [4]	2 [4]	2 [4]	2 [4]
Bandwidth	350 MHz	250 MHz	200 MHz	150 MHz	100 MHz	70 MHz
Input Impedance	1 M $\Omega$ /50 $\Omega$	1 M $\Omega$ /50 $\Omega$	1 M $\Omega$ /50 $\Omega$	1 M $\Omega$ /50 $\Omega$	1 M $\Omega$	1 M $\Omega$
V/div. 1 M $\Omega$	1 mV/div....5V/div.	1 mV/div....5V/div.	1 mV/div....10V/div.	1 mV/div....10V/div.	1 mV/div....10V/div.	1 mV/div....10V/div.
Max. Input voltage 1 M $\Omega$	200 Vpk					
V/div. 50 $\Omega$	1 mV/div....1V/div.	1 mV/div....1V/div.	1 mV/div....1V/div.	1 mV/div....1V/div.	N/A	N/A
Probe Attenuation Sense	Standard					
<b>Horizontal</b>						
Sample Rate per Analog Channel	2 GSa/s	1.25 GSa/s	1 GSa/s	1 GSa/s	1 GSa/s	1 GSa/s
Max. Sample Rate	4 GSa/s	2.5 GSa/s	2 GSa/s	2 GSa/s	2 GSa/s	2 GSa/s
Memory Depth per Ch.	2 MPts.	2 MPts.	1 MPts.	1 MPts.	1 MPts.	1 MPts.
Max. Memory	4 MPts.	4 MPts.	2 MPts.	2 MPts.	2 MPts.	2 MPts.
Timebase Accuracy	15 ppm	15 ppm	50 ppm	50 ppm	50 ppm	50 ppm
<b>Trigger</b>						
Trigger Rate	2500 wfs/s	2500 wfs/s	2000 wfs/s	2000 wfs/s	2000 wfs/s	2000 wfs/s
Trigger Modes	Edge, Pulse Width, Pattern, Video incl. HDTV, A/B Trigger					
<b>Measurement</b>						
Cursormeasurement List	$\Delta V$ , $\Delta t$ , $1/\Delta t$ (f), V to Gnd, Vt related to Trigger point, ratio X and Y, pulse count, peak to peak, peak+, peak-					
Parameter List	Frequency, Period, pulse count, V <sub>pp</sub> , V <sub>p+</sub> , V <sub>p-</sub> , V <sub>rms</sub> , V <sub>avgr</sub> , V <sub>top</sub> , V <sub>base</sub> , t <sub>width+</sub> , t <sub>width-</sub> , t <sub>dutycycle+</sub> , t <sub>dutycycle-</sub> , t <sub>rise</sub> , t <sub>fall</sub> , pos. edge count, neg. edge count, pos. pulse count, neg. pulse count"					
HW Counter	6 Digit					
Advanced Math, Math on Math	Standard					
Math Functions std.	ADD, SUB, 1/X, ABS, MUL, DIV, SQ, POS, NEG, INV, INTG, DIFF, SQR, MIN, MAX, LOG, LN, Filter (low-pass, high-pass)					
Pass/Fail Mask testing	Standard					
<b>Mixed Signal</b>						
Mixed Signal Functionality	via Option HO3508 (8 Channel) or HO3516 (16 Channel)			via Option HO3508 (8 Channel)		
Max. Number of Logic Channel	16	16	8	8	8	8
Sample Rate of the Digital Channel	1 GSa/s	1,25 GSa/s	1 GSa/s	1 GSa/s	1 GSa/s	1 GSa/s
Memory Depth of the Digital Channel	1 MPts.	2 MPts.	1 MPts.	1 MPts.	1 MPts.	1 MPts.
<b>Serial Trigger and Decode</b>						
I <sup>2</sup> C, SPI, UART/RS-232	HOO10 via Analog Channels and/or Logic Channels, HOO11 via Analog Channels					
CAN/LIN	HOO12 via Analog Channels and/or Logic Channels					
<b>Display</b>						
Display Size	6.5 inch					
Display Resolution	640 x 480					
Virtual Screen	20 div.					
<b>Interfaces</b>						
Monitor Output	Standard: DVI-D					
USB Remote Interface	Standard					
RS-232 Remote Interface	Standard					
Ethernet Remote Interface	Option HO730					
GPIO Remote Interface	Option HO740					
<b>Miscellaneous</b>						
Fan noise	very low					
Dimension (W x H x D)	28.5 x 17.5 x 22 cm	28.5 x 17.5 x 22 cm	28.5 x 17.5 x 14 cm	28.5 x 17.5 x 14 cm	28.5 x 17.5 x 14 cm	28.5 x 17.5 x 14 cm
Footprint	627 cm <sup>2</sup>	627 cm <sup>2</sup>	399 cm <sup>2</sup>	399 cm <sup>2</sup>	399 cm <sup>2</sup>	399 cm <sup>2</sup>
Weight	3.6 kg	3.6 kg	2.5 kg	2.5 kg	2.5 kg	2.5 kg
Power	70 W max.	70 W max.	55 W max.	55 W max.	55 W max.	55 W max.
Component Tester	N/A	N/A	Standard	Standard	Standard	Standard
Additional Bus Signal Source	Standard					
Languages	German, English, French, Spain					

Soldering Equipment Solders, Chemistry and PCBs Measuring Devices Tools



UNI-TREND Group Limited is one of the leading testing meters and instruments companies in Asia. Uni-Trend group develops and manufactures reliable, high quality and safe to use testing equipment and technology products, which are compliant to the global standards, offering high added value.

**CZ** UNI-TREND Group je jednou z popředních společností v oblasti testovacích a měřících přístrojů v Asii. Uni-Trend Group vyvíjí a vyrábí spolehlivá, vysoce kvalitní a bezpečná měřící zařízení a technologické produkty, které splňují mezinárodní standardy a poskytují vysokou kvalitu.

**DE** UNI-TREND Group ist eines der führenden Unternehmen im Bereich der Prüf- und Messgeräte in Asien. Uni-Trend Group entwickelt und produziert zuverlässige, hochqualitative und sichere Prüfgeräte und technologische Produkte, die internationale Standards erfüllen und einen hohen Mehrwert bieten.

**HU** Az UNI-TREND cégcsoport vezető szerepet tölt be Ázsiában a tesztelő és mérőműszerek területén. Megbízható, jó minőségű és biztonságos készülékeket és műszaki termékeket gyárt, melyek megfelelnek a nemzetközi előírásoknak és magas hozzáadott értékkel rendelkeznek.

**PL** UNI-TREND Group jest jedną z wiodących światowych spółek w dziedzinie przyrządów mierniczych i testowych z Azji. Uni-Trend Group rozwija i produkuje niezawodne, wysoko jakościowe i bezpieczne urządzenia testowe i produkty technologiczne, które spełniają standardy międzynarodowe i oferują wysoką wartość dodaną.

**RO** UNI-TREND Group Limited este una din companiile lider în aparate de testare și instrumente din Asia. Grupul Uni-Trend proiectează și produce echipamente de testare și produse tehnologice fiabile, de înaltă calitate și sigure în folosire, care sunt conforme standardelor mondiale, oferind multă valoare adăugată.

**SK** UNI-TREND Group je jednou z popředních společností v oblasti testovacích a měřících přístrojů v Asii. Uni-Trend Group vyvíjí a vyrábí spolehlivé, vysoce kvalitní a bezpečné testovací zařízení a technologické produkty, které splňují mezinárodní standardy a poskytují vysokou přidanou hodnotu.

Among major UNI-T product groups belong Digital Multimeters, Automotive Testers, Electrical Testers, Environmental Analysis Testers, Safety Testers, General Testers, Calibrating Testers and Digital Storage Oscilloscopes.

## Measuring Instruments

### Digital Storage Oscilloscopes

- Digital Storage Oscilloscopes
- Handheld Digital Storage Oscilloscopes
- Bright full colour LCD, 2 channels, Bench Type
- 250MS/s sample rate, Monochrome LCD, 2 channels, Bench Type
- 250MS/s sample rate, Full colour LCD, 2 channels, Bench Type
- 500MS/s sample rate, Monochrome LCD, 2 channels Bench Type
- 500MS/s sample rate, Full colour LCD, 2 channels Bench Type
- 1GS/s sample rate, Monochrome LCD, 2 channel, Bench Type DSO
- 1GS/s sample rate, Full colour LCD, 2 channel, Bench Type DSO
- 2GS/s sample rate, Full colour LCD, 2 channel, Bench Type DSO



### Electrical Tools

- Electrical Testers
- Digital RCD (ELCB) Testers



### Insulation Testers

- Insulation Resistance Testers
- Earth Ground Testers
- Inductance Capacitance Meters



### General Testers

- Tachometers
- Sound Level Meters
- Anemoscopes
- Luminometers
- Non-Contact AC Voltage Detectors
- Multi-Function Voltage Testers



### Process Calibrators

### Scope Meters



## Why UNI-T?

- one of the world leading producers of testing and measuring devices
- globally used innovative products
- excellent price/ performance ratio

### Clamp Meters

- ACA Clamp Meters
- ACA & DCA Clamp Meters
- ACA & DCA Clamp Meters with True RMS
- Digital Power Clamp Meters



### Bench Multimeters

- Multimeters
- Digital AC Milli Volt Meters



### Handheld Digital Multimeters

- UT10 series
- UT20 series
- UT30 series
- UT33 series
- UT39 series
- UT50 series
- UT50-II series
- UT58 series
- UT60 series
- UT61 series
- UT70 series
- UT71 series
- UT90-II series
- Pen Type Meters



### Automotive Multimeters

- Manual Ranging Automotive Multimeters
- Auto Ranging Automotive Multimeters



### Thermometers

- Digital Thermometers
- Infrared Thermometers 10:1
- Infrared Thermometers 12:1
- Infrared Thermometers 20:1
- Infrared Thermometers 30:1
- Infrared Thermometers 50:1
- Infrared Body Forehead Thermometers



### DC Power Supply



### Function Generators

- DDS Universal Waveform Generators
- DDS Function Generators
- General Function Generators



### Accessories





Scopemeters



UT 81 B

The Uni-Trend Digital Oscilloscope is ideal for those, who looking for a portable and affordable measuring device. Providing power through a standard power supply for desk top usage or off batteries, the Uni-Trend Oscilloscope makes an ideal companion for those looking for a TRUE isolated Digital scope with no worries of ground loops or other non isolated meter problems.

With its fantastic dynamic range of 750VAC this makes the meter perfect for measuring mains supply signals where other non isolated scopes struggle to do so. Providing display capabilities of up to 8MHz signals.

These units also come with a connection into the computer for Data logging which makes a perfect tool for overnight logging of signals for fault finding and the stability of voltages over time.

2in1

Type	Range	Accuracy
DC Voltage	400mV / 4V / 40V / 400V / 1000V	(0.8%+8)
AC Voltage	4V / 40V / 400V / 750V	(1%+15)
DC Current	400µA / 4000µA / 40mA / 400mA / 4A / 10A	(1%+8)
AC Current	400µA / 4000µA / 40mA / 400mA / 4A / 10A	(1.5%+8)
Resistance	400Ω / 4kΩ / 40kΩ / 400kΩ / 4MΩ / 40MΩ	(1%+5)
Capacitance	40nF / 400nF / 4µF / 40µF / 100µF	(3%+8)
Frequency	10Hz - 10MHz	(0.1%+3)
Measuring	transistors, periode, diode test, Continuity Test	

UNI-T Desktop Digital Multimeter

UT 803



USB True RMS

The UT803 is a high performance and low cost desktop multimeter. It comes with LCD display (5999, 28x128mm), shows the information. It is designed by a high-tech team. This instrument combines the bench-top and system features which provides a versatile solution for your testing requirements now and in the future. The device has an USB interface for easy data analysing using a PC.

Dimensions: 105x240x310 mm, Weight: 2,4kg

Type	Range	Accuracy
DC Voltage	600 mV-1000 V	±(0,3%+2)
AC Voltage	600 mV-1000 V	±(0,6%+5)
DC Current	600 µA-10 A	±(0,5%+3)
AC Current	600 µA-10 A	±(1%+5)
Resistance	600 Ω-60 MΩ	±(0,5%+2)
Capacitance	6 nF-6 mF	±(2%+5)
Frequency	6 kHz-60 MHz	±(0,1%+3)
Temperature	-40°C to +1000°C	±(1%+3)
Measuring	diode test, Continuity Test with buzzer, hFE	

UNI-T Multimeters



UT 71 E

Digital Multimeter UT71E is a 40000 counts and 4 3/4 digits with steady operations, fashionable structure and auto ranging instrument. It can measure not only AC voltage and current, DC voltage and current, Resistance, Capacitance, Temperature, Frequency, Diodes, Continuity, 4~20mA Loop, Max/Min, Relative Mode but also has Data Store, Data Recall, AC True RMS, AC+DC, Low Battery Display, Double Display Backlight, Data Hold, Automatic Power Off and full overload protection.

Power USB True RMS Current Loop

UT 71 E		
	Range	Accuracy
DC Voltage	400 mV-1000 V	±(0,025%+5)
AC Voltage	4 V-1000 V	±(0,4%+30)
DC Current	400 µA-10 A	±(0,08%+8)
AC Current	400 µA-10 A	±(0,5%+15)
Resistance	400 Ω-40 M Ω	±(0,3%+8)
Capacitance	40 nF-40 mF	±(1%+20)
Frequency	40 Hz-400 MHz	±(0,01%+8)
Temperature	-40°C to +1000°C	±(1%+30)
Measuring	power, current loop, diode test, Continuity Test with buzzer	



Full range of UNI-T Products on [www.soselectronic.com/unit](http://www.soselectronic.com/unit)



UT 70 A

The UT-70A Multimeter is a hand-held digital multimeter with advanced design, multiple functions, large display screen and reliable performance. This meter is able to measure voltage & current (AC & DC), resistance, capacitance, inductance, frequency, temperature, forward voltage drop of diodes, transistor hFE, Continuity Test & TTL LOGIC level measurement. Dimensions: 195x90x40 mm, weight: 600 g.

UT 70 A		
	Range	Accuracy
DC Voltage	200 mV-1000 V	±(0,5%+1)
AC Voltage	200 mV-750 V	±(0,8%+3)
DC Current	20 μA-10 A	±(0,8%+1)
AC current	20 μA-10 A	±(1%+3)
Resistance	200 Ω-2000 M Ω	±(0,8%+1)
Capacitance	20 nF-100 μF	±(2,5%+5)
Inductance	2 mH-20 H	±(2%+10)
Frequency	2 kHz-10 MHz	±(0,1%+3)
Temperature	-40°C to +1000°C	±(1%+3)
Measuring	diode test, Continuity Test with buzzer, hFE, logic probe TTL	



UT 60 H

Digital Multimeter UT60H is a 39999 counts and 4 3/4 digits with steady operations, fashionable structure and auto ranging instrument. The Meter has analogue bar graph, True RMS and full range overload protection. The Multimeter not only can measure AC voltage and current, DC voltage and current, Resistance, Capacitance, Temperature, Frequency, Diodes, Continuity, 4~20mA Loop EF Function, Max/Min, Relative Mode but also has Low Battery Display, Data Hold and Sleep Mode features.

Dimensions: 177x85x40 mm  
Weight: 340 g.

EF True RMS Current Loop

UT 60 H		
	Range	Accuracy
DC Voltage	4 V-1000 V	±(0,1%+5)
AC Voltage	4 V-750 V	±(1%+4)
DC Current	400 μA-10 A	±(0,5%+10)
AC Current	400 μA-10 A	±(1,2%+4)
Resistance	400 Ω-40 M Ω	±(0,5%+10)
Capacitance	40 nF-40 mF	±(1,5%+20)
Temperature	-40°C to +400°C	±(1%+5)
Frequency	4 kHz-400 MHz	±(0,01%+3)
Measuring	electric field, current loop, diode test, Continuity Test with buzzer	



UT 132 D

Measuring of DC current gain of transistors we nowadays can find at many measuring devices. However, much more rare is the possibility to measure this parameter even at SMT transistors, NPN and PNP types in a SOT-23 package. UNI-T UT132D is a measuring device with a well readable, sufficiently big display with a maximum value of 1999. With it you can measure all usual values and a capacity of condensators. A novelty is the included adapter for measuring of hfe of transistors, not only for classic with wire leads but also for SMT transistors. It enables to check the functionality and to roughly measure SMT transistors, what can be a big help at development or production of prototypes.

SMD adapter



UT 132 D		
	Range	Accuracy
DC Voltage	200 mV-250 V	±(0,8%+2)
AC Voltage	200V-250 V	±(1,2%+3)
DC Current	2 mA-20 A	±(2,0%+1)
Resistance	200 Ω-20 M Ω	±(0,8%+5)
Capacitance	20 n-200 μF	±(2,0%+5)
Measuring	diode test, hfe with SMD adapter, Continuity Test with buzzer	

Clamp Multimeters



UT 232

UT232 can measure power from one to three phases like an active energy counter up to 9999kWh. To minimize the amount of interference created by engineers in the operation of machines, a test device is required that can measure voltage, current and power (Active, Apparent, Reactive power), power factor  
USB Interface

CAT III 600V

Function	UT 232
Indicating Range	9999
Accuracy	0,5% - 3%
Voltage AC	20 V - 600 V
Voltage DC	-
Current AC	40 A - 1000 A
Current DC	-
Reactive Power	0,60 kVAr - 600,0 kVAr
Apparent Power	0,60 kVA - 600,0 kVA
Active Power	0,60 kW - 600,0 kW
Power Factor (cos φ)	0,3-1
Phase Angle	0-360°
Frequency	20Hz - 500 Hz
Active Energy (KWh counter)	0 - 9999kWh





V&A INSTRUMENT known as Mastech Shanghai, is one of the major test instrument manufacturers in China specialized in professional test and measurement instruments as well as power supplies.

Společnost V&A INSTRUMENT, známá i jako Mastech Shanghai, je jeden z hlavních výrobců měřicích přístrojů, specializující se na profesionální testovací a měřicí přístroje a laboratorní zdroje.

Das Unternehmen V&A INSTRUMENT, bekannt auch als Mastech Shanghai, ist einer der wichtigsten Hersteller von Messinstrumenten, der sich auf professionelle Prüf- und Messgeräte sowie Laborstromversorgungen spezialisiert.

A V&A INSTRUMENT, ismertebb néven Mastech Shanghai, az egyik legfőbb kínai mérőműszer gyártó, mely a professzionális tesztlő és mérőműszerekre, valamint laboratóriumai tápkora specializálódott.

Spółka V&A INSTRUMENT, znana również jako Mastech Shanghai, jest jednym z głównych producentów instrumentów pomiarowych. Specjalizuje się w produkcji profesjonalnych instrumentów testowych i pomiarowych, jak również zasilaczy laboratoryjnych.

V&A INSTRUMENT, cunoscută sub denumirea de Mastech Shanghai, este unul din principalii producători de instrumente de testare din China, specializată în instrumente profesionale de testare și măsurare cât și în rețele electrice.

Spoločnosť V&A INSTRUMENT, známa aj ako Mastech Shanghai, je jeden z hlavných výrobcov meracích prístrojov, špecializujúci sa na profesionálne testovacie a meracie prístroje, ako aj laboratórne zdroje.

V&A product line covers different industries such as electronic tools, electrical power, food and chemical, atmosphere monitoring, education and consumer electronics, laboratory equipment and other. V&A products feature very good electrical as well as mechanical quality.

## Measuring Instruments

- Data Loggers
- Calibrator And Insulation Multimeters
- Extra-Safety Multimeters
- Bench Multimeters
- Multimeters And Clampmeters
- Environment Instruments
- Infrared Thermometers
- Lcr Meters
- Other Test Instruments
- Accessory

## Special Measuring Equipments

### VA 588

VA588 Insulation Multimeters combine a digital insulation tester with a full-featured digital multimeter in a single, compact, handheld unit, which provides convenience for both troubleshooting and preventative maintenance. This meters are ideally suited to help you with your tasks and at a cost that is far less than buying the two products separately. Application: Motors, generators, cables, switch gear.



Function	VA 588	
	Range	Accuracy
DC Voltage	0.001V - 1000V	± (0.2%+5digits)
AC Voltage	0.1mV - 1000V	± (2%+5digits)
DC Current	0.01mA - 400mA	± (1%+5digits)
AC current	0.01mA - 400mA	± (2%+5digits)
Resistance	0.1 Ω - 60 MΩ	± (1.2%+5digits)
Insulation resistance	0.01MΩ - 2GΩ	± (1.5%+5digits)
Test voltage	50,100,250,500,1000V	-
Capacitance	1nF - 5000μF	± (2%+4digits)
Frequency	0.01Hz - 100KHz	± (0.1%+3digits)
Diode test		yes

## Why V&A?

- excellent price/performance ratio

### VA 6450

#### Ultrasonic Distance Meter

Measure distance, height, area, volume-fast and easily

**Measurement range:** 0.6~15m

**Accuracy:** ±0.5%±2digit

**Resolution:** 0.01m

**Aperture angle:** Approx.±5°



Function	VA 6450
Indicating range	0,6 - 15m
Accuracy	±0,5 % ±1 digit
Resolution	0,01m
Aperture angle	approx ±5°
Laser type	630 - 650 nm
Laser power	≤1mW
Battery	9V 6F22

### MS 6812

The cable tracker is designed to identify and trace wires or cables within a group without damaging the insulation. For telephone line, it can identify some state in the line, and provides more convenience to install. Debug, maintain telephone line. There is a Sender (MS6812-T) and a Receiver (MS6812-R) included in the cable tracker.



### VA 8030

#### Rotation speed meter

The meter is a rotation speed measuring instrument. It is normally used to measure rotational speed, e.g. of propellers, drums and spindles.

**Measure:** rpm, rps

**Range:** 100~30000rpm, 1.7~500rps

**Accuracy:** ±0.1%

**Special function:** Auto power off; Data hold; MAX MIN; Back light; Battery: DC1.5V (AAA) x 3pcs

Complete with pouch case and cover.





**Luxmeter MS-6610**

MS6610 Digital Luxmeter - compact and reliable device. Separate design of photo detector and the luxmeter itself makes the measurements more convenient. Data Hold

**Display:** LCD, 1999 counts

**Ranges:** 0-2000 Lux  $\pm 5\%$ , 2000-19990 Lux  $\pm 5\%$ , 20000-50000 Lux  $\pm 5\%$

**Power supply:** 9V battery

**Measuring rate:** 2/sec

**Accessories:** battery, protective case

**Dimensions:** luxmeter 126x72x27mm  
sensor 83x52x21mm



**VA 6520**

Infrared Temperature Meter with laser and display backlight for non-contact measurement.

Included 9V battery and case.

**TAMB measurement:** 0°C to +50°C

**Measurement range:** -50°C to +500°C

**Emissivity:** 0,95

**Field of view:** 8:1



**Multimeters**

**VA 16**

**3 In 1 Network Multimeter**

**Network Cable test (RJ45):**

- Tests for open circuits, shorts, miswires, reversals, and split pairs
- SHIELD detection tests a cable's shield integrity
- Main unit and one remote allow one person testing of T568A, T568B, 10Base-T, and Token Ring

- Easy to read fault display and high speed testing

**Telephone Line test (RJ11):**

- Debug mode for detailed fault



VA 16		
	Range	Accuracy
DC Voltage	200 mV - 1000 V	$\pm(1,2\% \pm 3)$
AC Voltage	200 mV-700 V	$\pm(1,2\% \pm 5)$
DC Current	200 $\mu$ A-10 A	$\pm(2,0\% \pm 5)$
AC Current	200 $\mu$ A-10 A	$\pm(3,0\% \pm 5)$
Resistance	200 $\Omega$ -20 M $\Omega$	$\pm(5\%)$

**VA 21**

Digital multimeter with non-contact AC voltage detector and misplug alarm

Continuity Check, Diode Test, AutoRange, Relative Measurement, MAX/MIN Value Measurement, Data Hold, Auto Power Off, Low Power Indication, 3999 display with backlight.



VA 21		
	Range	Accuracy
DC Voltage	400 mV-1000 V	$\pm(1,0\% \pm 3)$
AC Voltage	4 V-750 V	$\pm(1,2\% \pm 3)$
DC Current	400 $\mu$ A-10 A	$\pm(2,0\% \pm 8)$
AC Current	4000 $\mu$ A-10 A	$\pm(3,0\% \pm 8)$
Resistance	400 $\Omega$ -40 M $\Omega$	$\pm(2,0\% \pm 5)$
Frequency	9,999 Hz - 200 kHz	$\pm(0,1\% \pm 1)$
Capacitance	4 nF-200 $\mu$ F	$\pm(5,0\% \pm 5)$
Temperature	- 20°C to + 1000°C	$\pm(5,0\% \pm 4)$

**VA 38**

50000 Counts High Accuracy Multimeter

This multimeters are rugged and reliable, hand-held or system instruments for maintenance, initial start-up, training and R&D in industry, for government authorities, in the test lab, in manufacturing and quality assurance, as well as at universities.



VA 21		
	Range	Accuracy
DC Voltage	50 mV-1000 V	$\pm(0,5\% \pm 40)$
AC Voltage	50 mV-1000 V	$\pm(0,03\% \pm 10)$
DC Current	500 $\mu$ A-10 A	$\pm(0,75\% \pm 20)$
AC Current	500 $\mu$ A-10 A	$\pm(0,15\% \pm 15)$
Resistance	500 $\Omega$ -50 M $\Omega$	$\pm(2,0\% \pm 5)$
Frequency	5Hz ~ 200 kHz	$\pm(0,006\% \pm 4)$
Capacitance	50 nF-5000 $\mu$ F	$\pm(2,0\% \pm 8)$

**Clamp Multimeters**

**VA 315**

Versatile clamp multimeter with automatic / manual range selection, measuring also a frequency, capacitance and true RMS Vac.



Function	VA 315
Indicating Range	5999
Accuracy	0,1% - 5%
Voltage AC	6 V - 700 V
Voltage DC	6 V - 1000 V
Current AC	to 1000 A
Resistance	600 $\Omega$ - 60 M $\Omega$
Continuity Test	yes, buzzer
Frequency	40 Hz - 100 kHz
Capacitance	600 nF - 1000 $\mu$ F
ADP Measurement	600 mV
Notes	diode test, auto/manual range, MAX/MIN, data hold, Back Light

**Measuring Tweezers**

**VA 505B**

The V&A VA505B gives users an easy way to sort and evaluate loose components and to perform on-board measurements and debugging.

Precise tips made of non-magnetic steel are able to pick and reliably contact even smallest SMD components, or take measurements from the devices already mounted on a board. The probe can also be used to test conventional components with wire leads too short to insert into the test terminals.





Function	VA 503		VA 505 B	
	Range	Accuracy	Range	Accuracy
Resistance	400 $\Omega$ - 40 M $\Omega$	$\pm(2\% \pm 5)$	300 $\Omega$ - 60 M $\Omega$	$\pm(1\% \pm 5)$
Capacitance	4nF - 200 $\mu$ F	$\pm(5\% \pm 5)$	3nF - 60 mF	$\pm(3\% \pm 5)$
Auto Scan	no		yes	
Diode test	yes		yes	
Dimensions	181x35x20 mm		181x35x20 mm	


Full range of V&A Products on [www.soselectronic.com/va](http://www.soselectronic.com/va)





BENNING founded in 1938/ Germany, focuses already for many decades on measuring equipment, industry power supplies and chargers. Already from 1948 are known their famous testers DUSPOL and DUTEST.


 *Společnost BENNING byla založena v roce 1938 v Německu. Zaměřuje se již po mnoho desetiletí na měřicí techniku, průmyslové napájení a nabíječky. Již od roku 1948 jsou známé testery DUSPOL a DUTEST.*

 *Das Unternehmen BENNING wurde 1938 in Deutschland gegründet. Bereits seit mehreren Jahrzehnten spezialisiert es sich auf Messtechnik, Industrie-Stromversorgungen und Ladegeräte. Bereits seit 1948 sind die Prüfgeräte DUSPOL und DUTEST ein Begriff.*

 *A BENNING céget 1938-ban alapították Németországban. Már több évtizede a mérés-technikára, ipari tápfórásokra és töltőkre szakosodott. A DUSPOL és DUTEST teszterei már 1948 óta ismertek.*

 *Spółka BENNING powstała w roku 1938 w Niemczech. Od kilkadziesiąt lat zajmuje się techniką pomiarową, zasilaniem przemysłowym oraz ładowarkami. Już od 1948 roku znane są ich słynne testery DUSPOL i DUTEST.*

 *BENNING, fondată în 1938/ Germania, se axează deja de multe decenii pe echipamentele de măsurare, surse de alimentare și încărcătoare industriale. Încă din 1948 sunt cunoscute prin celebrele testere DUSPOL și DUTEST.*

 *Spoločnosť BENNING bola založená v roku 1938 v Nemecku. Zameriava už po mnoho desaťročí na meraciu techniku, priemyselné napájanie a nabíjačky. Už od roku 1948 sú známe testery DUSPOL a DUTEST.*

Today this product line of measuring equipment has grown into a large number of other test and measurement products like voltage and continuity testers, phase-sequence indicators, digital multimeters and clamp meters, device and installation testers, photovoltaic installation testers as well as many accessories.

Benning also has over 60 years of experience in power conversion and has a long-lasting reputation for providing highly reliable solutions including industry and telecom power supplies, charging systems for traction batteries and UPS systems.

In our portfolio of Benning products you can find measuring tools for professional use.

## Why BENNING?

- wide range of professional measuring equipment
- reliable and well-proven devices

### Multimeters

BENNING MM1



CAT III 600V

BENNING MM2



	BENNING MM1	BENNING MM2
Indicating Range	3.200	2.000
Accuracy	0,5 %	0,5 %
AC Voltage	1 mV - 600 V	1 mV - 750 V
DC Voltage	0,1 mV - 600 V	0,1 mV - 1000 V
AC Current	-	0,1 uA - 20 A
DC Current	0,1 uA - 3,2 mA	0,1 uA - 20 A
Resistance	0,1 Ω - 32 M Ω	0,1 Ω - 20 M Ω
Continuity	yes	yes
HOLD	yes	no

BENNING MM3



CAT III 300V

BENNING MM4



	BENNING MM3	BENNING MM4
Indicating Range	2.000	4.200
Accuracy	0,5 %	0,5 %
AC Voltage	1 mV - 600 V	1 mV - 600 V
DC Voltage	1 mV - 600 V	1 mV - 600 V
AC Current	0,1 uA - 20 A	0,1 A - 300 A
DC Current	0,1 uA - 20 A	-
Resistance	0,1 Ω - 20 M Ω	0,1 Ω - 42 M Ω
Continuity	yes	yes
Frequency	1 Hz - 200 kHz	-
Capacitance	1 pF - 200 uF	-
HOLD	no	yes

BENNING MM1-1



CAT IV 600V

BENNING MM1-2



	BENNING MM1-1	BENNING MM1-2
Indicating Range	2.000	2.000
Accuracy	0,5 %	0,5 %
AC Voltage	0,1 mV - 750 V	0,1 mV - 750 V
DC Voltage	0,1 mV - 1.000 V	0,1 mV - 1.000 V
AC Current	-	1 mA - 10 A
DC Current	-	1 mA - 10 A
Resistance	0,1 Ω - 20 MΩ	0,1 Ω - 20 MΩ
Continuity	yes	yes
Frequency	-	1 Hz - 20 MHz
Capacitance	-	1 pF - 2 mF
Integrated Volt Sensor	yes	yes
HOLD	yes	yes/MAX/MIN

### Clamp Multimeters

BENNING CM6

BENNING CM7

BENNING CM8



Function	BENNING CM6	BENNING CM7	BENNING CM8
Indicating Range	4000	4000	6000
Accuracy	0,7%	0,7%	0,7%
Voltage AC	0,1 V - 750 V	0,1 V - 750 V	10 mV - 1000 V
Voltage DC	0,1 V - 1000 V	0,1 V - 1000 V	10 mV - 1000 V
Current AC	0,1 A - 1000 A	0,1 A - 1000 A	0,1 A - 600 A
Current DC	-	0,1 A - 1000 A	0,1 A - 600 A
Resistance	0,1 Ω - 400 Ω	0,1 Ω - 400 Ω	0,1 Ω - 20 kΩ
Continuity Test	yes	yes	yes
Frequency	1 Hz - 400 Hz	1 Hz - 400 Hz	0,1 Hz - 400 Hz
Effective Power	-	-	1W-600kW
Temperature	-	-	- 50°C + 1000°C
HOLD	yes/MIN/MAX	yes/MIN/MAX	yes/MIN/MAX
TRUE RMS	no	yes	yes
Max. Clamp Opening	53 mm	53 mm	40 mm
Measurement Category	CAT IV 600 V	CAT IV 600 V	CAT III 600 V

### Voltage Testers

Duspol Expert



Duspol Digital LC



CAT IV 500V

Function	DUSPOL EXPERT	DUSPOL DIGITAL LC
Indication	LED	LED+LCD
Range	12 - 690 V	6-750V
Continuity Test	buzzer + LED	buzzer + LED
Phase-Sequence Test	yes	yes / LCD
Single-Pole Phase Test	yes	yes / LCD
Polarity Test	yes	yes / LCD
Load connection via push buttons	yes Is = 200 mA	yes Is = 200 mA
Vibrating Alarm	yes	yes
Measuring Point Illumination	yes / LED	yes / LED
Protection Class	IP 64	IP 64

### Special Measuring Equipment

BENNING IT101

#### Insulation and Resistance Measuring Device

- measurement of insulating resistance and calculation of the resulting leakage current
- testing voltages of 50 V, 100 V, 250 V, 500 V and 1000 V
- selectable limiting values for ISO measurement
- resistance measurement with a testing current of 200 mA for testing protective conductor connections
- measurement of polarization index (PI) and dielectric absorption rate (DAR)



Function	BENNING IT101
Indicating range	4 000 LCD illuminated
Low-impedance resistance	0,01 Ω - 40 Ω
Insulation resistance	1 kΩ - 20 GΩ
Voltage AC/DC	0,1-600V , true RMS
Resistance	0,01 Ω - 40kΩ
Measurements according to DIN VDE 0100/ 0105	insulation (50 V, 100 V, 250 V, 500 V, 1000 V), low-impedance resistance (200 mA)
Measuring category	CAT IV 600 V


Many other types also available.





Full range of Benning Products on [www.soselectronic.com/benning](http://www.soselectronic.com/benning)





A good tool is like a third hand. Pliers, screwdrivers, tweezers and other tools are essential for effective and quality work. In our portfolio can be found top quality professional tools but also tools for hobby.


 *Dobrý nástroj je jako třetí ruka. Kleště, šroubováky, pinzety a jiné nástroje jsou podstatné pro efektivní a kvalitní práci. V našem portfoliu najdete špičkové profesionální nástroje, ale i nástroje pro hobby použití.*

 *Ein gutes Werkzeug ist wie eine dritte Hand. Zangen, Schraubendreher, Pinzetten und andere Werkzeuge sind grundlegend für eine effiziente und qualitative Arbeit. In unserem Portfolio finden Sie professionelle Spitzenwerkzeuge, jedoch auch Hobby-Werkzeuge.*

 *Egy jó szerszám felér egy harmadik kézzel. A hatékony és minőségi munka nélkülözhetetlen kellékei a különböző fogók, csavarhúzó, csipeszek és egyéb szerszámok. Kínálatunkban a csúcsmínőségű profi szerszámok mellett a hobbi célúak is megtalálhatók.*

 *Dobre narzędzie to jak trzecia ręka. Szczypce, śrubokręty, pęsety i inne narzędzia są kluczowymi dla efektywnej i jakościowej pracy. W naszym portfolio znajdują Państwo wyjątkowe narzędzia profesjonalne, jak również narzędzia do zastosowania „hobby”.*

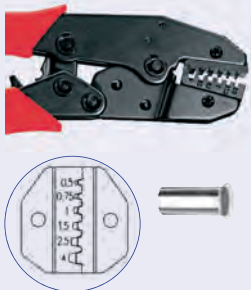
 *Un instrument bun este ca o a treia mână. Cleștele, șurubelnițele, pensetele și alte instrumente sunt esențiale pentru o muncă eficientă și de calitate. În portofoliul nostru puteți găsi instrumente profesionale de cea mai bună calitate, dar și instrumente pentru hobby.*

 *Dobrý nástroj je ako tretia ruka. Klešte, skrutkovače, pinzety a iné nástroje sú podstatné pre efektívnu a kvalitnú prácu. V našom portfóliu nájdete špičkové profesionálne nástroje, ale aj nástroje pre hobby použitie.*

In this category you can find many useful universal as well as specialized tools, like cutting pliers, combined pliers, crimping tools, shears, screwdrivers, stripping tools, tweezers, glue guns, lamps with magnifier, kits and sets of tools in cases or bags, high speed rotary tools and accessories.

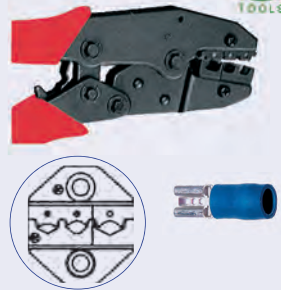
### Crimping Pliers

HT-236 E1



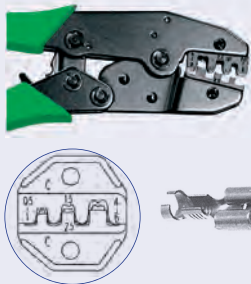
Crimping pliers for end sleeves (insulated and non-insulated crimping sleeves) 6 - 16 mm<sup>2</sup>.

HT-236 R



Crimping pliers for insulated fastons of 1,25 - 2 - 5,5mm<sup>2</sup> inter-section.

HT-236 C



Crimping pliers for un-insulated fastons of 0,5-1mm<sup>2</sup> / 1,5-2,5mm<sup>2</sup> / 4-6mm<sup>2</sup> inter-section.

HT-236 N



Crimping pliers for un-insulated cable lugs - rings of 1,5 - 2,5 - 6 - 10mm<sup>2</sup> inter-section.

HT-225 D



Crimping pliers for NSK (suitable for NSG - Type Wire-to-Board) of 0,05-0,2mm<sup>2</sup> and 0,5-1mm<sup>2</sup> inter-section.

HT-2008 R




3-Way-crimping pliers for 4,6,8 pin telephone modular plugs. Cutting, stripping and crimping using only one tool. Made of special steel, black burnished surface, PVC insulated grips.

### Stripping Tools


206-124 QUICKSTRIP 10



 Wago profi stripping and cutting pliers for wide range of conductors with 0,02 - 10 mm<sup>2</sup> diameter.


AWZ5



 WEICON insulation strippers - fully insulated, automatic wire stripper for all common stranded and solid cables of 0,2-6,0mm<sup>2</sup> (AWG24...10). The special scanning system adjusts automatically to the wire diameter. Fast and accurate stripping without damage to the outer insulation or the inner wire. Adjustable length stop (5...12mm) stripping can be repeated often to the desired length. Narrow clamping jaw, suitable for hard to reach areas. Integrated, easily accessible side cutter up to max. Ø2mm.

AWM - 28




 Universal cable stripper for circular cables of 4 - 28mm Ø. Equipped with a hook knife.

### Tools sets

CIMCO 17 0300



 Tool case made of robust cowhide with folding down front with document-bag, bottom, cover and side parts extra-strengthened, heavy carrying handle, 2 locks:

**Content:** 3x pliers, 8x screwdrivers, stripping pliers, cable knife, 2x hammer, 2x chisel, voltage tester screwdriver, pocket saw, paint brush, bowl, stripping knife and cutter.

**Dimensions:** 430x160x260mm



DREMEL, a member of Robert Bosch Tool Corporation, is from its foundation in 1932 dedicated to creating and manufacturing high speed rotary tools of the highest quality. DREMEL production range consists of an entire system of tools and accessories.

**CZ** DREMEL, člen Robert Bosch Tool Corporation, se od svého vzniku v roce 1932 věnuje vývoji a výrobě vysokorychlostních rotačních nástrojů nejvyšší kvality. Sortiment společnosti Dremel se skládá z uceleného systému nástrojů a příslušenství.

**DE** DREMEL, Mitglied der Robert Bosch Tool Corporation, widmet sich seit seiner Entstehung im Jahr 1932 der Entwicklung und Produktion von Hochgeschwindigkeits-Rotationswerkzeugen höchster Qualität. Das Sortiment des Unternehmens Dremel umfasst ein vollständiges Werkzeug- und Zubehörsystem.

**HU** A DREMEL a Robert Bosch Tool Corporation tagja. 1932-es alapította óta nagysebességű forgószerszámok gyártásával és fejlesztésével foglalkozik. Kínálata szerszámok és tartozékok egész sorából áll.

**PL** DREMEL, członek Robert Bosch Tool Corporation, poświęca się od swego powstania w roku 1932 rozwojowi i produkcji wysokobrotowych narzędzi rotacyjnych najwyższej jakości. Sortiment spółki Dremel składa się z kompletnego systemu narzędzi i akcesoriów.

**RO** DREMEL, membru al Robert Bosch Tool Corporation, este de la înființarea sa în 1932 dedicată creării și producerii de instrumente de rotație de mare viteză, de cea mai bună calitate. Gama de producție Dremel constă dintr-un întreg sistem de instrumente și accesorii.

**SK** DREMEL, člen Robert Bosch Tool Corporation, sa od svojho vzniku v roku 1932 venuje vývoju a výrobe vysokorychlostných rotačných nástrojov najvyššej kvality. Sortiment spoločnosti Dremel sa skladá z uceleného systému nástrojov a príslušenstva.

Dremel's slogan "Big on Detail" exactly reflects exceptional quality of Dremel products – you can work with them even on the smallest details – precisely and accurately. Dremel is famous for its innovations and high standards in quality, functionality and ergonomics.

## Why DREMEL?



- company specialized on high speed rotary tools from 1932
- wide range of tools and accessories for any kind of work and material

## Drills and Accessories



### DREMEL 3000 Series

The Dremel 3000 is the perfect all-round multitool with the new innovative EZ Twist Nose cap. With this new feature there is no need for a wrench to tighten and loosen the collet when changing accessories, the wrench mechanism is integrated in the nose cap of the tool.

#### Features:

- EZ Twist™ nose cap with wrench for fast accessory changes
- Can be used with all Dremel accessories and most attachments
- Cool-running ball bearing construction for smooth and quiet operation
- Replaceable motor brushes extend tool life

#### Supply voltage:

230-240 VAC, 50-60 Hz

#### Rated power input:

130W

#### No load speed:

10 000 - 33 000 rpm



### DREMEL 4000 Series

The 4000 is the most powerful and precise multitool from Dremel. Thanks to its electronic feedback the tool always delivers maximum force when the job gets tougher. Together with the soft grip and precise speed setting you are in perfect control of every situation. The collet lock out function prevents you from accidentally blocking the output shaft of the tool. This tool is an absolute must for the most demanding craftsman.

#### Features:

- High power 175W motor for high performance
- Soft grip in all gripping areas for better handling
- Electronic feedback for enhanced torque and performance
- Separate on/off switch with integrated collet lock out function

#### Supply voltage:

230-240 VAC, 50-60 Hz

#### Rated power input:

175W

#### No load speed:

5 000 - 35 000 rpm



### DREMEL 335 Plunge Router Attachment

Converts your Dremel tool into a plunge router to rout circles, signs and inlay work, decorative edges and to rout parallel to an edge.

- Plunge-lock in handle - simply turn handle to lock/unlock.
- Two depth stops for quick, consistent adjustment of depth.
- Edge guide and circle guide to rout straight lines and perfect circles.
- Guide bushing set for letter and pattern template routing.

#### Contents:

- Plunge router attachment
- Edge and circle guide
- Guide bushing set
- Wrench



### DREMEL 220 Workstation

This is the perfect solution for stationary working with your Dremel.

- Drill vertically or in an angle, adjustable in increments of 15 degrees
- Holds tool horizontally for polishing and sanding
- Integrated, telescoping tool stand holds tool with Flex Shaft (225)
- On-board accessory storage
- Cord management keeps cord safely stowed
- Depth markings for consistent depth adjustment
- Base markings (metric and inches)

#### Contents:

- Combined Drill Press and Tool Holder

**DREMEL 231 Shaper/Router Table**

Converts your Dremel tool into a bench mounted tool for precise routing, shaping and sanding.

- Plastic knobs for easy tool assembly and depth adjustment.
- Smooth table surface to slide your workpiece easily over the table.
- Slot, groove, sand and trim edges.
- 3-way adjustable fence for accurate working result.
- Worktable 203 x 152 mm.
- Adjustable, transparent router bit guard enables safe working.

**Contents:**

- Shaper/Router Table

**DREMEL 2500 - Multi Vise**

- The Dremel 3-in1 Multi-Vise. Stationary vise, stand alone clamp & Toolholder.
- Clamps to any workbench, table or countertop
- Rotates 360° and tilts 50°. Allows approaching the workpiece from an comfortable angle.
- Jaws may be used with base unit or detached for use as a stand-alone bar clamp.
- Easily accommodates larger work pieces.
- Stabilize oversize objects and protect delicate pieces from damage.
- Allows round and odd-shaped objects
- Makes removal of objects from jaws fast.
- Resists twisting and bowing for solid stability.
- Possibility to attach DREMELite.

**Contents:**

- Dremel Multi-Vise
- Removable soft-pads
- Tool holder adapter

**DREMEL 225 Flexible Shaft**

Ideal attachment for precise, detailed work or hard to reach places.

- Comfort grip handpiece allows fingertip control to cut, grind, sand, polish and more.
- Integrated shaft lock button for quick and easy accessory changes.
- 127 mm bend radius provides more comfort and flexibility during use.
- Quick connect attaches your Dremel tool in seconds.

**Contents:**

- Flexible Shaft - length 1070mm
- Driver Cap

**DREMEL 2222 - Flex-Shaft Tool Holder**

- Conveniently suspends your Dremel rotary tool above your workbench.
- Perfect for use with the Flexible Shaft attachment.
- Clamps to workbenches up to 50 mm thick, and adjusts in height from 300 to 1070 mm.
- Stores extra bits on base.

**Contents:**

- Flex-Shaft Tool Holder

**DREMEL 670 - Mini Saw Attachment**

- Transforms your Dremel tool into a precision circular saw for fine, clear and straight cuts in all sorts of wood.
- Perfect for laminate and wood flooring or thin wood plates.
- The safety guard and lower guard make it safe to use the circular saw blade.
- The guide allows to make straight cuts.
- Quick connect attaches your Dremel tool in seconds.
- This Mini Saw Attachment is easier to use than a hard saw, more precise than a jig saw and fits in tighter spaces than a circular saw.

**Contents:**

- Mini saw attachment
- Rip/Cross-cut blade (546)
- driver cap

**DREMEL 1453 Chainsaw Sharpening Attachment**

- The fastest, easiest way to sharpen dull, slow-cutting chain saws.
- Easily attaches to your Dremel tool.
- Works with a variety of different chain sizes.

**Contents:**

- Sharpening angle guide
- Adjustment gauge
- Chainsaw sharpening grinding stones

**Other tools and accessories****DREMEL 290JM Engraver**

Engraving tool with variable depth control, for engraving on a wide variety of materials like metal, glass, wood, plastics, ceramics, etc.

**Contents:**

- Dremel Engraver
- Replaceable carbide engraving point
- Letter & number template

**Supply voltage:** 230-240 VAC, 50-60 Hz

**Rated power input:** 35W

**Weight:** 0,31 kg

**Strokes per minute:** 6000



Full range of Dremel Products on  
[www.soselectronic.com/dremel](http://www.soselectronic.com/dremel)



## DREMEL 2000JA Gas Soldering Iron

One tool for 6 different applications: soldering, melting, hot cutting, welding, shrinking and woodburning (pyrography)



### Contents:

- DREMEL Versatip gas soldering iron
- soldering Tip
- cutting knife
- hot knife
- reflector
- hot blower head
- flat wide flame head
- soldering wire
- soldering sponge + sponge box
- soldering tin with Blue Cap

Weight: 1,300kg

Ignition: piezoelectric

Burn time: 30-60 min

## DREMEL 2200JA VersaFlame

The Dremel VersaFlame™ is the only stationary burner that safely combines open flame use with a catalyst and soldering head, making it the most versatile stationary burner in the market today, especially for DIY applications. The Dremel VersaFlame™ is powered by liquid butane gas for quick heat-up and fast recharge. Applications can be described as: soldering, shrinking, welding, etc.



### Contents:

- Dremel VersaFlame™
- Catalyst
- soldering Tip
- Flame extension piece
- Deflector
- Soldering tin with blue cap
- Soldering sponge + sponge box
- 1 Wrench

Ignition: piezoelectric

Burn time: 75 - 90 min

Tank capacity: 42ml / 22g

Temperature: 1200°C (open air),

680-1000°C (hot air), 550°C (tips)

## DREMEL 930 Glue Gun

Its innovative design and numerous features make it very user friendly and easy to use. The features are specially designed for making the job of glueing easier. The glue gun is the ideal tool for a wide variety of projects: model building, woodworking, scrapbooking or casemodding



### Contents:

- 930 Glue Gun
- 6x 7 mm Multipurpose Glue Sticks
- 12x Dremel 7mm Glitter Sticks

Supply voltage: 230-240 VAC, 50 - 60 Hz

Total weight: 0,2kg

Dual temperature: 105 / 165 °C

## DREMEL Miscellaneous

- goggles DREMEL SG4 - use the goggles to provide protection for your eyes when working on your projects



We provide you with something in addition:

- free samples for your projects
- loyalty program with bonuses for OnLine Shop purchases
- direct meetings and consultations with representatives of components manufacturers
- emotional experiences through the unique marketing communication (interesting events, competitions, shows, SOS cinema, etc.)



## PROFI TOOLS

### Cordless Tools

Always in top shape: a professional blue cordless tool from Bosch is always strong and light.

### Drills & Impact Drills

The professional blue Bosch drills and impact drills are all-round talents for versatile use and have been developed for the highest requirements with regard to power and lifetime.

### Screwdrivers & Impact Wrenches

Bosch offers the right impact wrench and drywall screwdriver for all applications. Handy, robust professional power tools, equipped with innovative, applied state-of-the-art technology.

### Rotary Hammers & Demolition Hammers

A Bosch rotary hammer or demolition hammer meets all requirements thanks to its extremely long lifetime, premium quality and impressive power. The Bosch hammer suits any situation and any robust material.

### Diamond Technology

Bosch power tools with diamond technology offer everything you need to get through thick and thin. Whether wet or dry drilling, concrete grinding, or cutting grooves or slots in concrete, masonry and stone.

### Tile Working

Tile working has never been this easy

Tile Working

### Angle Grinders & Metalworking

Bosch power tools for metalworking stand for maximum power – even in the toughest applications such as surface finishing or cutting a wide variety of materials.

### Sanders & Planers

Whether high material removal rate or fine finish, large surfaces or hard-to-reach areas – Bosch offers the right power tool for any requirement in surface treatment.

### Routers

Bosch is setting new standards in routing with innovative ideas. Quick and fine adjustment of the routing depth using setting wheels and exact centring of the template guide to the router bit guarantee maximum precision for any application.

### Multi-Cutters

The Bosch multi-cutters enable perfect trimming, adjusting and repairing. The comprehensive range of accessories offers you an endless range of applications.

### Saws

The right saw for any cut: whether precise rip or mitre cuts, tight curves or powerful cutting to length – Bosch saws always deliver perfect results.

### Benchtop Tools

Bosch benchtop tools enable you to saw panels, planks or boards to size with maximum precision. The benchtop tools from Bosch are the ultimate answer to any challenge when it comes to straight cuts or bevel and angle cuts.

### Measuring Technology

Measuring tools from Bosch offer outstanding precision and the greatest ease of use. Due to their robustness, the digital measuring tools guarantee the most accurate results also in day-to-day construction site applications – whether it be levelling, measuring distances, angles and inclines, or detecting all different kinds of materials.

### Dust extraction systems

The dust extraction systems from Bosch can also be used to remove wet dirt and coarse residues, making sure that your workplace is clean before you start the next phase of your work. All-purpose dust extractors and special dust extractors are both available from Bosch.

### Heat gun & glue gun

Whether speeding up glued joints, shaping, paint removal or gluing – Bosch always offers you the optimum power tool for the best work results.

### Pneumatic Nailers

The professional blue pneumatic nailers stand for power, precision and robustness. Whether framing nailer for frame construction, finishing nailer for interior fitting work or brad nailer and stapler for furniture construction: these tools guarantee you fast work progress and neat, efficient working thanks to the innovative Bosch Full Force Technology or the Wood Protection System.

### System Accessories

You are perfectly equipped for your work with Bosch system accessories. Be it dust extraction, saw stands or guide rails: these accessories are the ideal addition to your Bosch power tools.





## HOBBY TOOLS

### Cordless Tools

As practical as can be: cordless tools from Bosch enable you to work independently of mains sockets and annoying cables. This is thanks to state-of-the-art battery technology for extra-long running times.

### Impact Drills

The impact drills from Bosch prove their worth with high-power performance and state-of-the-art technology. Their ergonomic slimline design makes the versatile Bosch Impact Drills both convenient and safe to handle for a full range of applications: impact drilling, standard drilling as well as screwdriving.

### Rotary Hammers

Bosch Rotary Hammers for powerful hammering in concrete and masonry, chiselling and drilling. The concentrated power of the rotary hammers from Bosch enables you to drill into even the toughest of materials quickly and easily – regardless of the feed pressure.

### Saws

Precise rip or mitre cuts, tight curves, wavy lines or fast, powerful cutting – Bosch has the right saw for every challenge.

### Benchtop Tools

Whether table saw, mitre saw, sliding mitre saw or saw station – you'll always be pleased with your cut with Bosch.

### Planers

The planers from Bosch stand for fast and precise working with a high material removal rate and large planing width. They come as standard with a combined guidance and cutting depth adjustment handle for non-slip guidance and infinitely variable adjustment.

### Routers

The routers from Bosch are versatile tools: their applications range from accurate groove, edge and profile routing through to long-hole and copy routing. They enable you to work on all different kinds of materials with maximum convenience and precision.

### Sanders

Bosch offers the right sander for any requirement – from high material removal rate through to the finest finish, from large surfaces through to corners and hard-to-reach areas.

### Multifunction Tools

Sawing, cutting, routing, sanding.... The multi-function tools from Bosch offer countless possibilities for putting your ideas into practice.

### Decoration tools

We have the tools to help you put your decoration ideas into practice: versatile, easy-to-handle tools for perfect results.

### Paint systems

Whether you want to paint your home or revarnish a piece of furniture – Bosch has the right paint system for you: easy to handle and simple to clean.

### Digital Measuring Tools


Digital measuring tools from Bosch impress with precision and extremely easy operation – whether when levelling objects, measuring distances or detecting all different kinds of materials and power cables.










WIHA, with headquarter in Schonach/ Germany, is one of the world leading manufacturers for hand tools for professional industrial use. With currently over 650 employees, Wiha manufactures more than 3500 premium tools.


 WIHA, se sídlem v Schonach v Německu, je jedním z předních světových výrobců ručního nářadí pro profesionální použití v průmyslu. V současné době s více než 650 zaměstnanci vyrábí Wiha více než 3500 různých nástrojů.

 WIHA mit Sitz in Schonach in Deutschland ist einer der weltweit führenden Hersteller von Handwerkzeugen für professionellen Einsatz in der Industrie. Derzeit produziert Wiha mit über 650 Mitarbeitern mehr als 3500 Premium-Werkzeuge.

 A WIHA a németországi Schonach székhelyével az egyik vezető professzionális ipari kéziszerszámgyártó a világon. Jelenleg a több mint 650 alkalmazottjával, a Wiha több mint 3500 prémiumkategóriás szerszámot gyárt.

 WIHA, z siedzibą w Schonach w Niemczech, jest jednym z wiodących światowych producentów narzędzi ręcznych dla profesjonalnego zastosowania w przemyśle. Obecnie, z ponad 650 pracownikami, WIHA produkuje ponad 3500 narzędzi klasy premium.

 WIHA, cu sediul în Schonach/ Germania, este unul din producătorii de frunte din lume de scule manuale pentru uz industrial profesional. În prezent cu peste 650 de angajați, Wiha produce mai mult de 3500 instrumente premium.

 WIHA, so sídlom v Schonach v Nemecku, je jedným z popredných svetových výrobcov ručného náradia pre profesionálne použitie v priemysle. V súčasnej dobe s vyše 650 zamestnancami, vyrába Wiha viac ako 3500 prémiových nástrojov.

For the past 70 years the name of Wiha has stood for innovative tools of the highest quality with screwdrivers, torque tools, L-keys, bits, soft-head hammers, pliers, crimping pliers, measuring tools and articulated hoses. A host of awards underlines the setting of standards in terms of functionality and design.

## Maximum quality standards

- Own manufacturing
- 100% individually tested
- QM system according to 9001:2000

## Durability

- Top cutting performance even after one thousand cuts

## Why WIHA?

- wide range of top quality hand tools
- excellent ergonomics
- range of antistatic tools

## Ergonomics par excellence

- Ergonomic handle form
- Extra wide handle backs
- Optimal arrangement of soft and hard zones

Screwdrivers



Momentary Screwdrivers



Reversible Blade Systems



L-Keys



Bits



Pliers and Tweezers



Soft Faced Hammers



Measurement Tools



Articulated Hose Systems








WIHA Tools assortment is available at  
[www.soselectronic.com/wiha](http://www.soselectronic.com/wiha)








## Combination Pliers

		Wiha Professional	Wiha Professional electric	Wiha Industrial	Wiha Basic	Wiha Inomic®	Wiha Inomic® VDE
		Typ					
Combination pliers		160	•	•	•	•	•
		180	•	•	•	•	•
		200	•	•	•	•	•
High leverage combination pliers		200	•	•	•		
		225	•	•	•		
Needle nose pliers		160	•	•	•	•	•
		200	•	•	•		
Needle nose pliers, angled		160	•	•	•		
		200	•	•	•		
Long-flat nose pliers		160	•	•	•		
Long-round nose pliers		160	•	•	•		
Diagonal cutters		140	•	•	•	•	•
		160	•	•	•		
		180	•	•	•		
Heavy duty diagonal cutters		160	•	•	•		
		180	•	•	•		
		200	•	•	•		
Electrician's diagonal cutters		160		•			
Cable cutters		160		•	•		
		200		•	•		
Stripping pliers		160	•	•	•		
Crimping pliers for end sleeves		145			•		
		180			•		
Revolving punch and loop pliers		225	•				
Revolving punch pliers		225	•				
Water pump pliers		180			•		
		250	•		•		
		300			•		
Water pump pliers with push button setting		180			•		
		250	•		•		
		300			•		
QuickFix water pump pliers		250	•		•		
End cutting nippers		160			•		
		180			•		
		200			•		
Pincers (carpenter's pincers)		180			•		
		200			•		
Concretors pincers with handle coating		200			•		
		250			•		
		280			•		
		300			•		
Concretors pincers		200			•		
		250			•		
		280			•		
		300			•		
Pipe wrenches swedish style, S-jaw	⌀ 1"	320			•		
	⌀ 1 1/2"	420			•		
	⌀ 2"	535			•		
Pipe wrenches swedish style, 45°	⌀ 1"	315			•		
	⌀ 1 1/2"	420			•		
	⌀ 2"	570			•		
Pipe wrenches swedish style, 90°	⌀ 1"	320			•		
	⌀ 1 1/2"	415			•		
	⌀ 2"	555			•		
Grip pliers with wire cutter		180			•		
		250			•		
		300			•		
Welding grip pliers		280			•		
Pipe welding grip pliers		280			•		
Profile welding grip pliers		280			•		
Cable shears					•		
Crimp tools					•		
Automatic stripping pliers					•		

### Cutting Pliers

								
	for boreholes		for shafts		for boreholes		for shafts	
	Typ		Typ		Typ		Typ	
Circlip pliers for bores – Straight shape	J 0	8 - 13	A 0	3 - 8	J 0	8 - 13	A 0	3 - 10
	J 1	12 - 25	A 1	10 - 25	J 1	12 - 25	A 1	10 - 25
	J 2	19 - 60	A 2	19 - 60	J 2	19 - 60	A 2	19 - 60
	J 3	40 - 100	A 3	40 - 100	J 3	40 - 100	A 3	40 - 100
	J 4	85 - 140	A 4	85 - 140	J 4	85 - 140	A 4	85 - 140
Circlip pliers for shafts – Shape D: 90° angled shape	J 01	8 - 13	A 01	3 - 8	J 01	8 - 13	A 01	3 - 10
	J 11	12 - 25	A 11	10 - 25	J 11	12 - 25	A 11	10 - 25
	J 21	19 - 60	A 21	19 - 60	J 21	19 - 60	A 21	19 - 60
	J 31	40 - 100	A 31	40 - 100	J 31	40 - 100	A 31	40 - 100
	J 41	85 - 140	A 41	85 - 140	J 41	85 - 140	A 41	85 - 140

• with safety latching function

	Wiha Professional ESD 				Wiha Electronic			
				Typ				Typ
Diagonal cutter – Narrow, pointed head	•			115	•			118
		•		115	•		•	120
			•	115				
Diagonal cutter – Wide, pointed head	•			115	•			138
		•	•	115	•		•	138
			•	115		•		138
Diagonal cutter – Narrow, semi-circular head				115				
	•			115				
Diagonal cutter – Wide, semi-circular head		•		115				
			•	115				
Oblique cutting nippers – Wide, pointed head					•			138
Oblique end cutting nippers – Narrow head					•			118
– Extra narrow head, cutting edges angled at 40° – Wide head, angled at 29°	•			110				
		•		110				
End cutting nippers – Extra narrow, slim shape – Wide head		•		110				
		•		115				
Needle nose pliers – Straight head				120				
				145				
Needle nose pliers – Angled				120				
Round nose pliers				120				
Flat nose pliers				120				
Pointed pliers								135
Stripping pliers – 20 18 16 14 12 10 AWG, ø 0.81 - 2.59 mm – 26 24 22 20 18 16 AWG, ø 0.4 - 1.3 mm								180
								180



## WIHA Bits

### WIHA Standard Bits

7010 Z Series - Standard Bit, Slotted, Style C 6,3



**Material:** High grade chrome-vanadium steel, through hardened.  
**Drive:** DIN 3126 ISO 1173 style C 6,3.  
**Application:** For all types of screw applications in trade and industry.

7011 Z Series - Standard Bit, Phillips, Style C 6,3



**Material:** High quality chrome-vanadium-molybdenum steel, through hardened.  
**Drive:** DIN 3126 ISO 1173 style C 6,3.  
**Application:** For all types of screw applications in trade and industry.

### WIHA TORX® AutoFit Bits

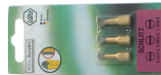
7045 Z L Series Standard Bit, TORX®AutoFit, Style E 6,3



**Material:** High grade chrome-vanadium steel, through hardened.  
**Drive:** DIN 3126 ISO 1173 style C 6,3.  
**Extra:** For extra long bits: 70, 90, 110, 150 mm.  
For all types of screw applications in trade and industry.

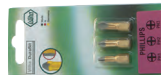
### WIHA Tin-Torsion Bits

7010 DR Series DuraBit, Slotted, Style C 6,3



**Material:** High grade chrome-vanadium steel, through hardened.  
**Geometry:** Patented torsion zone to prevent premature breaking of the bit when under stress  
**Coating:** Hard-metal coating, extremely wear-resistant.  
**Drive:** DIN 3126 ISO 1173 style C 6,3.  
**Application:** For effortless, safe working in demanding industrial applications and on delicate surfaces.  
**Extra:** Non-corroding nickel coating in combination with wolfram carbide particles. Extremely wear-resistant, hard-metal coated DuraBit® tip gains a secure hold in the screw head and guarantees a significantly greater service life when compared to conventional diamond-coated bits.

7011 DR Series DuraBit, Phillips, Style C 6,3



**Material:** High grade chrome-vanadium steel, through hardened.  
**Geometry:** Patented torsion zone to prevent premature breaking of the bit when under stress  
**Coating:** Hard-metal coating, extremely wear-resistant.  
**Drive:** DIN 3126 ISO 1173 style C 6,3.  
**Application:** For effortless, safe working in demanding industrial applications and on delicate surfaces.  
**Extra:** Non-corroding nickel coating in combination with wolfram carbide particles. Extremely wear-resistant, hard-metal coated DuraBit® tip gains a secure hold in the screw head and guarantees a significantly greater service life when compared to conventional diamond-coated bits.

## Wiha Torque Screwdrivers

### New Materials –

sensitive electronic components in extremely tight spaces – automated processes in production technology – just a few of many examples that illustrate how rapidly industrial and trade applications are developing. The demands for correct fastening of components also grow with these changes. Only in this way for example is it possible to eliminate protection from humidity or the danger of damage to materials in production processes.



### Fastening of Indexable Cutter Inserts

In the metal cutting industry, great importance is attached to process safety. When changing indexable cutter inserts, this can only be ensured by using torque tools.



### Sensitive Fastenings in the ESD Protected Zone

Printed circuit boards and electronic semiconductor components react extremely sensitively to mechanical loads. The correct torque guarantees secure installation of cost-intensive materials.



### Circular Plug Connector - Protection Class IP67

For correct functioning of distributions systems on machines, the correct torque must be observed when connecting the circular plug connectors. Otherwise the protection class IP67 cannot be complied



### Smartphones and Co.

Today's electronic devices are always smaller and more efficient. This makes smaller screws necessary which are fastened in sensitive materials such as plastic. Without the correct torque, these screws are damaged or the plastic

## Wiha Screwdriver Handles



**Wiha SoftFinish®.** The specialist for dry and general applications. Comfortable multi-component handle with soft zone for optimum torque transfer. Chrome-vanadium-molybdenum steel blade, through-hardened, matt chrome-plated.



**Wiha SoftFinish® electric.** The safe and comfortable insulated VDE screwdriver. VDE insulated multi-component handle with soft zone for optimum torque transfer. GS tested, for work on or around live components up to 1,000 V AC.



**Wiha SoftFinish® ESD.** The ESD screwdriver. Comfortable multi-component handle with soft zone, dissipative. Chrome-vanadium-molybdenum steel blade, through-hardened, matt chrome-plated.



**Wiha MicroFinish®.** The specialist for wet and oily applications. Non-slip handle with micro-fine surface structure. Chrome-vanadium-molybdenum steel blade, through-hardened, matt chrome-plated.



**Wiha Classic.** The robust screwdriver for multiple applications. Square handle made from impact-resistant plastic that is also resistant to oil and chemicals. Chrome-vanadium steel blade, through-hardened.



**Wiha Classic electric.** The compact classic. VDE insulated square handle. GS tested, for work on or around live components up to 1,000 V AC.



**Wiha Voltage and Automotive Circuit Testers.** VDE tested voltage testers. Test range up to 250 V AC.



**Wiha PicoFinish®.** The comfortable precision screwdriver. Comfortable multi-component precision handle with soft zone and rotating cap. Chrome-vanadium-molybdenum steel blade, through-hardened, matt chrome-plated.



**Wiha Precision.** The classic precision screwdriver. Handle with rotating cap.



**Wiha Precision ESD.** The dissipative ESD precision screwdriver. Dissipative handle, ESD safe, with rotating cap.



**Wiha Ceramic.** The adjustment screwdriver for laboratories and clean rooms. Blade made from high-quality zirconium ceramic, antistatic/antimagnetic.



**Wiha Pocket Screwdrivers.** The pocket screwdriver. Handle made of transparent plastic.



**Wiha Wood.** The all-rounder for woodworking applications. Handle made of sealed beech wood with leather cap. Through blade with hex bolster made of chrome-vanadium steel.

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**TRACO POWER**

[www.soselectronic.com/traco](http://www.soselectronic.com/traco)

**Power Management**  
DC/DC and AC/DC modules



TRACO ELECTRONIC AG is a Swiss company with headquarter based in Zurich, Switzerland. As a leading power supply specialist with more than 30 years of experience it is dedicated to the design and manufacturing of high quality DC/DC and AC/DC power conversion products. TRACO ELECTRONIC AG is marketing their products worldwide under the registered trademark TRACOPOWER.

**TRACO ELECTRONIC AG je švýcarská společnost s centrárou v Curychu. Jako přední specialista na napájecí zdroje s více než třicetiletými zkušenostmi se specializuje na návrh a výrobu vysoce kvalitních DC/DC a AC/DC modulů. Traco Electronic AG prodává své výrobky celosvětově pod značkou TRACOPOWER.**

**TRACO ELECTRONIC AG ist ein Schweizer Unternehmen mit Sitz in Zürich. Als führender Spezialist für Netzteile mit über 30 Jahren Erfahrungen spezialisiert es sich auf die Entwicklung und Produktion qualitativ hochwertiger DC/DC- und AC/DC-Module. Seine Produkte vermarktet Traco Electronic AG weltweit unter der Marke TRACOPOWER.**

**A svájci TRACO ELECTRONIC AG zürichi központtal rendelkezik. Mint a tápforrások vezető gyártója több mint 30 éves tapasztalattal rendelkezik a jó minőségű DC/DC és AC/DC modulok fejlesztése és gyártása terén. A Traco Electronic AG termékeit az egész világon TRACOPOWER néven értékesíti.**

**TRACO ELECTRONIC AG to szwajcarska spółka z siedzibą w Zurychu. Jako wiodący specjalista w dziedzinie źródeł zasilania, z ponad 30-letnimi doświadczeniami, specjalizuje się w projektowaniu i produkcji wysokiej jakości modułów DC/DC oraz AC/DC. Traco Electronic AG sprzedaje swoje wyroby na całym świecie pod marką TRACOPOWER.**

**TRACO ELECTRONIC AG este o companie elvețiană cu sediul în Zurich, Elveția și este unul prin principalii specialiști în rețele electrice cu peste 30 de ani experiență în proiectarea și fabricarea de transformatoare de curent continuu și alternativ de înaltă calitate. Traco Electronic AG și comercializează produsele la nivel global sub marca comercială TRACOPOWER.**

**TRACO ELECTRONIC AG je švajčiarska spoločnosť s centrárou v Zürichu. Ako vedúci specialista na napájacie zdroje, s viac než 30 ročnými skúsenosťami, sa špecializuje na návrh a výrobu vysoko kvalitných DC/DC a AC/DC modulov. Traco Electronic AG predáva svoje výrobky celosvetovo pod značkou TRACOPOWER.**

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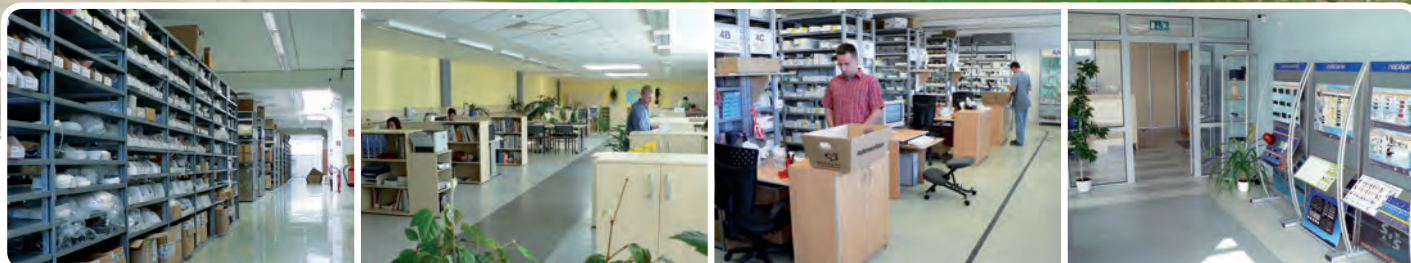
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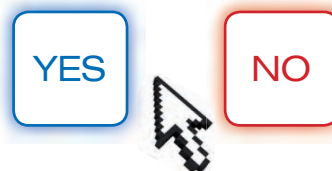
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