Specialized addition
**SOSnews eXtra:**

# Practical advice for quality and efficient
## *Hand Soldering*

**TMPS 10** ‖ TRACO POWER

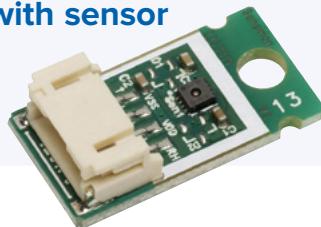**Ultra Compact Power Solution for IoT Devices**

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# TRACO POWER

**Reliable. Available. Now.**

**Harsh Environments & Hazardous Locations**

# INDUSTRIAL DIN-RAIL POWER SUPPLIES

## TIB-EX Series, 80 – 450 W AC/DC
**DIN-Rail power supplies for harsh environments and hazardous locations**

- Hazloc class I, division 2 and ATEX certifications
- Operating temperature —40°C to +70°C max.
- 150% peak current for 4 sec.
- Efficiency 90-95% typical, model dependent
- Rugged metal case with optional side-mounting
- Back power immunity
- Short-circuit and overload protection
- Shock & vibration per EN 61373 (Railway & Industrial)
- 5 year warranty

| Models | Power (W) | Peak Power (W) | Output Voltage (V) | $V_{ADJ}$ Range (V) | Efficiency (typical) |
|---|---|---|---|---|---|
| TIB 080-112EX | 80 | 120 | 12 | 11.8 - 15.0 | 88.0 % |
| TIB 080-124EX | 80 | 120 | 24 | 23.5 - 28.0 | 90.0 % |
| TIB 080-148EX | 80 | 120 | 48 | 47.0 - 56.0 | 90.0 % |
| TIB 120-112EX | 120 | 180 | 12 | 11.8 - 15.0 | 94.0 % |
| TIB 120-124EX | 120 | 180 | 24 | 23.5 - 28.0 | 94.0 % |
| TIB 120-148EX | 120 | 180 | 48 | 47.0 - 56.0 | 94.0 % |
| TIB 240-124EX | 240 | 360 | 24 | 23.5 - 28.0 | 95.0 % |
| TIB 240-148EX | 240 | 360 | 48 | 47.0 - 56.0 | 95.0 % |
| TIB 480-124EX | 480 | 720 | 24 | 23.5 - 28.0 | 95.0 % |
| TIB 480-148EX | 480 | 720 | 48 | 47.0 - 56.0 | 95.0 % |

# Content

**Ivan Kozlay**
Head of Purchasing Department

## Dear readers, customers,

From time to time, information from our sales representatives shows that SOS electronic has currently fewer components in stock than in the past. This is particularly concerns reports from the Slovak market, where in 1995 we started as a broad-spectrum catalogue seller ("reseller") of electronic components and in a short time we became a corker within local market. We bought and sold almost everything you - our customers - needed at that time and we found it with our suppliers. And actually you are right if you are telling us now that you can no longer buy everything you want at us, as it was in the past.

The rapid development of the Internet and the significant simplification of e-commerce in a relatively short time have brought new possibilities to everyone – e.g. to a developer who quickly needs a sample - order it from office or home and have it on the table the next day.

Since the big multinational distributors with huge warehouses and databases of components have hit our original business plan thanks to new communication technologies - I will not name them, we all know them well - we decided not to compete with them.

In 2006, we merged the warehouses of all SOS branches into one central warehouse in Košice, Slovakia. At the same time, we have gradually left out the products from our offer that we have bought from other distributors, because nowadays you can buy them there by yourself. Of course, we still have them in our database in our e-shop in case you want to order them with us. But if they do not move regularly, there is no point in being in our warehouse - they would certainly not benefit from it. We believe that you too prefer brewers' lagers, not the ones from the stock...

And to convince you that we really do not have less than in the past, I will show you few numbers. From already mentioned year 2006, we have increased our warehouse value by 5 times - currently it is worth about EUR 3.5 million. The number of stock Typees has also increased - we currently have about 10,000, which is "only" 1.5 times more than in 2006, but there has been a change of the sortiment focusing on brands where we have strong support from manufacturers. This implies many benefits in terms of project support, the possibility to select almost any product from the manufacturer's portfolio, customization, technical support, and the possibility to negotiate mutually beneficial delivery conditions.

Along with our stock items, we have about 200,000 other products in our database that we can deliver upon request, or agree to have them in stock for you.

Of course, we do not make a selection of warehouse products randomly. We listen very carefully to your needs and we pursue responsibly all the suggestions our salesmen bring. Have you ever tried to agree with a large multinational distributor to stock an item that you will regularly purchase for your project? I believe it was impossible without binding order. In SOS, trust and loyalty are sometimes sufficient. We try to maintain human approach to you and not always look at numbers.

This issue of SOS news will certainly show you our strengths too and it is definitely worth taking them into consideration when preparing new projects. During 2019 we will also introduce you the interesting news of "our" manufacturers and we secretly hope and believe you will notice them thanks to our activities and it will bring you a lot of new ideas.

I wish you a nice spring, great summer, beautiful autumn and... if you like the winter, add your own adjective 😊. And to all this, a healthy and successful year full of new inspirations.

# Latest news on SOS electronic...

## We have prepared something special for you this year



We have selected 12 TOP brands for you and we are preparing some special activities in cooperation with our most important suppliers. Every month is dedicated to one brand. You can look forward to interesting articles, news, free samples, special events or competitions. We won't leave out our favourite workshops, or the possibility to talk directly to the people responsible for developing our TOP products, or to the technicians of our TOP brands. To learn more, follow our website, read our regular newsletter or follow us on Facebook. Our colleagues will certainly gladly provide more detailed information.

## SOS electronic on Embedded world 2019 trade fair

**Nuremberg, Germany,** 26.–28. 2. 2019

**Almost 1,000 companies exhibited the latest embedded technologies from modules and complete systems to operating systems and hardware tools.**



The great satisfaction of visitors from the past set a high standard on the quality of this event. It did not disappoint this year either. The International Trade Fair continues to be one of the most important factors for the Embedded Appliance sector and its manufacturers, AAEON, Apacer, TechNexion, 4D Systems, Bridgetek.

SOS electronic, as a part of Conrad electronic, could be found in Hall No. 3, represented by its best-qualified colleagues from the Embedded product area.

Our new product rack with the real products of our suppliers greatly attracted the interest of the visitors. We are pleased that we were able to answer questions, discuss benefits, compare and try to suggest the right solution. That´s what the Embedded world is about.

## International Meeting of Sales Representatives



We love meetings. Why? Because we all are different, we come from different countries and cultures, we have different customers, different experiences, all of us work their own way. But we have one thing in common - love for what we do and the desire to be better.

And that's why we organize the International Meeting of Sales Representatives several times a year. The first meeting in 2019 took place in Slovakia in the parent company in Košice, where we also invited our TOP suppliers, now friends, Mr. Gregorz Bazyluk from Quectel and Mr. Sven Jenschur from ElectronicAssembly. They trained us, we talked about the hottest news in the field of GSM modules and displays, about the situation on individual markets, we had fun on teambuilding…

It's really great to have such meetings… 13 sales representatives from 6 countries, countless experiences, and a lot of new knowledge…

We love what we do and we do it for you.

# SOS electronic as the „Best Distributor of Electronic Assembly Products"

**Year 2018 was marked by success.**
**SOS electronic received the Best Distributor 2018 award.**

Electronic Assembly is our long-term partner in intelligent technology displays. All the more we value their decision to evaluate our year-long work and give us the status of Best Distributor 2018 for Austria, Hungary, Poland, Romania, Slovakia and the Czech Republic. Your interest and the satisfaction of our customers with this manufacturer have made us one of the top distributors for this manufacturer. Thank you!

# Favourite books of March

Have you recently read a good book? We have and not just one. The rich collection of books in our March library proves that.

Last year we had a book yard sale in our company; participation and success exceeded all our expectations. This year we focused mainly on our favourite books that have a special place in our libraries. We borrowed them from each other because what is better than our personal recommendation? "You have to read this, it's a great book." And we've collected more than 60 great books. What more to say. There was plenty to choose from. Many of us have discovered forgotten stories, recalled the compulsory reading, and bestsellers that have flashed around the world.

And so we were reading, flipping over the pages, discussing. But one thing is for sure. We have once again reminded ourselves that we are more than just working together. We found not only time for a good book, but also new paths to each other.

So we recommend regular and quality reading because it broadens our horizons, relieves everyday stress and ultimately connects us all through communication.

And finally, one more thing:

*"A sure sign of a good book is that you like it more the older you get." (Georg Christoph Lichtenberg, German scientist, satirist 1742-1799).*

# How to Create IoT Solution Within Few Hours?

**The question was answered during the workshop organized by SOS electronic, Microsoft Slovakia and AAEON. It is easy.**

We have wanted to present the benefits of Windows 10 IoT Enterprise LTSB operating system and test it along with AAEON, Sensirion and Apacer products. During the creation of IoT solutions, participants could use MS Azure cloud services. (instructions below)

During the training, we used the Aaeon industrial PC Boxer-6404U, single board computer PICO-APL3. Testing kits from Sensirion for temperature, humidity and $CO_2$ concentration measurement and industrial SSD from Apacer. For embedded devices, we used the Microsoft operating system (Windows 10 IoT Enterprise LTSB 2016).

Software part of the workshop was led by Marek Láni from Microsoft Slovakia. He started to create the NET application, which reads the measured values from the sensors via the SEK sensor bridge and sent them to the MS Azure cloud service IoT Hub cloud for processing. The data was analyzed by Stream Analytics, which generated an alarm when the $CO_2$ concentration was exceeded. Alarm was processed by Event Hub which sent a command to turn on the alarm signaling connection to industrial PCs to SBCs.
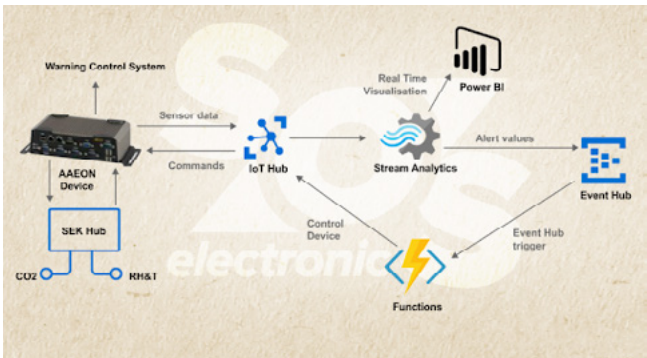
# Overview of your open orders

One of the most useful functionalities in our e-shop is tracking information about undelivered goods. In this section you can also find a list of the goods we are just packing for you. But at the same time there is a comprehensive overview of goods that are not delivered yet. We've made some changes on this site in recent weeks. This page includes:

- list of goods sorted by order date
- the agreed price, the quantity ordered and the current status in our warehouse
- the agreed delivery date, this is mainly used for orders planned for specific term
- if the goods are on our way, you can see the planned delivery date to our warehouse

**The list can be sorted by various criteria, such as:**

1. by name of goods - if you have ordered the goods several times, you will see them together
2. depending on the status of our warehouse – the goods that we can ship immediately to you are listed together
3. by delivery date - in case you need to have better overview of terms and see if something is late

And if you are impatiently waiting for some goods, you can set up a Watchdog - we will send you a notification email when the goods arrive in our warehouse.

| IMAGE | NAME ▲▼ / DESCRIPTION | ORD.NUMBER ▲▼ | YOUR ORDER NUMBER ▲▼ | DATE OF ORDER | AGREED DELIVERY DATE ▲▼ | PRICE PER UNIT | QUANTITY | TOTAL PRICE | IN STOCK | PENDING ▲▼ | DELIVERY DATE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ATMEGA32-16AUR AVR ATmega Microcontroller 8-bit 16MHz 32KB FLASH TQFP44 | 119101 | Rámcovka | 06.02.2019 | 22.03.2019 | 1,5000 € | 100 | 150,0000 € | 0 pcs | 1600 | 08.03.2019: 1600 pcs | |
| | ATMEGA32-16AUR AVR ATmega Microcontroller 8-bit 16MHz 32KB FLASH TQFP44 | 119101 | P0000010842 | 19.09.2018 | 05.04.2019 | 1,4800 € | 300 | 444,0000 € | 0 pcs | 1600 | 08.03.2019: 1600 pcs | |
| | ATMEGA32-16AUR AVR ATmega Microcontroller 8-bit 16MHz 32KB FLASH TQFP44 | 119101 | 10.4.2018 | 10.04.2018 | 22.03.2019 | 1,4800 € | 90 | 133,2000 € | 0 pcs | 1600 | 08.03.2019: 1600 pcs | |
| | ATMEGA644PA-AUR AVR ATmega Microcontroller 8-bit 20MHz 64KB FLASH TQFP44 | 119219 | Rámcovka | 06.02.2019 | 05.04.2019 | 1,3300 € | 100 | 133,0000 € | 1112 pcs | 2000 | (We are checking the delivery date: 2000 pcs) | |
| | ATMEGA644PA-AUR AVR ATmega Microcontroller 8-bit 20MHz 64KB FLASH TQFP44 | 119219 | Rámcovka | 06.02.2019 | 01.05.2019 | 1,3300 € | 250 | 332,5000 € | 1112 pcs | 2000 | (We are checking the delivery date: 2000 pcs) | |
| | ATMEGA644PA-AUR AVR ATmega Microcontroller 8-bit 20MHz 64KB FLASH TQFP44 | 119219 | Rámcovka | 06.02.2019 | 01.08.2019 | 1,3300 € | 280 | 372,4000 € | 1112 pcs | 2000 | (We are checking the delivery date: 2000 pcs) | |

# Don't you have the login details to e-shop?

Would you like to try an e-shop but do not know your login details? Ask for them on our website; at the top right there is an "I Forgot the Password" link. You just need to enter the email address you use to communicate with us. System will send you an email with a link to generate your login information.

If the system does not recognize your email address, ask our sales assistant for an account set up in the e-shop.

**Adrián Lipták**
webteam manager

# Latest articles to read...

## High Performance and Cost-effective I/O Modules for Industrial Automation

Various versions of IO-Link I / O modules, multiprotocols... All of that in a robust design with IP65 or higher is already available in our offer from Lumberg Automation.

## Is there a sparking atmosphere in your team?

Don´t let discharge your emotions on innocent components – use ESD safe tools ! :)

## UTP, FTP, S/FTP? Small Refresh Might Be Useful

Are you also sometimes not sure whether you are correctly using acronyms marking data cables that are mostly used for Ethernet?

## How to choose the right power supply?

Vehicle´s performance data. A neverending topic for car sellers, car owners or even car lovers. Are consumers being misled when their cars consume 1 to 2 litres more than manufacturer data specifies?

## Get OMNI in Just 15 Minutes

Insert SODIMM RAM module into socket, connect SSD and fasten it to CPU BOX kit. Connect 3 cables from the LCD kit to CPU BOX kit, click CPU BOX kit into LCD kit and fix 3 screws - done. You can build panel PC yourself or buy pre-assembled one.

## Can you handle mounting OLED display within 2 seconds?

Mounting of a small graphic display EA OLEDS102 which is mounted only by soldering into PCB or plugging into a socket is not only fast and reliable but also cheap.

## TE Connectivity. Leader in Crimping Quality.

Anyone can make a tool to crimp terminals onto a wire. But not everyone can manufacture a tool to crimp the terminals properly.

## Yet unrivalled battery life - Li-SoCl2 batteries from EVE

For the IoT era, a reliable and long lasting power source is essential. The most advanced primary batteries use Li-SoCl2 formula to deliver required energy.

## SUNNY - Reliable manufacturer of adapters and power supplies

Technically every application needs a power supply. It matters which adapter or power supply we use. It needs to be durable and have low power consumption in an idle state, it needs to have interesting design and its manufacturer needs to have all the required certificates.

# TMPS 10 - Ultra Compact Power Solution for IoT Devices

**II TRACO POWER**

**The family of encapsulated 10W AC/DC TRACO converters is exceptional not only for their ultra-compact design and high efficiency. It is ideal for use in IT, communication and home electronics.**

Traco Power 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 blade connector or with flying leads for installation into standard flush boxes.

Power supplies are the most stressed parts of electronic devices. They must withstand wide temperature ranges and because they also generate heat by converting input energy to output power, the high efficiency is a crucial parameter for every such power supply.

The TMPS 10 series comprises ultra compact AC/DC power supply modules in a lightweight fully encapsula-

ted plastic casing for PCB mount. Beside the latest safety approvals for industrial and IT solutions (IEC/EN/UL 62368-1), they are also certified as per IEC/EN 60335-1 for household appliance. These 10 Watt modules are the ideal solution for low power or segregated circuits when space is critical or for an efficient powering of a standby mode when compliance to ErP directive is required.

The TMPS series offers 3W and 5W TMPS03 and TMPS05 power supplies which are, along with the 10W version of the TMPS10, available in our assortment upon request.



## *Main features*

- Compact PCB Power module in 1" x 1.5" package
- Certified as per EN 60335-1 and UL 62368-1 for household and industrial appliance
- Reinforced I/O isolation 4000 VAC
- Operating temperature range −25°C to +70°C
- Allows 130% peak current up to 30s
- Ready to meet ErP directive, < 0.15 W no load power consumption

- 7 versions with single output: 3, 5, 9, 12, 15, 24, 48 VDC
- EMI meets EN 55032 class B and EN 55014-1
- Protection class II prepared
- 3-year product warranty

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 309773 | TMPS 10-105 | AC/DC Power Supply for PCB 10W 5V/2A | 17,60 € |
| 309788 | TMPS 10-115 | AC/DC Power Supply for PCB 10W 15V/0,66A | 17,60 € |
| 309791 | TMPS 10-148 | AC/DC Power Supply for PCB 10W 48V/0,21A | 17,60 € |

# *Three Cases*
# for WAGO Splicing Connectors

**Easier, Faster, Safer. These 3 attributes characterize WAGO's 221 Series of Splicing Connectors. Pull the lever up, insert a conductor and push the lever back down. All done.**

The **221 Series** connectors carry two test slots: one in the conductor entry direction and one in the opposite direction.

These easy-to-access test slots provide extremely convenient testing conditions, even after installation within widely varying applications. They also provide good contact for all standard test probes.

The recessed grips on the side prevent slipping and make it easier to hold the connector while inserting the conductor. Optional DIN-rail adapter provides secure installations within distribution and junction boxes.

Not just for building installations, but electrical appliance manufacturers as well. The new 221 Series with a conductor cross-section of 6 mm² offers completely new options: High-power lighting and signal systems or HVAC systems within commercial buildings can be wired easily, safely and quickly.

See 3 **easy everyday tasks** for Wago 221 Series connectors:

**1. Task : There is only last 10mm on DIN Rail and we need to connect one more circuit (L,N,PE) but with two outputs.**

**Solution 1:** Three Rail-Mount Terminal Blocks, .e.g. 2200-1301

(grey), 2200-1304 (blue), 2200-1307 (yellow-green) each 3,5mm, i.e. 10,5mm together with the end plate... That is definitely more than 10mm. Therefore, this solution is not suitable. For wires with cross-section of more than 1,5mm² it would be even wider.

**Solution 2:** Twist the wires with pliers, and a piece of insulation tape. This would be the cheapest solution but it is out of the question even for the amateurs.

**Solution 3:** Three splicing connectors with lever 221-412 and one mounting carrier 221-500. The carrier accepts 3 connectors side by side. Pull the lever up, insert a conductor and push the lever back down. All done.

**2. Task: Internal wiring in a luminaire.**

**Solution 1:** Wago has specialized installation lighting connectors for all cases with ideal installation - the lamp with stranded wires 0,5-2,5mm², and solid wires from the ceiling 1-2,5mm². The solution is 224-101 (or for temperature 120°C 221-104). But for all non-standard cases...

**Solution 2:** Twist the wires with pliers, and a piece of insulation tape - very cheap, but not a solution
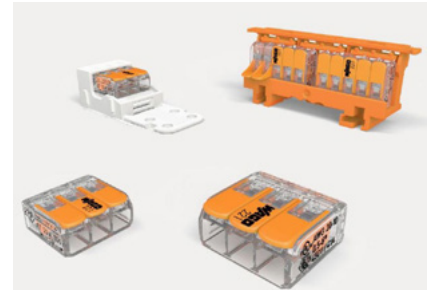


**Solution 3:** 2 pieces 221-412 and that's all. To add a bit of elegance, we can add mounting carrier 221-502. It is possible to fix it to the chassis of lamp with screws - nothing moves, neither wires, nor connectors. Pull the lever up, insert a conductor and push the lever back down. All done.

**3. Task: To connect the speaker in a ceiling**

**Solution 1:** Old good chocolate block. First, release the screws but not too much, then tighten the screws but not too much and not too weak. Oh, it is frustrating.

**Solution 2:** Twist the wires with pliers and a piece of insulation tape - very cheap, but not a solution.

**Solution 3:** Yes, we're here with 221-412 again. What else? There is no easier solution. Even if you want to use not 4mm² wires but 6mm2 wires, you can use 221-612. Pull the lever up, insert a conductor and push the lever back down. All done.

## *Features/ Advantages*

- Rated voltage 450V
- Rated current 32 Amps for size 4mm²
- Rated current 41 Amps for size 6mm²
- Wire cross-sections for size 4mm²: fine-stranded conductors from 0.14 to 4 mm² and solid or stranded conductors from 0.2 to 4 mm²

- Wire cross-sections for size 6 mm²: all conductor types ranging from 0.5 to 6 mm²
- Versions for 2, 3 and 5 wires
- Transparent housing = Visually inspect the connection
- Maximum ambient operating temperature 85 °C
- Continuous service temperature: max. 105 °C

| Order no. | Type | Description | Guide price |
|-----------|------|-------------|-------------|
| 297920 | 221-612 | COMPACT Splicing Conn. 2wire 41A 6mm² trans/orange 85°C | 0,45 € |
| 297923 | 221-615 | COMPACT Splicing Conn. 5wire 41A 6mm² trans/orange 85°C | 1,10 € |
| 170977 | 221-415 | COMPACT splicing conn. 5wire 32A 4mm² trans/orange 85°C | 0,50 € |

# "The Condor Series"
# The raptor between antennas

**If you are using 4G networks in your application for fast data transfer, it is crucial to have a reliable and high performance antenna. The new 2J4A24Pa adhesive mount antenna is the most competitive solution on the market.**

With a size reduction of up to 50% in comparison with other antennas on the market and the highest performance for a 2-in-1 antenna solution, the Condor 2J4A-24Pa antenna is the most competitive solution on the market.

Other configurations in the same enclosure such as 3-in-1, 4-in-1 or 5-in-1 antenna are available upon request based on your current needs. If you are looking for an antenna that is sleek in design and makes no compromises on efficiency and performance, then 2J4A24Pa is the best option.

## Worldwide solution

The key feature here is that 2J4A24Pa is compatible with all LTE, 4G, 3G or 2G network ecosystems. Engineered according to the latest technological advancements, this antenna provides LTE-MIMO, delivering very high-efficiency uninterrupted data transfers at maximum speed, achieved by the low Envelope Correlation Coefficient at the LTE-MIMO Antennas.

## Installation and durability

The 2J4A24Pa can be easily installed or hidden in any part of your environment and application; on the top or bottom surfaces including windshields, dash, plastic, etc., as it comes equipped with a separate double adhesive pad that secures it safely.

This product includes a low loss double shielded cable with fully customized length and connector that provides maximum antenna performance and reliability, avoiding drop connections, higher speed data, higher gain, etc. 2-in-1 feature allows for a quick handling in places where other solutions cannot be implemented and eliminates the need for the extensive labor involved in the installation of the product, saving time and resources. Not only does this technology assure smooth performance, but it also comes bearing safety guarantee.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 265061 | 2J4A24Pa-050LL195-C947G | Antenna LTE/3G/GSM LL195 0,5m CRC9 Au | On request |

# Take the advantage of ready to use module with SHT30 sensor

**The SHTxx sensors measure relative humidity and temperature of their direct environment. But what to do if PCB doesn't allow the sensor to be placed in the optimal position?**

Sensirion's **Design Guide Humidity Sensors** describes how to design PCB, enclosure and place sensor to optimal location but in practice, there are also applications where it is not possible.

With the **SCC30-DB** module, designer can place a humidity and temperature sensor anywhere within a device and connect it to the main PCB with four wires. You do not need to spend time to create your own sensor module. Based on Sensirion's experience and expertise, the SCC30 is optimized for easy design-in and sensing performance.

The SCC30 uses the latest generation sensor -SHT30. Module uses Scondar SCT2001WR-S-4P connector (compatible to JST part no. S4B-PH-SM4-TB). To support the development, we offer you mating connector, JST **PHR-4** housing and pre-crimped wires.

The SCC30-DB supports I2C normal (100 kHz) and fast (400 kHz) mode. Lower frequencies (below 100 kHz) are recommended for communication because of capacitive coupling of cables with the I2C bus.

## Sensirion Control Center

The most convenient way to evaluate SCC30-DB performance is the use of **SEK-SHTxx/SGP30** evaluation kit. SEK-SCC30-DB, SCC30-DB module with cable for connecting to kit and Sensirion **Control Center** software. Software is available for Windows, Linux and macOS.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 308299 | SCC30-DB | Humidity & Temperature Sensor ±3% RH ±0,3°C I2C PCB Module | 6,00 € |
| 308300 | SEK-SCC-30-DB | SCC30-DB module with cable for SEK Eval. Kits | 33,00 € |
| 107227 | PHR-4 | Connector Housing JST 4poles | 0,044 € |

# EA PlugL – OLED Display with USB and Touch Panel

## The new OLED from Electronic Assembly offers, besides usual RS232, I2C and SPI protocols, also a convenient and full-featured USB interface.

The new EA Plug family of OLED displays represents touch-sensitive OLED display that can be addressed directly via USB. USB communication is especially convenient for development and debugging, but it can also be used as a main communication channel in a final application.

However, you´ll probably rather use RS232 (or also RS485, RS422 with an external level converter), SPI or I2C in final application. The EA Plug family comes with a nice and robust glass panel with a black frame (á la tablet) so the installation is very easy by gluing the display on a main panel without any need for additional frames, cover glasses and similar.

The display is extremely easy to read. It is protected by a robust, touch-sensitive glass panel. Various graphic functions and character sets with German diacritics are already implemented. Thanks to various digital inputs and outputs, the display can take over small control tasks independently.
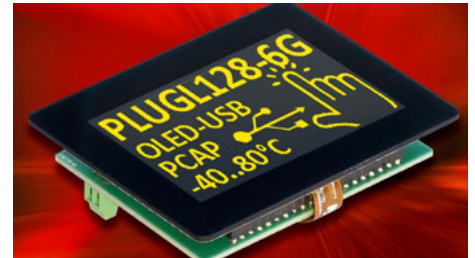
Widely known advantages of OLED technology probably don´t need to be highlighted and you can find them well arranged for example in our article EA OLEDL128 – OLED alternative to EA DOG displays.

### How does it all function?
All serial interfaces (USB, RS 232, SPI, I2C) are protocol-equivalent and the data sent is stored in the same buffer. After you connect the EA Plug through USB to a PC (use the driver available at manufacturer website), you´ll find a CDC USB device (communication device class), in other words a virtual COM port.

USB port is intended for a full-featured control of the display (not only for communication with a touch panel).

The display has two internal "layers" – Terminal layer and Graphic layer. Terminal layer is mainly intended for first steps and debugging.

### *Advantages / Features*

• 2,9" OLED with a capacitive TP • Control by commands• USB port for a full-featured communication with the display (not only for TP) • Single 3.3V power supply • Graphic functions • Extremely wide viewing angle • Digital I/O ports • Installation by simple gluing on a main panel

| Order no. | Type | Description | Guide price |
|-----------|------|-------------|-------------|
| 309841 | EA PLUGL128-6GTC | OLED Graphic Module 2,9" 128x64 Dots Yellow | 91,60 € |

# Do you know a LED with zero height?

## Kingbright KPTR series, suitable for reverse mounting, makes it possible to achieve that the LED is hidden in the PCB.

Naturally, manufacturing LED with a zero height is most likely unreal at the current physics status and 34D experience of the world. Nevertheless, it´s still possible to reach the goal that the LED wouldn´t stick out of the PCB – by the above mentioned „reverse" mounting, alias by mounting from a rear side of a PCB. In this case, naturally, there´s a suitable size opening in the rear side of a PCB.

### What is it good for?

Simply said, PCB tracks to a LED and the package itself is from the rear PCB side.

On the top side, on the side on which the LED lights up, you then have a free hand in the placement of other components. In the situation when there are only 0,2mm high LEDs on the market it may seem useless but sometimes even those 0,2mm matter. It can be said that such an assembly practically does not affect the top of the PCB, except the need to have a milled hole for the LED body in the PCB.

By this way, it´s possible to make extra thin backlight panels and mainly also to use LEDs even to backlight components, which weren´t designed/accommodated for backlight (switches, ...). Another advantage of such mounting is that even relatively densely placed LEDs don´t interfere among each other. In result, for example by gluing such PCB to a semi-transparent panel, it´s possible to gain a cheap and high-quality indication panel without undesired light leakage to nearest segments.

The KPTR-3216 series intended for mounting „**upside down**" is already packed(tape and reel) in the opposite position in order to make it usable for machine (pick and place) assembly.

The KPTR-3216 series contains 15 types in all common colours (except white).

### *Advantages / Features*

• "reverse" mounting from the bottom side of a PCB • no space occupied on the top side • easy construction of backlight panels with minimum height • easy backlighting of various components • almost no light-interference between nearby LEDs

| Order no. | Type | Description | Guide price |
|-----------|------|-------------|-------------|
| 139648 | KPTR-3216CGCK | LED 3,2x1,6mm Green 570nm 50mcd/20mA 120° | 0,049 € |
| 160811 | KPTR-3216EC | LED 3,2x1,6mm Red 625nm 12mcd/20mA 120° 1206 | 0,040 € |

# Are you familiar with SSD terminology and parameters?

**We will help you better understand the significance of the most important parameter to make your data safe.**



### NAND Flash Memory Type

#### SLC

SLC stands for single-level-cell. Memory cell is based on floating gate MOS transistor. Gate has either charge stored (0, programmed) or not (1, erased). SLC flash memory based SSDs are the most reliable, durable but also the most expensive SSDs. Apacer provides **five years warranty** (applies to the products shipped later than Jan. 1st, 2019) or the period ending on the date when the SSD has exceeded **60 000** erase count.

#### MLC and 3D TLC

MLC stands for multi-level-cell. Floating gate stores one of four amount of charge. TLC memory cell (triple-level-cell) stores charge in charge trap instead of floating gate. Charge trap stores one of the eight charge sizes. Apacer provides the same warranty for MLC and 3D TLC based products, **two years warranty** (one year for capacity 4GB or lower) or the period ending on the date when the SSD has exceeded **3 000** erase

count for the both technologies.

#### SLC-Lite

SLC-Lite technology uses MLC flash chips, but firmware either stores charge to floating gate or not - the same procedure as for SLC. Such strategy significantly increases the erase count and allows Apacer to provide three years warranty or the period ending on the date when the SSD has exceeded 20 000 erase count. Erase count is indicated by Apacer SMART software as parameter Avg.erase Count.

### Capacity

Apacer uses convention where

1GB=1000MB. Operating systems uses convention where 1GB=1024MB. For example, 64GB MLC mSATA from SM210-300 series datasheet mentions 64 023 257 088 total Bytes and capacity 64GB. Operating system will show capacity 64 023 257 088/1024^3=59,63GB. Usable capacity will be lower because small portion of the capacity is required by file system. NTFS consumes 66,31MiB, EXT4 uses 1,24GiB and XFS only 29,92MiB. SLC flash based SSDs are available up to 240GB capacity, SLC-Lite SSDs offer up to 256GB capacity and MLC flash SSDs up to 2TB.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 306938 | APM032GMFFN-5DTM1W | Industrial SATA 3.1 SSD 32GB SLC-Lite mSATA (MO-300) -40...85°C | 57 € |
| 306799 | APM2T42SM22032GTN-5ETMW | Industrial SATA 3.1 SSD 32GB MLC M.2 2242 -40...85°C | 35 € |
| 305955 | APM064GMFFN-5BTM1W | Industrial SATA 3.1 SSD 64GB MLC mSATA (MO-300) -40...85°C | 52 € |
| 306103 | APM2T80ST17120GF-ND-08TTG | Industrial SATA 3.1 SSD 120GB TLC M.2 2280 0...70°C | 39 € |

# iM282A-L - Long Range Radio Module for 2,4GHz band

**The only available radio chip for LoRa on the market has been the SX1272/76 from Semtech up to now. Things have changed and company IMST came up with the new type of radio chip SX1280 which can work on 2.4GHz band and decided to use this chip for their new LoRaWAN Long Range module, the iM282A-L.**
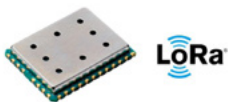


The iM282A-L is a compact and low-cost radio module that operates in the 2.4 GHz frequency band and combines the powerful Cortex-M3 MCU with the new ultra long range transceiver SX1280 by company Semtech. It has been specifically designed for battery driven applications and is able to transfer data without any additional amplifiers up to the distance LoS of more than 12 km.

The embedded WiMOD LR Base Plus provides LoRa®-modem functionalities which allow the implementation of proprietary and cost sensitive radio networks with typical topologies like peer-to-peer and star configurations. The embedded radio protocol offers unacknowledged and acknowledged radio packet exchange with optional encryption and automatic power saving for battery driven applications.

### Main features

• frequency range: SRD Band 2.4 GHz • modulation: LoRa®, FLRC, (G) FSK • RF output power: up to +12 dBm (50Ω pad) • RF data rate: 476 bps to 2.3 Mbps depending on modulation and settings • RF range: up to 12 000 m (Line of Sight) • operating voltage: 1.8 V to 3.6 V • current consumption: 0.8 µA (module in sleep, RTC off), 2 µA (module in sleep, RTC running), 9 mA (Rx, MCU sleep), 34 mA (Tx @ 3.0 V/ +12 dBm, MCU sleep), 25 mA (Tx @ 3.0 V/ +8 dBm, MCU sleep)

Besides the modem services the firmware includes some example features which are typical for the application area of this LoRa® radio modules: a tiny sensor application which demonstrates a periodic sensor data transmission and a remote control with digital input/output via radio communication.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 305761 | iM282A-L | LoRaWAN Module Cortex-M3 SX1280 UART SPI I2C | 21,50 € |
| 307770 | SK-iM282A | Starter / Evaluation Kit for iM282A Radio Module | On request |

# Reliability and reasonable prices from Euroclamp

euroclamp

**High-quality PCB terminal blocks and DIN rail electronics enclosures directly from the Italian manufacturer with many customization options for your unique solutions.**

Euroclamp began the production of printed circuit terminal blocks in 1991. Thanks to their experience of about 30 years within the electronic field, we recognize them as a flexible, reliable and highly innovative company.

### Why do we like Euroclamp?

Because the basic range of terminal blocks has never dramatically changed throughout all those years but has "only" been continuously improving - thus we're having a certain guarantee of quality, supported by Integrated Company system (Quality, Environment, Safety) according to ISO standards.

**Extra features you should consider:**
Specifically prepared surface treating (Sn 100%) in order to grant excellent soldering performances, even after a long stocking period.

Plating of contact in tin baths that ensures the "WHISKERS FREE" process.

Easy mounting peaky shaped pins.

Screws have a hardened surface that allows a high number of tightening and loosening cycles.

**Euroclamp offers several connection systems for terminal blocks and plug-in connectors:**

**1. CAGE CLAMP** - It is the easiest and cheapest system.

**2. RISING CLAMP** - It's the strongest screw type connection system. It allows a high number of actions (screwing down/up). Besides, it has a large contact surface and high clamping force.

**3. BARRIER** - This system combines handiness and high clamping force.

**4. SPRING-CAGE** - It is quick and easy to use. It involves the activating of the connection system (spring) by an appropriate tool or by a specific push-button that is fully integrated into the body of the terminal block.

**5. PUSH-WIRE** - It allows the connection by pushing the wire (either solid or stranded with a push rod) into the terminal block. The connection and disconnection of the wire can be easily achieved with the aid of the special tool (screwdriver).

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 51448 | MV253-5,08-V | PCB Terminal Block Modular P5,08mm 2,5mm2 16A 3P V | 0,233 € |
| 57125 | MPT275-GY | Panel Term.Block Clip Mod P7,5 2,5mm2 24A 1P grey ST | 0,245 € |
| 51533 | PV02-5,08-H-P | Plug-in Connector M P5,08 12A 2P H Closed | 0,076 € |
| 50705 | SH02-5,08 | Plug-in Connector F P5,08 2,5mm2 16A 2P H | 0,203 € |

# To which enclosure will you confide your project?

HAMMOND MANUFACTURING

**Or, which criteria are the most important when choosing enclosures? If you are not sure, get advised. Hammond is an expert on enclosures for more than 100 years.**

As we all know, it´s more than advisable to think of an enclosure already at the very beginning of the device design and to partially adjust a PCB design to a given enclosure. Otherwise, it can easily happen that despite a huge offer of enclosures on the market, we cannot find a suitable size for a given PCB, mainly in respect to a position of connectors and mounting openings.

### Material choice alias Plastic or Metal?

**Plastics**

The most widely used plastics for production of small electronic enclosures are ABS, PC (polycarbonate) and polyester (glass reinforced).

Advantages of plastic enclosures are mainly insulating features, considerable shock resistance (however, from a certain level of deformation, cracking may occur), easy machining (milling, drilling, ...), resistance to many aggressive agents, mainly acids and alkali.

### *Advantages / Features*

• high-quality enclosures from the producer with over 100 years of experience • wide range, a lot of shapes and sizes • wide range of accessories • possibility of custom modifications directly at producer • stable quality (color shade, dimensions,...) • reliable deliveries on time

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 56096 | 1455C801 | Enclosure AL 80x54x23mm Natural metal end panels | 7,60 € |
| 56860 | 1551KBK | Enclosure ABS 80x40x20mm Black | 2,00 € |
| 308405 | 1551V1GY | Enclosure ABS 40x40x20mm Grey IP30 Vented | 1,50 € |
| 54659 | 1591BTBU | Enclosure PC FR 112x62x27mm Ice Blue | 4,20 € |

# XPort® EDGE
# for Truly Demanding Tasks

**LANTRONIX®**

**The next generation of wired Ethernet gateway and device server deliver secure network connectivity with integrated device management and cloud connectivity in the same compact form factor as the Lantronix XPort.**

**XPort® EDGE** is the only network communication engine for secure IoT connectivity and remote management that fits within a standard Ethernet connector.

Requiring minimal engineering effort, the XPort® EDGE allows device manufacturers to add fully integrated, secure Ethernet connectivity and a remote control of their products in a few weeks.

Running on **Cortex R4 MCU** with up to **320MHz frequency** and packed with 8MB SPI Flash memory, this tiny device

offers enormous computing power capable of solving virtually all tasks easily. Consuming only **160mA (100Base-T) at 3.3VDC**, its power efficiency is much better comparing to the previous **XPORT - Generation**.

**Data Communication**

- TruPort® Serial Technology — TCP and UDP Server Mode, TCP and UDP Client Mode, Multi-host Connect; TLS Client and Server
- TruPort® Socket — Multi-host Client

and Server Modes, HTTP(S) Server

- Authenticated SMTP Support — Send email directly from the device

## Key Features

- Network & IoT Offload • Full IoT Gateway Functionality in a single RJ45 package • Industrial-grade Security • Robust Data Handling • Integrated Device Manageability • Cloud Ready • Faster Time to Market • Lower TCO • Quickest Integration

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 307169 | XPE200100B | Embedded Web Server XPort RJ45 | 57,00 € |

# RTH34024 doesn't even sweat at 105°C!

**TE connectivity**

**Where other relays fail, this one works without hesitation. Max switching current of 16A at 400VAC voltage is a commonplace.**
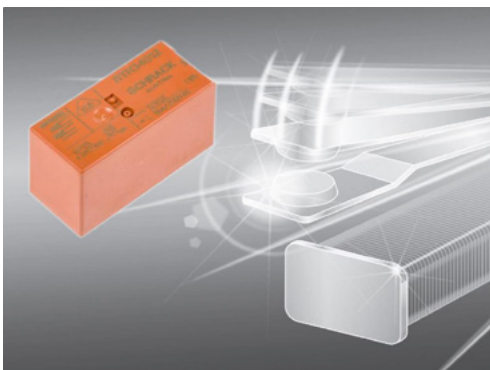
RTH34024 relay (1415039-1) is a novelty in our product range. It is primarily designed for PCB mounting and, thanks to its size, does not take up much space.

Moreover, thanks to the pin layout, it is possible to switch voltages up to 400VAC.

For general industrial use, the relay is manufactured with a 24VDC coil, but a 12VDC version (RTH34012) is also available. With today's steady miniaturization trend, this relay satisfies even the most demanding industrial applications, with

the emphasis on long-term service life that is required for PCB-mounted components without the possibility of replacement.

Another important factor is ambient temperature. The RTH series is capable of operating in a temperature range up to 105° C. In practice, it works well in devices that generate a lot of heat such as power drives, boilers and various automation systems.

Sometimes, however, it is necessary to place the relay in the distribution box and connect it to the wiring. This is also possible if the socket RT7872P, RT78725, RT78726 or the like are used. With this extension, we will be able to quickly replace the relay in applications with a large number of working cycles.

## Technical parameters

- Switching current: 16A • Switching voltage: 400VAC • Number of contacts: 1 switching (SPST-NO) • Ambient temperature: -40 to 105°C • Insulation strength contact/coil: 5000Vrms • Insulation strength between open contacts: 1000Vrms • Enclosure dimensions: 29x12,7x15,7mm • Mounting: PCB – through hole

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 118276 | RTH34024 (1415039-1) | Power PCB Relay 24VDC 16A/400V SPST-NO AgNi | 0,995 € |

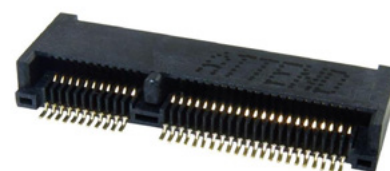# M.2 Connectors - Key to the successful connection

**M.2 connectors originally known as NGFF (New Generation Form Factor), become gradually more popular over the form factor MiniPCIe and are used as a standard in computers, communication equipment, and M2M applications.**

The main advantage of **M.2 connectors**, we chose the 123A Series from AT-TEND, is the implementation of PCI Express 3.0, Serial ATA 3.0 and USB 3.0. buses into one connector. This eliminated the limitations of SATA interface. The connector is considerably miniaturized and at the length of only 21.8 mm, it has up to 75 pins (0.5mm pitch/ 50V/0,5A).

M.2 connectors are designed as a standard for SSD memory media, WiFi, Bluetooth, GPS/GNSS, NFC, and other modules.

An important fact is that connectors are produced with **various keying (A-M)**. That provides a possibility to differentiate various modules on one board and prevents improper connection (PCIe x2, PCIe x4,...). There are 12 different keys in total, but e.g. SSD modules typically use only 2 of them - B, M, and combination B+M.

M.2 connectors are designed for direct insertion of PCB, i.e. one part of the connection (M) is the PCB and another part is the connector (F). Connectors support various PCB widths - 12, 16, 22 and 30 mm. Depending on a type, M.2 connectors also enable double-sided assembly of components on the PCB.

There is a nomenclature (on the next picture) for specifying the modules for M.2 sockets. The code defines the size, maximum height of components, single or double side assembling and the keying.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 160200 | 123A-32AA0-R01 | Connector M.2(NGFF) 67P A Key Type SMD, Angled | 1,19 € |
| 160214 | 123A-32BA0-R01 | Connector M.2(NGFF) 67P B Key Type 3,2mm SMD, Angled | 1,29 € |

# speedE - The first manual screwdriver with electric drive

**Screw with speed, pull with emotion! If the screwdriver is a key tool for your day-to-day work, with the unique Wiha speedE you can manage everything twice as fast.**

You can see at first look that Wiha speedE really isn´t just a standard battery-powered screwdriver, but rather it looks like a classic manual (mechanical) screwdriver with typically great ergonomics and small weight.

Today's electric battery-driven screwdrivers often provide even enormous performance - as for speed and torque power and are great for jobs where high performance is needed, for example for wood screws.

But for jobs where you would normally manage with a classic screwdriver, they are often too big, heavy, non-ergonomic and sometimes even risky to use because of the risk of thread damage, especially at the beginning of screwing the screw.
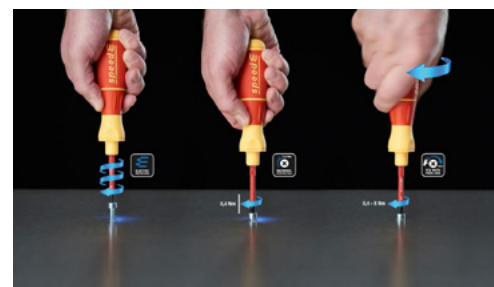
**Is Wiha speedE really unique?**

At first look, the speedE is a classic manual screwdriver, but it is also insulated and can also be used for work on equipment under voltage.

It contains a sophisticated metal planetary gearbox and a small motor. You can use it for manual screwing as well as the other similar manual screwdrivers.

## *Advantages / Features*

• motorized "manual" screwdriver for fast and sensitive jobs • as a result, it brings about approx. 2-times more efficient work • idle speed approx. 215 / min • minimum weight compared to standard battery-powered screwdrivers

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 306637 | speedE 590 T101 (41911) | E-screwdriver Set1,Bits+Battery+Charger | 205 € |
| 306639 | speedE 590 T102 (41912) | E-screwdriver Set 2, slimBits+easyTorque Adapter Battery+Charger | 235 € |
| 306640 | speedE 590 T103 (41913) | E-screwdriver Set 3, slimBits+easyTorque Adapter Batteries+Charger | 348 € |

# RTC-1010: The Optimal Combination of Performance, Durability and Interfaces

**The rugged 10,1" tablet is a perfect tool for industrial field service and maintenance or mobile HMI. It offers industry standard interfaces and connectors, hot-swappable battery and optional barcode reader, as well as the fact that it has been designed to allow customization.**

RTC-1010 series design shares many features with AAEON flagship, the RTC-1200 series. It is IP65 compliant, can withstand drops from a height of 122cm, meets MIL-STD-810G standards, allows customization and has an operating temperature range of -20°C to 50°C.

Tablet uses standard D-SUB9 connector for RS232/422/485 so you don't need any special cables. USB interfaces uses type A connector, which is more rugged as micro USB used by consumer tablets,

and one type C connector.

The tablet uses a standard DSUB-9 connector for RS232/422/485 so you do not need any special cable. RS232 is often used in the industry to configure devices. RS-485 is physical layer for fieldbuses such as BACnet, Bit-Bus, EIB, LonWorks, ModBus, P-Net or ProfiBus. USB interfaces use Type A connectors that are mechanically more durable than microUSBs used in non-industrial tablets, and one type C connector. Of course, the tablet also has an RJ-45 Ethernet connector.

You can work with the touchscreen wearing thin working gloves such as Hyflex. It has built-in speaker but no microphone. For calling, you can use a Bluetooth/USB headset or headset with the built-in mic via the audio jack.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 308347 | RTC-1010-R0003 | Rugged tablet 10,1" 1280x800 CTP Intel Pentium N4200 4GB RAM 64GB eMMC -20...50°C | 1 270 € |
| 308350 | RTC-1010-R1003 | Rugged tablet 10,1" 1280x800 CTP Intel Pentium N4200 4GB RAM 64GB eMMC -20...50°C | 1 370 € |

# Why Do We Need a Power Line Filter and Where to Place It?

**Currently, it is almost impossible to meet the requirements of the EMC standards. Schurter EMC components will help you with this.**

Schurter offers a wide range of EMC components:

- Power entry modules with filter for currents 0.5 to 20A.
- EMC filters (1-phase, 3-phase AC and DC). The smallest one, 1-phase, 6A/250VAC FMLB-09 5500.2031 has dimension 50x45x28,6mm and weight 116g. One of the biggest ones is 3-phase, 1100A/520VAC FMAC-0974-K152I with dimensions 590x230x200mm and weight 47kg.
- Current compensated chokes (1-phase and 3-phase) for currents 0.4 to 50A.
- The majority of power entry modules

feature V-Lock locking system. The power connector is equipped with a pin that interlocks with a notch in the power entry module and thus reliably prevents the cord from being pulled out unintentionally.

You can find more information about all Schurter EMC components in PEM, filter and chokes overviews.

### Why Do We Need a Power Line Filter?

At the present time, electronic equipments typically use switching-mode power supply and fast digital circuit. Such devices generate high frequency

voltages and currents during normal operation. Without the power line filter, it is almost impossible to meet the requirements of the EMC standards.

The two primary functions of the power line filter are:

- Preventing high frequency signals generated within the device from reaching the input power line.
- Preventing high frequency signals on AC power distribution system (disturbance) from entering into equipment.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 104919 | 5500.2027 | Power Line Filter 250VAC 2A Chassis Mount | 6,20 € |
| 72443 | 5220.0643.1 | Appliance Inlet with Line Filter 250VAC 6A Chassis Mount | 12,60 € |

# Why is Micro Switch called a micro switch

MARQUARDT

**Because it switches uAmps? Not really. It's more common to switch several Amps. Because of its size? It is quite questionable what is considered big and what is already small. Then why so?**

Probably because the first producer was the American company called Micro Switch. And as these products were very popular, the name micro switch became a generic trademark for all producers.

The company Micro Switch was acquired by Honeywell in 1950. And Honeywell registered the trademark Micro Switch. Other manufacturers used the name Snap-Action Switch or Basic Switch.

But the question still remains why the founder of the company, Mr. Schulte, decided to name his company Micro Switch?

Because they switched micro-amps? Probably not since in 1937 the mi-

cro-amps did not even exist. Because of their miniature dimensions?

Probably yes, at that time they could be considered tiny.

### And what exactly is that micro switch?

It is an electric switch (patented in 1932) that is actuated by very little physical

force. Switching happens at specific positions of the actuator (not like other switches). Relatively small movement at the actuator button produces a relatively large movement at the electrical contacts, which occurs at high speed (regardless of the speed of actuation). Typical durability is from 1 to 10 millions of cycles. This durability is a natural consequence of the design.

Micro switches are not operated by person; it is always some moving part of the equipment. Common applications are detection (e.g. jammed paper in photocopier, the presence of material or product). Other application can be a limit switch (for control of machine tools) or door switch (e.g. fridge).

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 159468 | 1006.1201 | Snap-Action Switch 1-(1) SPDT 10(4)A 400VAC Roller Lever F6,3 | 2,80 € |
| 71289 | 1050.0103 | Snap-Action Switch 1-(1) SPDT 10(1,5)A 250VAC Solder Lugs | 2,20 € |

# QPD Installation System

PHŒNIX CONTACT
INSPIRING INNOVATIONS

**Are you one of us? Electricians and nervous wrecks? Phoenix Contact Systems promise solutions. Beneficial effects will occur already after the first installation.**

Has it already happened to you that you were in the fury and anger when it was not enough just to cut off the cable, but you had to strip each wire, crimp the ferrule, then loosen the screws in the terminal block, insert the wire, tighten the

screws (I am not mentioning crimping just in case as you would most likely not finish reading the article or, in the worst case scenario, you could break your notebook).

### Advantages / Features

• three sizes - for cross sections 1,5mm$^2$, 2,5mm$^2$ and 6mm$^2$ • number of positions - 3, 4, 5 (for 1,5mm$^2$) • number of positions - 4, 5 (for 2,5mm$^2$) • number of positions - 5 (for 6mm$^2$) •rated voltage 690V • rated current up to 40A •operation temperature range -40°C up +80°C • time savings of up to 80% for on-site connection • quick and easy assembly without special tools • flexible power distribution design thanks to fixed and plug-in QPD versions • high reliability thanks to robust housing with up to IP68/IP69K degree of protection with IK07 shock resistance • the electronics are thoroughly protected as the housing does not need to be opened, even when connecting the power supply

There are connectors and terminals with the Push-In system to mitigate the adverse impact of the older installation systems, but the true relief comes with the QPD system.

### QPD installation system with QUICK-ON connection

Industrial power distribution does not have to be time-consuming or complicated. The robust IP68/IP69K QPD installation system for capacities of up to 690 V / 40 A proves this. Thanks to the proven QUICKON IDC displacement connection, cables of up to 5 x 6.0 mm$^2$ can be connected quickly and easily, without the need for stripping or special tools.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 309215 | QPD C 2PE1,5 1X4-9 BK (1414699) | Connector QUICKON 2+PE 690V 17,5A 1,5mm$^2$ IDC | 7,50 € |
| 309226 | QPD C 4PE2,5 2X6-11 BK (1403838) | Connector QUICKON 4+PE 690V 20A 2,5mm$^2$ IDC 2 Nuts | 11,30 € |

# The best SPIDER in the net

**HIRSCHMANN**

**The unmanaged switches from Hirschmann are the cost-effective way of entering the world of Industrial Ethernet technology without compromising the quality and reliability.**

All switches have been specially designed for use in harsh environments and come with all the necessary certifications. They are suitable for all applications in which switch management is unnecessary. Switches with PoE ports are also available, capable of supplying power to devices such as IP cameras or IP phones via the Ethernet cable.

### SPIDER Series

**SPIDER Switch -** The entry-level Industrial Ethernet Rail switches in the SPIDER family are the cost-effective way of utilizing Ethernet technology. They are characterized by compact design and extremely simple installation (plug-and-work).

The SPIDER family of switches provides users with an economical, reliable Ethernet switch. Models are available with Fast Ethernet, Gigabit Ethernet and PoE ports. All copper/RJ45 ports are auto-negotiating and auto-crossing. All SPIDER switches have LED indicators that provide information on power status, link status, and data rate.

**SPIDER PoE Switch -** The entry-level Industrial Ethernet SPIDER PoE switch can be used to power network devices such as IP cameras. Thanks to a combination of PoE and optical ports, the SPIDER PoE switch also opens up flexible network extension options.

**SPIDER PoE Injector -** The Power over Ethernet (PoE) injector provides power to networked terminal devices without having to replace the existing Ethernet switches or purchasing a stand-alone power supply — a solution that is both practical and cost-effective.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 113159 | SPIDER 5TX | Industrial Ethernet Rail Switch 5 x 10/100BASE-TX | 127 € |

# Panel PC with the Highest Ingress Protection

**TechNexion** INNOVATORS OF TECHNOLOGY

**TWP series industrial panel PCs have IP69K certification. Cabinet made of 316L grade stainless steel makes them ideal for the food and pharmaceutical industry.**

### Stainless Steel Cabinet

Stainless steel is used widely in food manufacturing and pharmacy. It is characterized by the addition of chromium — at least 10.5 percent of total composition. Chromium is highly reactive to oxygen environments and quickly forms a highly resilient passivated barrier on its surface protecting the internal structures from further corrosion. Stainless steel can be easily cleaned and disinfected. Its smooth surface—which is a result of polishing—does not support bacterial and mold growth.

304 stainless steel grade contains 18 to 20% Cr, 8 to 10% Ni, < 2% Mn, <0.75% Si, <0.08% C, < 0.045P and < 0.03% S. It has excellent anti-corrosion features, making it suitable for most food products. The presence of chlorides, however, can compromise passivated surfaces and cause pitting corrosion.

316 stainless steel grade is similar to 304 but contains 16 to 18% Cr, 10 to 14% Ni and 2 to 3% Mo. In conjunction with chromium, molybdenum provides superior resistance to attacks by most chemicals and increased resistance to chloride corrosion as compared to 304 steel grade. This makes it more suitable for processing of meat products and foods with mild salt contents.

316L steel grade is the most common type of stainless steel used in the pharmaceutical industry. Corrosion resistance is the same as standards 316, but the low carbon content (<0.03%) helps to avoid possible inter-granular corrosion in welding.

### IP69K

The IP69K rating provides complete protection against ingress of dust and protection against splashing hot water with temperature 80 °C under high pressure 8–10 MPa (80–100 bar) — making products with this certification ideal for use in industries such as food processing, where hygiene and cleanliness are paramount.

The IP69K rating is the highest protection available.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 309531 | TWP-1010-E8000-R40-M064-L130-QCA-9377 | PPC 10,1" 1280 x 800 CTP Atom x5-E8000 4GB RAM 64GB SSD 0...50°C | 1 020 € |
| 309675 | TWP-1560-N3710-R40-M064-L130-QCA-9377 | PPC 15,6" 1366 x 768 CTP Pentium N3710 4GB RAM 64GB SSD 0...50°C | 1 170 € |

# Do you believe it's possible to design a graphic solution within few hours?

**4D SYSTEMS**
*TURNING TECHNOLOGY INTO ART*

## Free software tool 4D Workshop intended for 4D Systems displays enables that surprisingly well and easy.

Do you know the abbreviation „WYSI-WYG" alias „what you see is what you get"? Even though it may seem excessive or unbelievable, it´s really possible to design a serious graphic application, including a touch panel only using a **„drag and drop"** method.

Intelligent displays from 4D Systems are probably already familiar to you from our recent articles. Free software tool 4D Workshop4 IDE intended for development with these displays enables designing in the 4DGL language (similar to C) and mainly it also enables designing an application fully graphically – by placing the pre-prepared widgets like push-buttons, switches, panel meters, indicators,

graphic symbols, text fields and also your images and videos.

Almost every such object can be customized according to one's own ideas and linked to each other by different actions— for example after pushing a switch (on the display), a LED should light up (on the display) and also send out a code controlling a connected device of the display module. Similarly, a panel meter can indicate value read from I/O ports, etc.

Such a graphic environment is fully sufficient to create many simpler applications. Yes, it´s worth mentioning that to develop a truly complicated applications and algorithms, it´s better to program "classically" by writing a code. But even in this sec-

ond case, the 4D Workshop4 tool can be helpful as many things can be checked and simulated in it.

Even more powerful is then the **Pro version** of the 4D workshop4 IDE. The license can also be bought via our webshop.

Current, already 4-th generation of 4D Systems displays marked as **gen4 xxx** is available in sizes from 2,8" to 7" with a resistive and capacitive touch panel, also in a version with an attractive black glass bezel (CLB) as well as in a super bright version (SB).

As an accessory, also available are high quality plastic bezels with brass bushings in a white and a black colour.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 218172 | gen4-uLCD-35DCT-CLB | DIABLO16 3,5" 320x480 Intelligent Display Module CTP w/ Cover Lens Bezel | 70,90 € |
| 218171 | gen4-uLCD-35DT | DIABLO16 3,5" 320x480 Intelligent Display Module RTP | 54,50 € |
| 289314 | IoD-09TH | Intelligent Display Module 0,9" 80x160 WiFi THT | 15,90 € |

# VC-200 and VC-800: Devices for education and development purposes

**VOLTCRAFT**

## The lowest possible energy consumption or TLD function. Middle and Professional series of multi-meters handle this hands down.

### VC-200 - Ideal for schools and education

The VC 200 series is continuously optimized for users with medium demands and keeps its affordable price on the multi-meters. Many features make the device class attractive for both, home users and professionals.

The power consumption has been reduced so that it can reach up to 6000 hours of battery life. All models of the VC 200 series are equipped with impedance switching. This allows a short-term reduction of the input resistance from 10 MΩ to

400 KΩ by pressing the button to avoid erroneous measurements due to dispersed voltages.

### VC-800 - Optimal for laboratory and development purposes

Robust, reliable, ergonomic, safe for users - these are the attributes of the professional multi-meters. From a safety point of view, the VC800 series is an example.

Due to the special case design, the case can only be opened to replace batteries and fuses when the device is disconnected from all measuring cables. The

integrated TLD (Test Cable Detection) function warns the user if the test leads are improperly connected. For an input voltage> 30 V, a warning symbol appears on the display.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 306649 | VC-271 | Digital Multimeter CAT III 600V | 37 € |
| 152416 | VC830 | Digital Multimeter U,I,R,f,C,Auto, 0,5% | 65 € |

# The top-class multimeter can make your work more efficient

**UNI-T.**



**Hand multimeter/ datalogger with 60 000 counts, high precision, comprehensive graphic full-colour display and with the possibility to connect to a PC or a smartphone – that´s the UT 181 A.**

If you consider buying a top-class multimeter, probably you already know what you expect of it.

Let´s take a look with us at main or most interesting features of the **UT 181 A**:

• Displaying on a full-colour backlighted TFT display with **320x240px resolution**.

• Possibility to display measured value graphically (value/ time) as well as numerically.

• **Memory for 20 000 values** (measurings) backed up by a small knob coin battery. User chooses period of measurement, for example 1 second.

In this case it means memory for 5,55 hrs of measuring.

• High precision and **resolution of 60 000 points (0,025% Vdc)**.

• Measuring of capacity with lowest range of **6nF (pF resolution) up to 60mF (miliFarad)** on a highest range.

• Lowest voltage range only 60mV

• True RMS measuring with a possibility to switch on **Low Pass filter** (1kHz)

• Possibility to measure **1000V AC/DC** (not only 250-600V as it is common with basic models)

• **2-channel adapter for temperature measuring** (K type thermocouple) on 2 places simultaneously, or to display temperature difference

• Optically **isolated USB cable** for connection with a PC and software on a CD, to display measuring even in real time as well as to read out data from device memory

• Powered from a built-in Li-Ion rechargeable battery

Graphic display enables to display, for example **maximum, minimum and average value simultaneously**. In case of wrong test leads connection, the display shows warning (Load Error). Also pleasant is a really useful **fast analogue bargraph**. For a demanding outdoor usage, the device features **IP65** class.

Optionally the Bluetooth adapter UT-D07 is available, enabling communication with mobile devices (Uni T App).

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 211578 | UT 181 A | Dig.multimeter Datalog. 320X240 3,5"TFT Color LCD UIRCTfD | 237 € |

# WE 1010 education kit – soldering station with a bonus

**Weller®**

**Extraordinarily affordable WE 1010 station is now available in an even more attractive set with practical accessories, ready for the immediate use.**



By introducing the WE 1010 soldering station on the market, Weller sets a level of Features/ Price ratio really high. No wonder,

as buying a quality 70W station for less than 150 Euros is not very common.

We presented the soldering set WE1010 with detailed description recently in our article - Weller Soldering Station for Less Than 150 Eur?

The latest WE 1010 set is also available in so-called **Educational kit** that, besides the usual WE 1010 kit, also contains the following:

• modern soldering wire WSW SCN M1 in diameter 0,8mm/100g

• top class cutting pliers Weller Xcellite 170MN

• ET B (2,4mm) soldering tip.

WSW solder with nickel and micro alloying additives has an excellent wetting capabil-

ity and is very gentle to soldering tips, thus contributes to their long lifetime.

Among the products of Weller (APEX group) we can also find Xcellite pliers that are known for their quality for decades. Namely, Xcellite 170MN are low profile, general purpose cutters, requiring only a small force of the operator and they are ESD safe.

In result, WE 1010 Educational kit offers the attractive possibility to try (together with a new station) also a modern solder wire, top quality cutting pliers and to have one 2.4mm extra for relatively bigger joints (WE 1010 is in the basic set delivered with one ET A tip).

The cost-effective set, WE1010 Education kit, is now in our standard stock offer and we are sure that it will find its use in many of your workplaces.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 304393 | WE 1010 Education Kit (T0053298390) | WE1010 + Xcelite 170M + WSW SCN M1 + ET-B | 157,70 € |

# Do you know all the battery installation options for your device?

**There is always a challenge for engineers to include a battery compartment into a battery powered device. We have prepared an interesting video for you with an overview of the battery holders for different battery cells.**
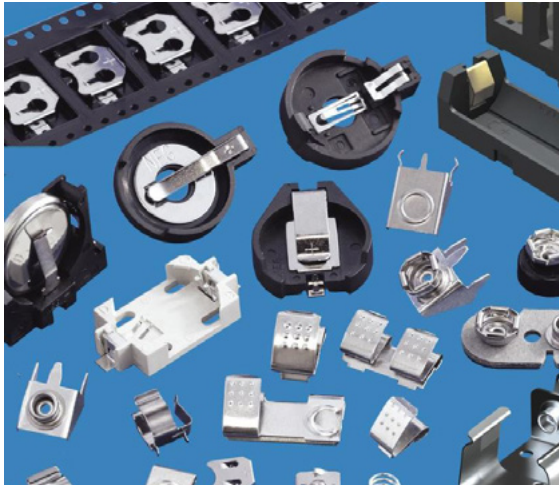


The place for battery compartment must be compact, easy to operate, dustproof and rugged to withstand battery exchange procedures.

If you often face such a situation, check the video and learn more about Keystone's broad selection of battery clips, contacts, holders and straps that are designed with leading edge technologies to accommodate all major manufacturers' battery cells and the latest chemical technologies.

### PCB Lithium Coin Cell Battery Retainers

(THM) Thru Hole Mount & (SMT) Surface Mount retainers are available for batteries with diameter of 4.8mm, 6.8mm, 11.6mm, 12mm, 16mm, 20mm, 23mm and 24mm.

They are designed for memory backup and stand-by applications. These contacts permit quick and easy coin cell replacement and installation. They eliminate "soldered-in" cells in computer, video, telecommunication and similar PCB based applications. They reliably replace soldered batteries and moreover, there is no need to use any tools to replace them.

### Lithium Coin Cell Battery Holders

(THM) Thru Hole Mount & (SMT) Surface Mount battery holders available for 12mm, 16mm, 20mm, 23mm, 24mm and 30mm diameter cells.

| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 146145 | KEYS502 (502) | 16mm coin cell holder CR1616-CR1632 | 0,86 € |
| 289256 | BCL 595 PC (595) | Battery Contact 2/3A, AA, THT | 0,13 € |
| 67602 | KEYS1028 (1028) | Battery Holder 1xAA THT | 1,40 € |
| 116602 | KEYSTONE 3002 (3002) | Battery holder 20mm SMD | 0,30 € |

# Meet the 3rd generation EVE

**Building on the success of the first two generations of FT8xx touch display controllers, Bridgetek introduces two new chips, BT815 and BT816. The possibility to connect up to 256MB of external FLASH is not the only enhancement that EVE3 offers.**

### QSPI Port for External FLASH

The interface is used exclusively to access the external NOR FLASH memory. It is not shared with the QSPI interface for MCU communication. The BT815/6 uses a clock frequency of up to 72MHz and can address up to 256MB of external FLASH. Currently, QSPI FLASH with up to 128MB is commonly available.

### Enhanced Bitmap Compression

The Adaptive Scalable Texture Compression (ASTC) algorithm provides higher compression than DXT1 while maintaining the same quality, allowing for example larger fonts or more complex, better-looking images.

### Unicode String Support

The user can define and store custom font metrics (character size definitions)

in graphical RAM or external FLASH to support the full range of UTF-8 Unicode characters.

Table below summarizes EVE 1, 2 and 3 generation features.
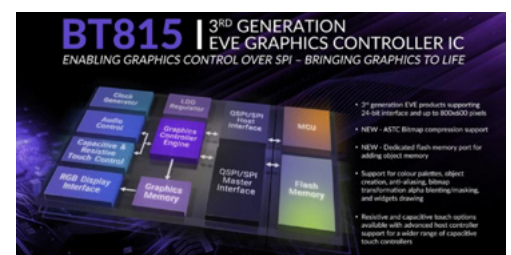


| Order no. | Type | Description | Guide price |
|---|---|---|---|
| 306045 | BT815Q-T | Advanced Embedded Video Engine Chip 24-bit RGB CTP VQFN64 Reel | 3,80 € |
| 306064 | BT816Q-T | Advanced Embedded Video Engine Chip 24-bit RGB RTP VQFN64 Tray | 3,80 € |

# Simple Fuse. Really?

**Every electric circuit should be protected against overcurrent. Fuses are the most frequently used solutions. Understanding how they work simplifies choosing the optimal fuse for the application.**



### How Fuse Works

Fuse contains a metallic element which is heated to its melting point by the excessive current. The element is designed in such a way that it melts within defined times for various overcurrent values.

Once the element melts open, the circuit voltage across the two ends of the open element creates arc. The fuse is designed so that the **arc burns only inside it and it is extinguished without damaging the fuse housing** (glass/ceramic tube, plastic case, etc.). The arc is extinguished when the element ends burn back far enough that the arc cannot be maintained across the increasing gap.

Some fuses employ a "filler", typically silica sand to help disrupt and extinguish the arc.

### What to Consider?

**Rated Current, In**

- For fuse, according to EC 60127 and EN 60127, the rated current corresponds to the continuous current through the fuse without interrupting the fuse.
- For fuse, according to UL 248-14, the rated current corresponds to the current, which would interrupt the fuse-link already after a few hours. The current which, according to IEC, can flow constantly without interrupting the fuse-link, is approx. 0.75 In.
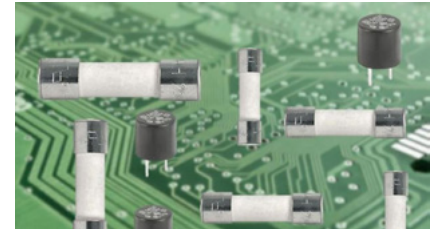


**Voltage rating (AC or DC voltage)**

The voltage rating of the fuse must be equal to, or greater than, the circuit voltage. If circuit voltage is considerably lower than fuse rated voltage, voltage drop on fuse has to be taken into account. When metal element approaches melting point, voltage drop increases.

The circuit voltage must be sufficient to allow current that is capable of interrupting the element.

# NB IoT network in your country

**Coverage of your country's NB-IoT network is constantly spreading. Do you have it in your reach? Can you use the NB-IoT technology?**
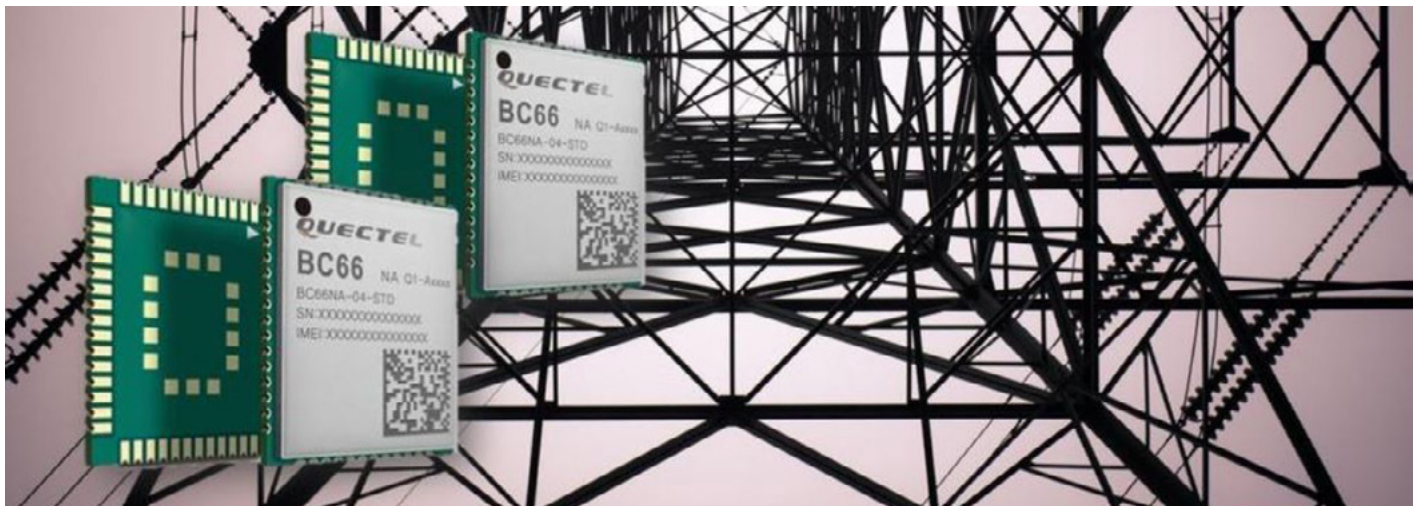


NB IoT, the Narrowbank Internet of Things, is a special narrowband network designed to deliver data reliably, safely and cheaply. We wrote about it in our article Have you tried NB-IoT?

The network belongs to the group of LP-WAN Networks (LowPowerWideAreaNetwork), which are used to transmit low volume data at low speeds. It allows devices two-way communication with bandwidth between 600bps and 250kbps.

Operators in Europe are literally competing in covering the territory of their countries with network as soon as possible. NB-IoT and LTE-M technology are a certain deposit for the future. MNOs (mobile network operators) are planning to gradually shut down 2G and 3G support and migrate to newer communications technologies such as 5G cellular mobile. 5th Generation is a new trend in mobile communications, and NB-IoT and LTE-M will be part of the 5G network standards.

### What does it mean for the use?

To get started with NB-IoT, you need a **SIM card from your operator and the module**, or NB IoT development kit. The next step is up to you and your courage to go into development.

# Why do we cooperate with SOS electronic?

## Customers

**Ionel Susanu / Antibiotice SA**
*We thank you very much for your attention and professionalism.*

**Ms. Selina / procurement manager, BlueBlueVision Ltd.**
*SOS electronic is a very reliable partner who provides prompt and professional responses; the most valuable is that they always put the customers' best interest first.*

**Mr. Marc Lajoie / purchaser, Les Escalteurs Atlas Inc.**
*We purchase special wire terminals from this distributor, OEM type of agreement and pricing. Despite the high quantity we use (5000 pcs per order), all is well packaged direct from factory.*
*My contact is Michaela Ficova, and my dealings with this company over the past year has been nothing short of excellent. I never had to return anything so I can't answer as to how they handle RMA's but I would be surprised if they would cause any problems on that end unless it's a non-returnable/non-cancellable item.*
*They are pleasant to work with and the fact that they are located in Slovakia did not cause any communication issues.*
*Thumbs up for me!*

**Mr. Udo Korsmit / manager, Korsmit Production Improvement / Korsmit Rally Electronics**
*You always are willing to help, have good and fast responses, very competitive prices and to keep your promises! Sometimes items have certain delivery times which is logical but you always keep your promise or do even better.. I rather have the real delivery times that are kept than people that promise better delivery times but in the end always deliver too late...*
*I am a happy customer and the only thing that I sometimes regret is that although you have a very big amount of products, sometimes I need things that you do not have. I want to reduce the amount of suppliers and buy more from fewer suppliers and you are for sure the one i want to buy more from...*

**Mrs. Elka Georgieva / sales manager, Comet Electronics**
*"Thank you" for the kind support, fast and adequate reaction and friendly attitude! It is always quite helpful to find the items you are looking for, with good price in an EU country with fast delivery. The good news is that we can check items which we also have in our line card, but have no stock, as well as items which are not included in our stock list, expanding the list of items we can offer to our customers. The website is well organized and easy to use, providing various information about products, stock availability, pricing. Hope in future to continue finding points of common interest!*

**Mrs. Olena Tymchenko / purchasing manager, Altway (UK) Ltd.**
*I can confirm that SOS Electronic provide high level service.*
*- Company representatives are well educated.*
*- Managers responds to inquiries in a timely manner.*
*- Company staff is knowledgeable,professional and responsible.*
*Overall, we are satisfied with the way SOS Electronic is performing each project.*

**Mr. Cesar Dias / private person**
*I'm very satisfied with SOS products that I have buying for some years now! Reasonable prices and quite fast delivery.*
*That's why I come back again and again adding some new products on every new order I place.*

## Suppliers

**Daniel Gehrig / Area Sales Manager / TRACO POWER**
*SOS electronic and Traco Power are historical partners. All it started in its origin location in Slovakia with geographical expansion step by step. Today, SOS promotes successfully TRACO POWER products in a huge European region with local offices to support its customers in commercial and technical aspects. Hopefully this valuable and beneficial partnership continues for many more years.*

**Russell Irvine / Account Manager / Europe, Hammond**
*The knowledge SOS electronic have of Hammond products, markets and customers, have been key factors in our growth together. With their enthusiasm and desire to be the best they can be for the customers, we are excited for the future and looking forward to working together to bring even greater success for both Hammond and SOS electronic.*

**Ralph Tischer / Electronic Assembly**
*In Munich, November, 12th 2018, we´ve been proud to get SOS electronic awarded as the Best Distributor 2018. The ceremony took place during the ELECTRONIC ASSEMBLY sales meeting in "Oberanger Theater", Munich.*

**Jaroslav Dvoracek / Distribution Market Manager Cz, Sk / TE Connectivity**
*SOS electronic is a reliable partner with the perfect team of devoted people who have the feeling and understanding for customers' needs. Based on our more than 14 years of cooperation, I firmly believe in the further potential and growth of this company in the region.*

**Antonio Sassi / Euroclamp**
*SOS electronic is a very active distributor that provides one of the utmost quality service. The relationship is based on clear communication and great assistance for customers and suppliers. We always experienced high responsiveness and eagerness to offer the best support.*

**Henri Parmentier / Sales VP of TechNexion**
*SOS electronic is a key distributor of embedded systems in Eastern Europe. They have a strong vision for supporting IoT device makers which syncs with our own commitment and new range of products we have developed for IoT. We are looking forward to working with them to drive the sector forward.*

**Candice Lai / ATTEND**
*We are pleased to have SOS electronic to be our distributor. As a very professional team, you did a remarkable job to promote ATTEND's business development in Europe. SOS electronic are fully understand ATTEND's target markets and customers. You are also greatly enhance our brand awareness in Europe market. We are pleased to have a partner like you. SOS has an excellent and trustworthy sales and marketing team.*

**Markku Riihonen / Product & Business Development Manager / 4D SYSTEMS**
*4D Systems has worked with SOS as a valued distribution partner in Europe since 2011. SOS is able to reach out to many customers with its local presence in many countries, particularly in Eastern Europe, and thus generate valuable client relationships that last. We are very pleased to be working with partners like SOS and look forward to close cooperation for many years to come.*
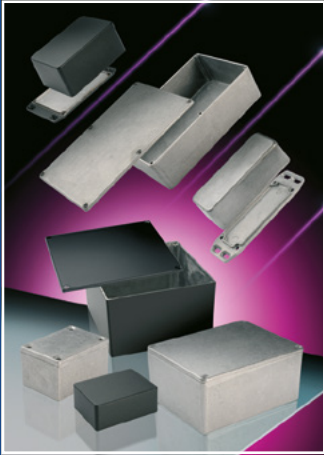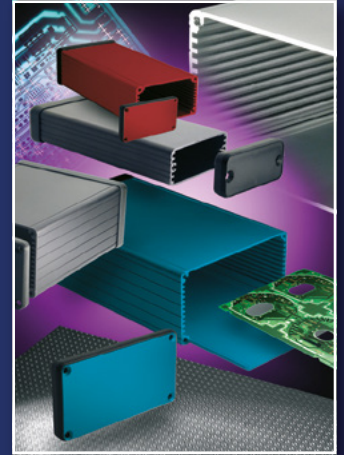
# Practical advice for quality and efficient

# *Hand Soldering*

*Can I somehow prevent tip oxidation?*
*Why complications with "lead-free"?*
*Are all soldering wires spattering in the same way?*
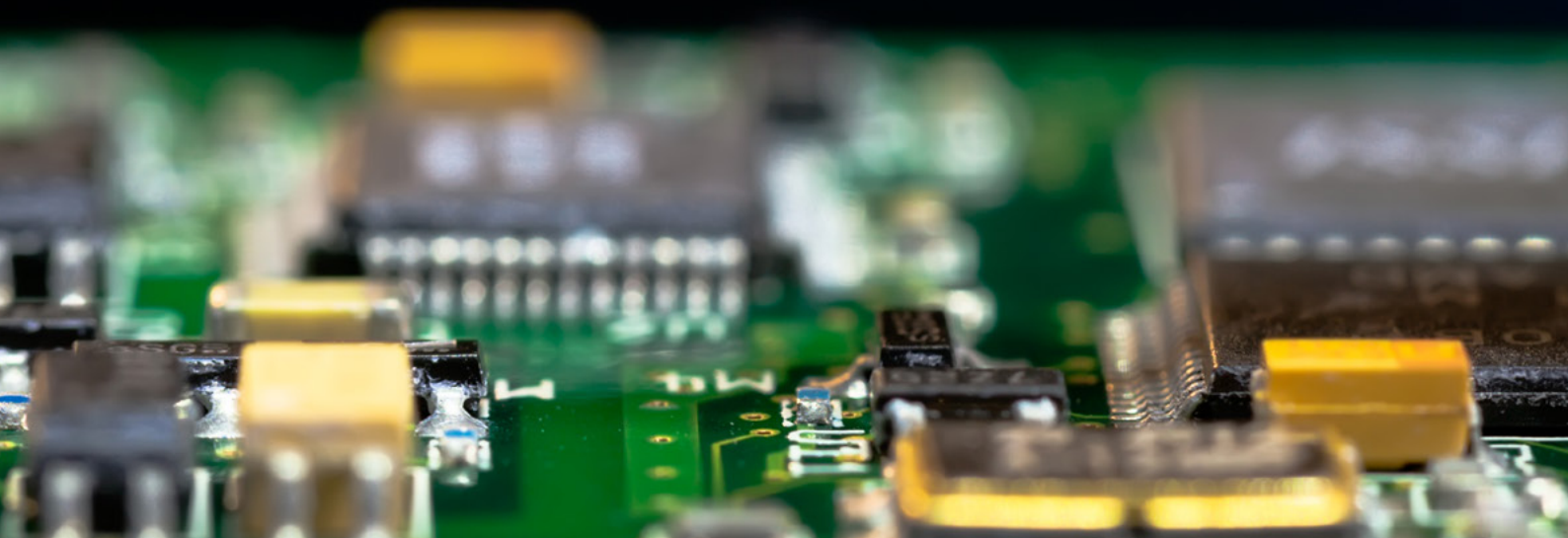
# Practical advice for quality and efficient hand soldering

**Parts damaged from high temperature or poorly overheated joints, short lifetime of tips and soldering handles, poor solder spillage... Sounds familiar? Here are the answers to frequently asked questions and difficulties regarding manual soldering.**

## What is a soldered joint?

It is an electrically conductive connection of two wires, surfaces, outlets, leads/pins etc. using molten metal. This connection, in the vast majority of cases, also has a fastening function where it mechanically fixes the component or conductor, and therefore, except applications operating at a high vibration, the components no longer require additional support.

Without deep penetration into chemistry, metallurgy, and exploration of the properties of metals, we can conclude that molten solder (colloidal tin) forms an intermetallic transition layer that contains elements of the solder itself, as well as elements contained in the soldered surface, most often copper.

Hand soldering is basically quite a simple operation - at least at first sight. It is true that nice and good connections can be made, after a short training, even by a person who has never held a soldering iron before. But you, who daily solder various-sized joints, parts and materials, know that it is often almost a masterpiece to achieve a reliable and visually appealing joint. Whether it is a prototype, a pre-production series or a run-in production, a reliable connection is crucial at all stages of the project.

## Solder

Solders are divided into so-called soft and hard. However, this classification is not about mechanical hardness or softness. It is about the melting temperature of the solder. Soft solders have a melting point below 500 °C and in electronics, we use almost exclusively soft soldering. Soft solders are practically always made up of two to three main metals and additives. In a very small proportion, they also contain various micro-alloying ingredients, the ingredients of which are usually hidden by the manufacturer, as they are part of the manufacturing know-how and often have a significant impact on the solder behavior.

Historically, the most widely used were tin/lead (SnPb) solders for many decades, most often in a ratio of 60:40 or Sn63Pb37, etc., and a small amount of additional metals such as copper and other micro-alloying ingredients.

However, lead has one major and well-known drawback - it is a toxic heavy metal, accumulating in the body, attacking the nerve system, but also reproductive organs, etc. So, after the adoption of the directive, known as RoHS, lead has been abandoned (except for several segments such as medicine, military and automotive).

Although the transition to lead-free technology has brought technological complications, overall, it has been a very good environmental step.

## Why complications with "lead-free"?

With this transition, we suddenly reached working temperatures of about 20-30 °C higher. At the same time, the mechanical and optical

properties of the joints were not always ideal at the beginning. However, the technological features of lead-free solders have considerably improved over the past decade, and both the reliability and appearance of joints are mostly at a very good level. The biggest technological minus, which will not be overcome very soon, is the higher melting temperature and hence the higher thermal stress of the components during soldering.

## How is it with melting temperature and why do tin-based solders, but without lead, have it usually higher?

Well, it's very interesting. Most interesting is the fact that sometimes alloys used for soldering have a lower melting point than the elements from which the alloy is composed.

> **Pure lead has a melting point of 328 ° C and a tin of 231.9 ° C. However, the Sn63Pb37 alloy has a melting point of only 183 °C (!)**

The common and known lead-free alloy Sn96.5Ag3Cu0.5 (so-called SAC305) has a melting point of 217-218 ° C, thus apparently missing the positive effect of lead in the alloy to reduce the melting temperature. For those looking for an explanation of this phenomenon, we recommend entering the words "eutectic" and "phase diagram of metals" in the search engine.

## Why is the melting temperature sometimes referred to as an interval rather than a single specific value?

Again rather an interesting thing. If, for example, we find the melting point of 183-190 °C in the table for the Sn60Pb40 alloy, it means that even at temperatures as low as 183 °C, the metal appears to be liquid, but there is one large BUT – there is

still a significant proportion of undissolved crystals. The whole metal dissolved only after heating above 190 °C and it is essentially the minimum temperature that the brazed joint should achieve in order for the resulting bond to have the desired quality. Metallurgy specialists, please excuse me, this is, of course, very simplified explanation, but I believe it's suffi-

cient for clarification.

Only with so-called eutectic alloy (metal ratio) is this interval so narrow that the melting range is essentially one temperature (not an interval).

## Flux or why solder fumes during soldering...

You may have sometime got in touch with (especially those born earlier) a flux-free solder wire. If you tried to solder it, the result was probably more than bad. In fact, there is almost always at least a microscopic oxidized layer on the metal surface which prevents the good spreading of the solder. Even if the joint is perfectly clean before soldering, at the temperature at which it is commonly sold, a thin oxide layer is formed almost immediately. At the same time, the solder is also being partially oxidized, producing slag which further deteriorates the bonding properties. To remove the tiny oxide layer, prevent oxidation during soldering, and ensure the best wettability, that is, the spreading of the solder, these are the main tasks of the flux, nowadays contained in almost every solder wire.

> **The main and still frequently used main constituent of flux is rosin, a substance obtained from the coniferous trees resin.**

| SOLDER WIRE FLUX | FLUX CONTENT | HALIDE CONTENT | NO-CLEAN | DIN EN 29454-1 | J-STD-004 | DIN 8517 F-SW | LEAD-CONTAINING ALLOYS | | | | | FLOWTIN SERIES [1] (lead-free alloys with micro-alloyed adders) | | | | | ECOLOY SERIES [2] (lead-free alloys without micro-alloyed adders) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S-SN60PB40 | S-SN60PB39CU1 | S-SN62PB36AG2 | S-PB92SN5AG3 | PB80SN18AG2 | FLOWTIN TSC SN95,5AG3,8CU0,7 + FLOWTIN | FLOWTIN TSC305 SN96,5AG3,0CU0,5 + FLOWTIN | FLOWTIN TSC263 SN97,1%AG2,63CU0,3 + FLOWTIN | FLOWTIN TSC0307 SN99A0,3CU0,7 + FLWTIN | FLOWTIN TC SN99CU1 + FLOWTIN | ECOLOY TS S-SN96AG4 | ECOLOY TSC S-SN95AG4CU1 | ECOLOY TSC305 S-SN96AG3CU1 | ECOLOY TSC263 SN97,1%AG2,63CU0,3 | ECOLOY TSC0307 S-SN98CU1AG | ECOLOY TC S-SN9CU1 | NSL S-3l58SN42 / BI57SN42AG1 |
| MELTING RANGE | | | | | | | 103 190°C | 183 190°C | 179°C | 296 301°C | 179 200°C | 227°C | 217 220°C | 217 224°C | 217 227°C | 227°C | 221°C | 227°C | 217 220°C | 217 214°C | 217 227°C | 227°C | 139°C |
| HS10 | 2.5% | 1,0% | • | 1.1.2 | ROM1 | 26 | • | • | • | • | | | | | | | • | • | • | • | | • | |
| Kristall 511 | 2.70% / 3.0% | 1,1% | • | 1.2.2 | REM1 | 26 | | | | | | | • | • | | • | • | • | • | • | | | • | |
| Kristall 505 | 3.0% | 0,5% | • | 1.2.2 | REM1 | 26 | • | | | | | | | | | | | | | | | | |
| KS115 | 3.0% | 1,5% | • | 1.2.2 | REM1 | 28 | | | | | | | • | • | | • | | | | | | | |
| 2630 | 2.0% / 2.2% | 1,7% | • | 1.1.2 | ROM1 | 26 | | • | | | | | | | | | | • | | | | • | |
| Kristall 400 | 2.2% | 0,0% | • | 1.2.3 | REL0 | 33 | • | | • | | | • | | • | • | • | • | • | • | | | • | |
| KS100 | 3.0% | 0,0% | • | 1.2.3 | REL0 | 33 | | | | | | • | • | | | • | | | | | | | |
| HF32 | 3.5% | 0,0% | • | 1.1.3 | ROL0 | 32 | • | • | • | | | | | | | | | • | | | | • | |
| HF32 SMD | 1.0% | 0,0% | • | 1.1.3 | ROL0 | 32 | • | | • | | | | | | | | | | | | | | |
| X39B | 1.0% | 0,0% | • | 1.2.3 | REL0 | 33 | • | | | | | | | | | | | | | | | | |
| HF34 | 1.6% | 0,0% | x | 2.2.3 | ORM0 | 34 | • | | | | | | | • | | • | | | | | | | |
| S321 | 2.0% | >5,0% | | 2.1.2 | ORH1 | 24 | • | | | | | | | | | | | | | | | • | |
| ALU | 2.2% | >5,0% | | 2.1.2 | ORH1 | | | | | | • | | | | | | | | | | | | |
| ARAX | 2.7% | >5,0% | | 2.1.2 | ORH1 | 25 | • | | | | | | | | | | | | | • | | | |
| Solid | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | • | | | | | • | • | | • | • | • | • | • | | • | • | • |

Thus, colophony is a natural material, with a relatively pleasant (for some people, even irresistible) fragrance. Colophony solder residues are not corrosive and may remain on a PCB. However, during soldering, the colophony is fairly smoke-rich and its residues are only harmless in a relatively dry environment. In a humid environment, they are subject to hydrolysis and can be slightly corrosive. Manufacturers have gradually come up with many other modified colophony-based fluxes but also based on different resins or fully synthetic compounds. Colophony-based fluxes are still popular and have their place, but many synthetic fluxes that overcome the properties of colophony-based types are also available on the market.

We always find the exact flux specification in the technical sheet of flux or solder wire that the flux contains and is practically always described either according to DIN EN 29454-1 (eg type 1. 1. 2), J-STD-004 (eg ROM1) or according to standard DIN 8517 (eg F-SW26). In this example, type 1. 1. 2. roughly corresponds to type ROM1 or also F-SW26.

## Where do we come across the fluxes?

Fluxes are typically contained in the solder wire in the range of about 1-3.5%. Of course, they are also available separately in liquid form and, to a lesser extent, in a gel-like or pasty form suitable especially for repairs.

To a large extent, liquid fluxes are mainly used in wave soldering. In the usual manual adding of a few THT components on board already equipped with SMT components, the flux is usually not required as it is already contained in the solder wire.

It is worth mentioning that many fluxes also contain halides, especially those designed to solder not completely clean surfaces and to solder thicker joints (e.g. motor terminals, alternators, etc.). Halides have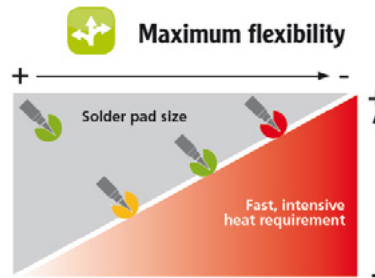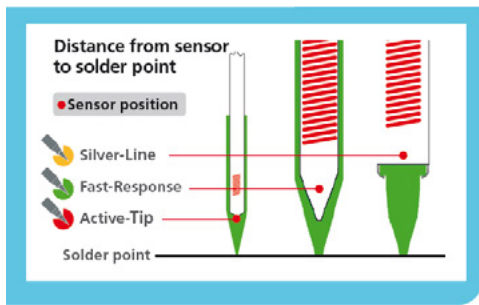 considerable "cleansing" and wetting properties, but at higher concentrations they can be corrosive, hence the halide content is always easily identifiable from the classification of the flux.

Fluxes normally have different market names, e.g. HS10, KRISTALL 400, TELECORE HF 850 etc. In terms of both effect and process properties, there may be considerable differences between fluxes of the same classification but from different manufacturers.

You can read more about the fluxes and their labelling on our website in our article "Find the Right solder for you".

## How is the flux information reflected in the solder name?

After reading these lines, it is clear that the full name of the solder wire always consists of the (commercial) flux name and the alloy composition, possibly the percentage of flux, such as KRISTALL 400 Sn96.5Ag3Cu0.5, 2.2%.

Distance from sensor to solder point
● Sensor position
Silver-Line
Fast-Response
Active-Tip
Solder point



**Maximum flexibility**

Solder pad size

Fast, intensive heat requirement

## Are all soldering wires spattering in the same way?

As we know, the hand-soldered PCB is usually contaminated with flux residues contained in the solder wire, as many fluxes are spattering several centimeters around the joint.

### There are already various types with low spatter fluxes on the market.

"Low spatter", low smoke, as well as a small amount of translucent and non-tacky residues. Among widely known belong for example Kristall 400, Kristall 511, Trilence, Telecore HF 850 and others.

## So we have a suitable solder, let's solder...

Having a suitable solder and clean (non-oxidized) surfaces (component outlets) are essential prerequisites for good connections. Understandably, there is still a technological "minimum" that we should follow to get the perfect result.

## Soldering station

In principle, it is "just" enough to be able to rely on the tip to have the temperature that we have set with as little deviation as possible. At the same time, the heat transfer from the heater to the tip should be as good as possible. In practice, these seemingly simple requirements are only satisfied by the quality solders from reputable manufacturers. Especially - the best heat transfer to the tip and then to the soldered joint is really quite a challenge.
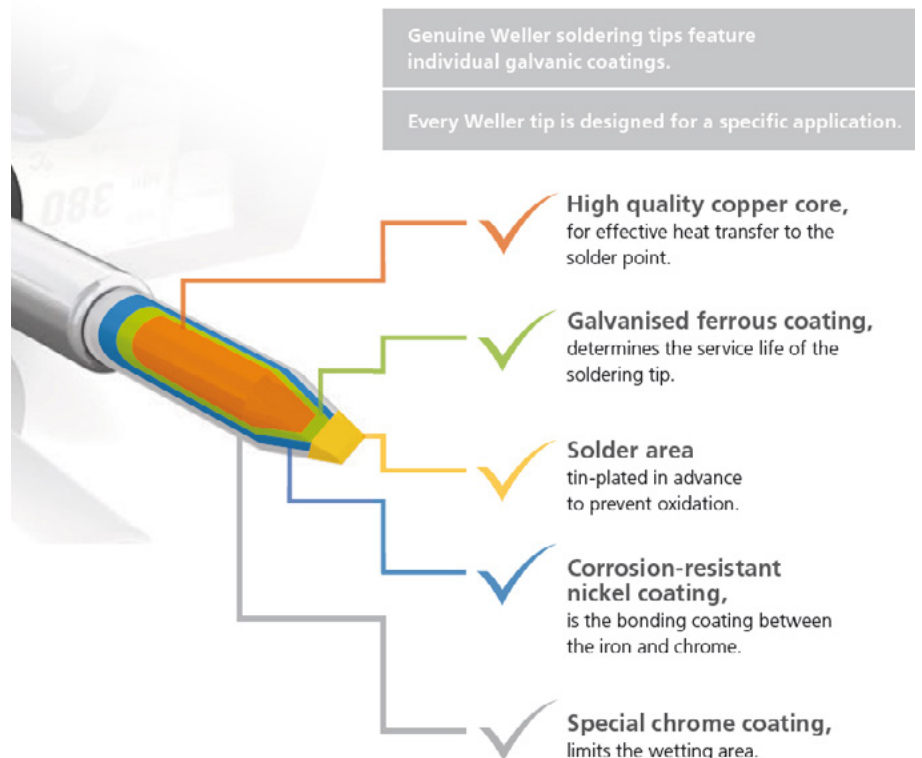
## Why is it often so difficult to overheat a connection, even though the 380'C is on the display, which is about 150'C more than the lead-free solder temperature?

You may know the answer - because of low power, or more often - because of the insufficient heat transfer from the heating element to the tip and then the joint. The copper area around the joint, perforated holes, PCB material, outlets are all the mass that the tip must heat over the solder melting temperature and, moreover, they are like miniature coolers, with fairly good heat dissipation during soldering.

The heat transfer from the heater to the tip is the feature, which we can't influence, but a suitable choice of soldering station and handles may help.

Every serious manufacturer, such as in our company well-proven Weller, offers a comparison of its models and the selection table according to the size of joints.

But what we can influence is choosing the right tip.

### The tip should be approximately as large as the soldered joint.

In other words, it should be as large as we are able to use for a given joint. The better the heat transfer from the heater to the tip, the lower the temperature can be used. And this is a great advantage as we'll show below...

From a physical point of view, the best heat conducting properties are featured at the short and thick tip. Of course, the pike itself can be relatively thin, so it can be easily used e.g. to solder 0603 or 0402 SMT parts.

This is perhaps the most important rule when choosing a soldering tip. Practice shows that usually, the best choice is a short conical tip with a relatively thin flat chisel-shaped pike. An example of such a tip is, for example, type LT A.



Genuine Weller soldering tips feature individual galvanic coatings.

Every Weller tip is designed for a specific application.

**High quality copper core,** for effective heat transfer to the solder point.

**Galvanised ferrous coating,** determines the service life of the soldering tip.

**Solder area** tin-plated in advance to prevent oxidation.

**Corrosion-resistant nickel coating,** is the bonding coating between the iron and chrome.

**Special chrome coating,** limits the wetting area.

## Why is it preferable not to bake the tip too much?

As you know, even the same sized joints have a significantly different heat requirement. Usually, the worst are ground connections with a large copper surface around, with a plated through-hole connections (so-called vias), especially in multilayer boards. Thin and long tips usually do not help in such cases, as they cannot bring enough heat for demanding joints. Therefore, the operator often "helps"



himself by setting a high temperature. Temperatures above 380-400 °C are considered a high temperature for long-term soldering. At these temperatures, the tip and solder on the tip oxidize very quickly, needing to be cleaned relatively often, and the life of the tip, as well as the heater in the handle, is significantly shortened.

At the same time, if the operator wants to "make life easier and to increase productivity", and he solders larger THT joints as well as miniature SMD components (with the same tip) without changing the tip temperature, small connections with little heat demand are exposed to unnecessarily high-temperature shock.

In contrast, the thicker and shorter tip, along with the good heat transfer technology from the heater to the tip, allow the temperature of 330-360 °C (sometimes lower) to be used for the same joints, while the lifetime of the tips and heater is significantly higher. The tip does not oxidize so quickly, so we do not need to clean it so often and the components experience smaller temperature shock. And, as a bonus, we also have a lower smoke and flux spread from the solder.

## Why do we need to clean the soldering tips?

If we have a new tip and we touch the solder wire with it, the solder will usually spread beautifully throughout the tip. After some time of soldering, a portion of the point that does not touch the joints will usually be covered with a layer of oxides and flux residues, and the area on which the "solder" is held is gradually smaller and smaller. In an extreme case when the entire tip is already oxidized, we cannot keep the solder on that tip. Although it is able to melt the solder, the solder jumps away from it as if it was impregnated...

So we have to cleanse the tip. at first,



only gently, preferably in a dry way in a brass wool, which is usually part of the solder handle holders. Alternatively, only in a very slightly moistened sponge.

If this is not enough, the big help is the so-called tip regenerator, e.g. Weller tip activator, which cleans and tins the tip in one step.

However, even these tip regenerators operate only to a certain degree of pollution. If the tip is very dirty, only gentle and careful mechanical cleaning will help (there are also special fine brushes and abrasive stones, e.g. Weller WDC 2 kit….).



The core usually consists of copper and a layer of iron and then nickel. If the surface layer is damaged, or it even has a miniature recess in the tip, nothing will help and it needs to be replaced. It is worth noting here that the thickness of the nickel layer and the tip construction are quite different at various manufacturers and in the vast majority of cases, the original manufacturer's tips have the longest lifetime.

## Can I somehow prevent tip oxidation?

It is not possible to completely prevent it, but it can be significantly reduced. A simple and very effective method is to keep a little solder on the tip. This means that at any break in soldering when putting the handle into the rack, but not turning off the solder or switching to standby mode. This solder will deteriorate within a few minutes but will perform its service as tip protection. Thus, before soldering, it is sufficient to wipe

**It is good to apply a piece of solder to the tip.**

the tip in a brass wave and we have a clean tip with good wettability.

Also, having a clean tip is a big plus with regard to the above-mentioned heat transfer, since a dirty tip that holds the solder on only a small surface at the tip has a significantly smaller contact surface for heat transfer from the tip to the joint.

## How long should I heat the circuit board?

A beginner and an amateur usually doesn't care about time (length) of soldering and they have no problem to solder one joint for even up to 5-10 seconds. Of course, it's already quite a long time. At the other end, we usually find a pay-per-action operator, alias paid for the number of completed boards in a given time. These professionals often tend to shorten the time to a minimum, even below 1 second, usually at the cost of very high working temperatures, shortened tip and solder life, and moreover making a high-temperature shock to the components. As a result, however, such a joint is also of lower quality in terms of technology. True professionals already have their own well-proven process and among you - readers, you will surely find a technologist from an EMS company, who has this issue managed to the last detail. For those less experienced, we can say that the recommended length of time for the tip to touch the joint is about 1.5-3 seconds.

If it is necessary to heat the connection considerably longer, there is usually a low set temperature, or more likely an inappropriate tip/power for the given joint.

If we look at a typical temperature/time graph for reflow soldering, we will find that SMT components can withstand quite a lot. And especially if we work mainly with SMT components, we can say that they can be more stressed by the temperature shock from the too hot tip (extremely steep temperature rise of a component in a short time) than a little longer soldering at a reasonable temperature.

## What if I can't get enough heat even from a short and thick tip?

Obviously, in that case, the heat supplied from the solder handle/station is not sufficient. In other words, I need a more powerful station/handle.

In practice, for example, there is quite a big difference between typical 80W tools (such as Weller WSP80) and 120 / 150W tools such as e.g. WXP120.

However, there is another known helpful device – the (bottom) heating plate. Thanks to the heating plate, we can heat the whole PCB to a certain temperature, which is still fully safe for other components on a PCB and consequently considerably reduce the need for the soldering tool power. If we only heat the board to 100-120'C, we find that suddenly we can also solder earth-joints with a large area of copper around without problems. In addition, the heating plate reduces the thermal shock of components, making it a very convenient accessory for manual soldering.



## Can we do anything more about the lifetime of tips and soldering station?

Yes. If the soldering iron allows it, we recommend using any power saving mode (temperature reduction mode) while not soldering. When we, for example, reduce tip temperature during a break to 150 °C, we, in fact, eliminate the formation of oxides during solder inactivity, while maintaining a sufficiently high temperature that the rise to about 350°C will be considerably faster than if we started from room temperature.

Some soldering irons use power monitoring to go into power-saving mode, some have a microswitch stand (or such a stand can be purchased, for example, WDH10T), and have a state-of-the-art motion sensor in the handle (for example, the entire WX handle series and Weller WTP90).

**In principle, if we meet these basic assumptions, we are well on track to reach reliable joints:**

- choose a suitable solder with good metallic composition as well as content and type of flux
- solder only clean and non-oxidized surfaces/outlets
- if the soldered surface is not ideal, it is possible to use more aggressive flux, but it will most likely be necessary to rinse the residues from the PCB
- use quality soldering station with reliable temperature measurement and good heat transfer from the heater to the tip
- use the largest and shortest tip usable for a given type of joint
- in many cases, the heater plate (bottom heater) is almost a miracle aid for soldering problematic heat-demanding joints
- original manufacturer's tips are in the vast majority of cases better and more economical as a result of their longer life
- do not use excessively high soldering temperatures to compensate not ideal tip selection
- keep the soldering tip clean and always tinned

*We believe that our insights will help you solder even better than before. If you have other questions that we have not mentioned in the article, we will be happy to advise you at* **info@soselectronic.com** *or we can train you directly as in the case of our customer.*



# We will advise and train you

" *By training, we have gained a real overview of how individual manual tinning activities are linked. Demonstrations - causing too high temperature, too low solder temperature during tinning was a good example for our employees, and despite our long experience in tinning, we have been given a different perspective on tinning and therefore we hope to improve our performance process.*

*Qess s.r.o.*

" *The operators were fully satisfied with the form and content of the training. Thanks to the training we managed to guide all the employees through soldering, operation and maintenance of soldering stations. In our reports, we have seen the decrease of scrap due to cold junction and short circuit. We have a lot of new staff since your visit and we are considering taking up this training so that we have the whole team back on one standard.*

*GE Energy Slovakia s.r.o.*