TOPIC

The most important criteria that will make it easier for you to choose the right LED for your device

Value Redefined

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TSR 1E: 1 A
- Non-isolated (POL)
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TEA & TBA: 1 – 2 W
- Isolated
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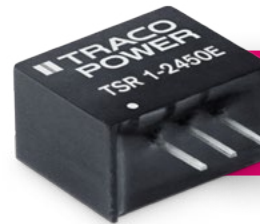
TEC: 2 – 3 W
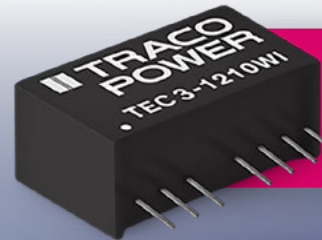- Isolated
- Regulated
- Wide Input

Corona
is a challenge for us

Corona crisis – words that are currently used so much. A topic that is discussed daily has not been bypassed by the electrical engineering industry either.

We are being informed about extending delivery times, major trade fairs are being cancelled, production is slowing down...

But is it really so? It all depends on the point of view. Couldn't the current crisis be a new opportunity at the same time?

I think the situation nowadays will clean up the market significantly. Only those who bring new ideas, move forward and add some value to their services will survive.

For us, distributors, these times bring great challenges. It is undeniable that distribution companies play an important role in the electrical engineering industry. In the current situation, our main priority is to provide assurance in access to components for many manufacturing companies.

SOS electronic also strives to be a support for you in this turbulent time. We proactively communicate with our suppliers to be able to respond in time to possible outages in the market of electronic components. Our goal is to look ahead, pre-stock, and thus protect our customers and their production. Many companies are currently afraid to take risks for obvious reasons. Our main task is to be their support and to be here for them once they start with the production. We have above-standard relationships with several logistics companies, such as UPS, GLS, FedEx, and we are constantly working to mitigate the impact of delayed shipments.

We are constantly innovating our website and e-shop, automating the ordering process, as well as the process of electronic communication with suppliers on one hand and customers on the other one through the API platform.

Our highest priority is to follow current trends and be ready for them. The development of digitization, robotics and the application of Industry 4.0 ideas (the fourth industrial revolution) will be the key in the support of successful companies. There is already an undeniable trend of elec-tromobility, the application of artificial intelligence in almost all areas of our daily lives, or the increasingly „hot" topic of 5G networks.

Erika Kačírová
sales manager

We, SOS electronic, are also a part of it. We cooperate with the world's leading manufacturer of 5G modules – QUECTEL, and we are proud to be among the first in Europe to bring this brand to the market. Our portfolio is also enriched by computer manufacturers supporting artificial intelligence such as AAEON, TECHNEXION and LEXSYSTEM... We are an official distributor of SENSIRION precision sensors, which our customers have successfully applied to their applications of intelligent buildings, waste monitoring and air quality.

Yes. This crisis is a challenge but also an opportunity for us. It is a challenge on how to maintain good relations with you, despite the distances and prohibitions. And it is also an opportunity to support you. That is why we are preparing a virtual online meeting for you, a conference where many interesting and current topics and even more interesting guests will be waiting for you.

We, at SOS, bet on future. Will you join us?

I believe so...

Content 2 / 2020

How are we coping with the coronavirus

Like the most people and companies at the end of February we quietly and with concern watched what was going on. And we were waiting for how it will affect our lives. Compared to today, the situation was more tense because we had no idea what is going to happen. The online world kept churning out a non-stop flow of catastrophic scenarios.

But apart from extreme health concerns, we have tried to keep the company running and we are very happy that we have succeeded.

You, our customers, were our mirror. In March 2020, we closed our offices overnight and left most of our colleagues work from home. We connected our phones, borrowed larger monitors from the company and worked „from the living room". After a few weeks, we regularly answered your question: „When are you going to work from home office?" and replied „We're already working from home!" That reassured us that we were doing well.

SOS electronic underwent the digitization of its activities last year. Unxpected spring situation tested our quick response and flexibility. We managed to move 80% of our colleagues to work from home within just 1 day. We have not stopped digitizing the company even during the summer, we are not stopping our development. We are constantly working on projects in the field of digitization and artificial intelligence.

We could not move the warehouse though. The goods were regularly delivered and shipped and our colleagues prepared it for you on a daily basis.

We were pleased with the close cooperation with carrier companies. Their regular and up-to-date communication and helpfulness have paid off and our relations have been strengthened even more. We have maintained a high level of quality of our services and created various operational measures, which we continue with so far.

Face masks, gloves, an ozone generator, regular disinfection and higher hygiene are our daily standard.

Close cooperation with suppliers deepened even more in early spring thanks to regular shared information on deliveries and stocks. We monitored the situation with manufacturers on a daily basis to inform you in the event of outages.

Unfortunately, we had to give up business meetings. This was probably the most painful part of the whole situation. Personal meetings are irreplaceable. However, we discovered the charm of webinars, online trainings and we were left with regular phone call at least.

The visits of the first customers were then so full of joy, even though with face masks. For a short time, we also had to give up various events that we have organized in recent years. Work-shops, Road show, exhibitions, meetings with customers during sport events, but also our regular blood donation came across a barrier due to anti-virus measures. We still visit our customers while keeping all current government hygiene regulations.

By the time the magazine goes to press, countries are rein-troducing tighter measures. In this difficult times, we believe that neither of your companies, nor foreign logistics, nor industrial production will be suspended, and we will all successfully and in good health handle these challenges that life brings.

Our quality has been confirmed again

We know that your expectations are high and your satisfaction with the quality of our services is our priority. Therefore, we're constantly working to improve our workflows. Passing through regular control audits only proves the high level of our quality management system every year.

This year we successfully passed the Recertification Audit, which was performed by the renowned company TÜV SÜD Slovakia s.r.o. The result of the audit is a new certificate STN EN ISO 9001:2016 for the area of „Distribution, mediation and advisory work of electronic components and devices."

The ISO 9001:2015 standard addresses the quality management system through a process approach. Applying this approach is a basic necessity in all companies that have an established and subsequently certified quality management system. This system proves that our company is able to effectively meet the requirements of you, our clients.

We enjoyed

Late summer, grill in the atrium and amazing hamburgers. At SOS electronic, we had an expert in preparing burgers (Mr. Bíly), and we have to say, he prepared them really thoroughly and tasty. Thank you!

Sports for health

Do you run? We too! Although our tempo and rhythm are more certain in electrical engineering, we will not reject the challenge. When the pandemic finally allows us to do so, we will finally run with this nice gentleman, the champion of Slovakia in running, Tibor Sahajda. Even if only for a few minutes, it doesn't matter, because we are all good at something else.

Kingbright
Kingbright Electronic Europe GmbH

The most important criteria
that will make it easier for you to choose
the right LED
for your device

SMT, THT, super thin, high brightness, reverse, transparent, milky and many other LEDs. Here are some basic tricks to help you find your way around the wide range of LEDs easily and quickly.

We have summarized the basic criteria for selecting LEDs, which is good to know, whether you are facing the selection of a suitable LED or you are only interested in them in general, for the sake of interest.

Although the LED is a simple component at first sight, it is still good to consider several parameters to achieve long-term reliability in your application. In particular, the design of industrial equipment requires careful consideration of all aspects.

In this case, the different length spacers for the LEDs can significantly help with the assembly and are able to ensure a defined constant position of the LEDs.

2 Color or exact wavelength

The choice of color is typically a subjective matter. Most people probably associate the green color of the indicator with the OK status and the red one with the error status. In general, however, choice of colors is a subjective matter.

1 SMD or THT?

In general, if the SMT version is acceptable in terms of LED visibility and its function in the device, then it is certainly easier and more convenient to use this type of LEDs, both because of a simple automated mounting and reflow soldering.
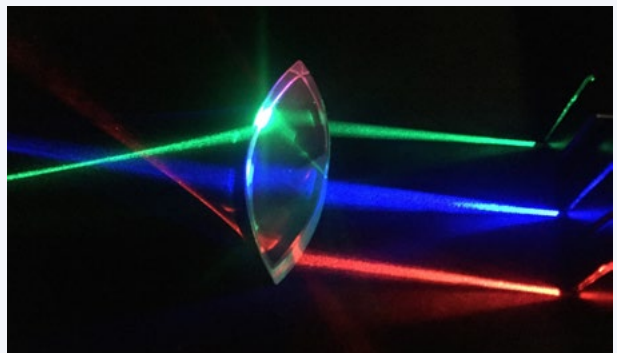
On the other hand, classic LEDs with wire leads (THT) still have their stable place, as it is a relatively simple and inexpensive solution to place a signal element, e.g. on the front panel, without the need for additional light guides, etc.

The wavelength of the emitted light is the best indicator of the true color of the LED.

Under the parameter „Wavelength" we usually find 2 data:

- **Lambda peak** – i.e. the exact value at which the LED has maximum brightness

- **Lambda dominant** – the real value of the wavelength (color) how the LED appears, as the course of brightness depending on the Lambda is not symmetrical on both sides of the top value.

Beware of color labeling by different manufacturers (red vs. orange).

Under the basic names of colors such as green, red, yellow, orange, etc. we find a wide range of wavelengths. **When making a specific selection, it is necessary to orient oneself according to the parameter „lambda" rather than only according to the general classification into the color category.**

In addition, manufacturers do not have uniform boundaries from which to indicate a given color, and so it easily happens that e.g. LEDs with a wavelength of about 600 nm are indicated by some producers as orange and others as red. Similarly, green was often green with a slight yellow tinge. Only later so-called „True green" types with a shorter wavelength appeared on the market, the color of which is „purer" green or, from a photographic point of view, it is cooler green (closer to the blue end of the spectrum).

3 Luminosity

This is very important information about the „brightness" of a given LED at a certain current. Usually the brightness in mcd (millicandela) or the luminous flux in lm (lumens) is given. The brightness in the mcd tells more about how bright the LED will appear when viewed perpendicular to the LED. The luminous flux speaks much more precisely about the total light output that the LED emits.

If we compare two LEDs with the same chip but with different optics, then **the LED with a narrower beam angle will have a significantly higher brightness**, as the luminous flux in the main axis of radiation increases significantly. In practice, however, this is not always an advantage, as such LEDs appear significantly darker when viewed from angles.

4 Beam angle

As mentioned above, **this parameter has a significant effect on the direction of luminous flux**. SMT LEDs without optics usually have a very wide radiation pattern, sometimes approaching almost to a theoretical maximum of 180°.

On the other hand, THT LEDs with a classic lens on top, as well as SMT LEDs with a dome, have a significantly narrower characteristic.
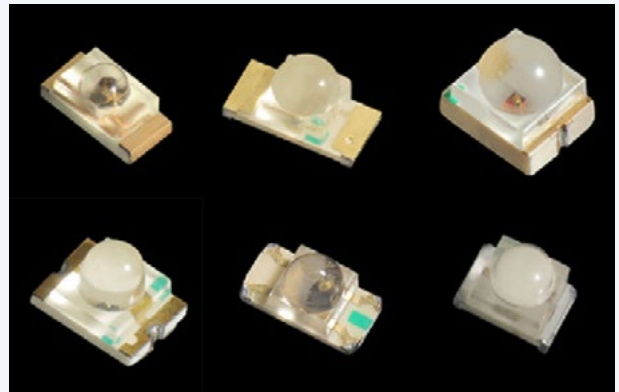
5 Maximum and minimum current

The maximum data can be easily found in the technical datasheet. The minimum current is usually not defined, because the small current does not „harm" LEDs. For example, a classic 3 mm leaded LED with Imax 20 - 30 mA, can also be operated at 1 mA or less. We therefore take advantage of the fact that the luminous flux of the LEDs is almost linearly dependent on the current.

Reducing the current saves the overall consumption of the device and is often very necessary, as modern LEDs usually have a significantly higher brightness at 10-20 mA than is necessary for a particular application. At the same time, this reduces the thermal stress on the LED and prolongs its service life. Renowned manufacturers usually also state in the technical sheets a graph of the dependence of the brightness of specific LEDs on the current.

Luminous Intensity vs. Forward Current
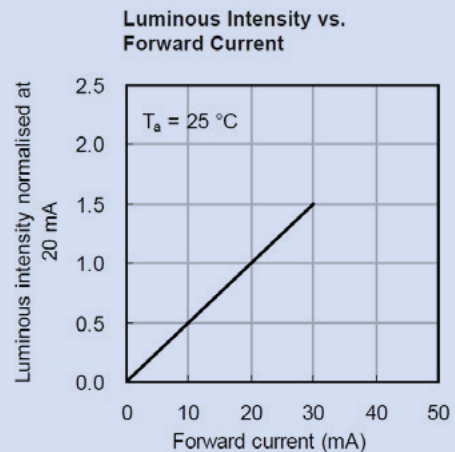
6 Voltage in forward direction - VF

This parameter is defined by the production technology. Classic LEDs, depending on the color, have VF 1.2-1.8V. **Newer and more efficient types usually have this voltage higher. The highest VF usually have blue and white LEDs (approx. 2.9-3.5V).**

You will probably be interested in the value of VF even if you are limited by voltage, e.g. when powering the device only at 3V.
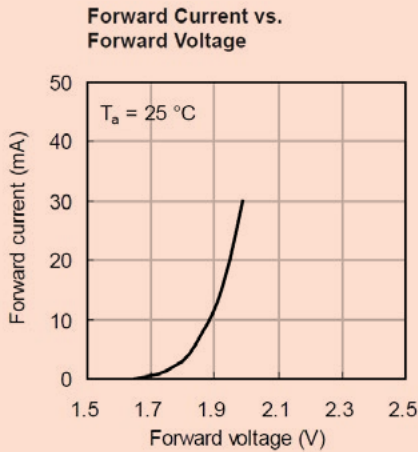
7 SMT package size marking

If you opt for the SMT version, then you often find the same LED (same chip) mounted in a different size housing - for example 1206, 0805 but also 0402 and so on.

From a practical point of view, it is more advantageous to use relatively large housings such as e.g. 1206 or 0805, as handling them is easier and also automatic or manual mounting in prototypes is problem-free.

When we mention marking the sizes of SMT packages, **we distinguish between metric and so-called imperial size.** Commonly, „imperial" marking is much more widespread, e.g. 0805 case = 2012 (metric) = 2.0x1.25mm and similar 0402 (imperial) = 1005 (metric) = 1.0x0.5mm and so on.

Kingbright uses metric marking when marking its LEDs, therefore e.g. series KP 1608 = „0603" (imperial) and KPG-0603 = „0201" (imperial).

8 Super thin and super small...

Nowadays, they are available e.g. also LEDs with a size of 0.2 * 0.1 mm and a height of only 0.1 mm. For ordinary projects, however, this may not be the best solution, as this LED is **really extremely small and looks subjectively very „spot-sized".** Of course, for space-critical applications, it can be a great benefit.
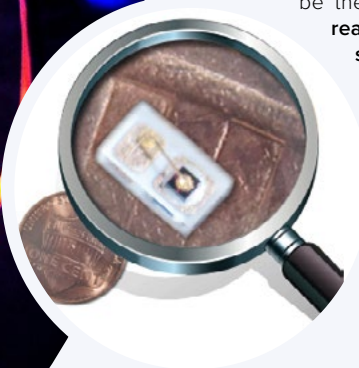
9 Clear or diffuse case?

When choosing a THT LED, we usually have a completely clear housing to choose from, the so-called Water Clear, then slightly diffused (milky, diffused), or even colored or colored diffused, when the case itself is in the color of the LED.

An advantage of the package is that we do not see the LED chip itself and the entire surface of the LED appears to be lit. At the same time, such an LED has a slightly wider beam angle, with the same housing shape. **Also with two-color or RGB LEDs, the diffusion housing of THT LEDs is clearly a better choice, as the color mixes much better in them.**

On the other hand, an LED with a transparent housing is seemingly brighter. For example, **for applications placed in direct sunlight, a clear case may be a better choice**, as the diffuse case appears white when illuminated by the sun or another strong light source, which significantly reduces the contrast between the ON and OFF LEDs.

10 Light guides

Various light guides offer an elegant way **to get light from the SMT LED on the front panel of the device**. The great advantage of light guides is that they are available in different sizes (i.e. what we see on the front panel of the device). At the same time, the big fields („clusters") of light guides are available, e.g. 1x12 or 3x10 etc., so with the help of several small SMT LEDs we can create a custom indicator that would be practically unfeasible from THT LED due to spatial reasons.

There is a huge number of light guides on the market, we will be happy to help you with the selection and provide any light guide directly from leading manufacturers.

11 Specialties - reverse mounting, rectangular LED

In addition to standard SMT packages, we can also find a seemingly standard SMT LED, but in reality it is a „reverse" LED. It is designed for soldering to the back of the PCB and the light passes through a cutout on the board towards the front of the PCB.

One of the advantages of the reverse LED is that its body is largely embedded in the PCB with a cutout and thus does not protrude in any way to the other side of the PCB. For example it is an ideal solution for extra thin devices, where we only place the components on one side of the PCB. We wrote about it more detail in the article... *Do you know LEDs with zero height?*

The **rectangular LED** shines along the PCB and is therefore ideal for applications where we need to get the light „sideways".
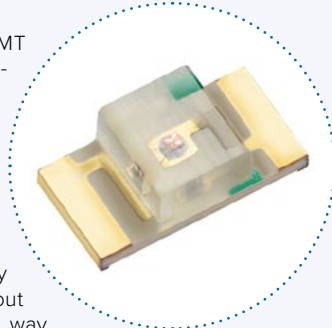
12 LED handling and installation

Although the LED is a relatively simple discrete component, we also recommend following the basic rules for mounting, PCB design as well as the handling of the LED itself.

The basic rule is, for example, not to bend the THT LED leads close to the housing, or to deform them in any way to avoid mechanical strain close to the enclosures, because it can damage the LED.

Another rule is that LEDs are usually ESD sensitive components, so we should follow all the principles for an anti-static workplace.

With SMT LEDs, the shape of the solder pads is very important to maintain a stable position of the LED during reflow soldering. The size of the pads is also important, for example, for cooling off more powerful LEDs.

All important rules can be found clearly and in one place in the document directly from the manufacturer - Kingbright technical notes.
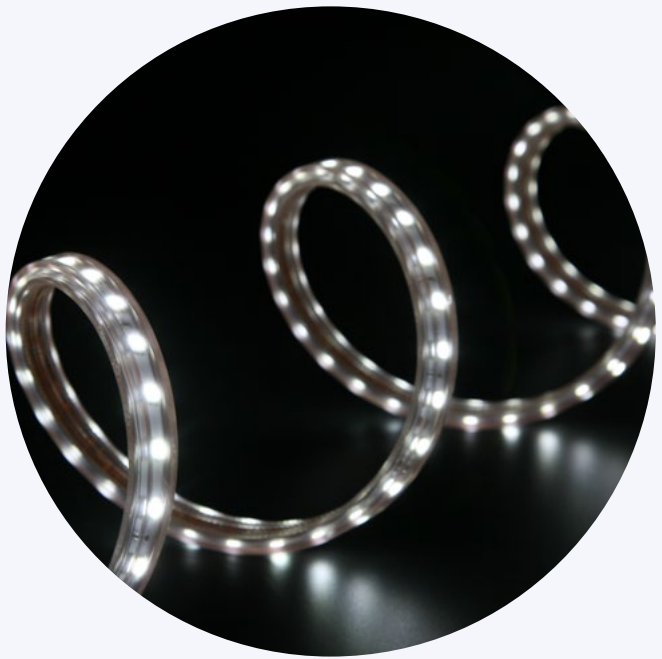
13 LED life

The service life aka luminosity depending on the operating time is usually stated in tens of thousands of hours. This value indicates the time after which the brightness of a given LED drops to 50% of the original value, under certain defined conditions.

In general, however, the **LED will continue to function also after this time, only its brightness will be significantly lower**.

Conclusion

We have summarized the most important criteria to help you find your way around the wide range of LEDs on the market. In practice, we will encounter many other criteria, depending on specific applications, but we will write about it in the next article.

In our assortment you will find a wide range of standard, flashing, high-power, but also ultraviolet and infrared LEDs. In addition also resistor LEDs, LED strips and light bulbs and a wide range of accessories such as sockets, light guides and other complementary products to LEDs from various manufacturers.

Choose from our stock range or send us your request.

If you need further information on LEDs, we will be happy to advise you at *sales@soselectronic.com*.
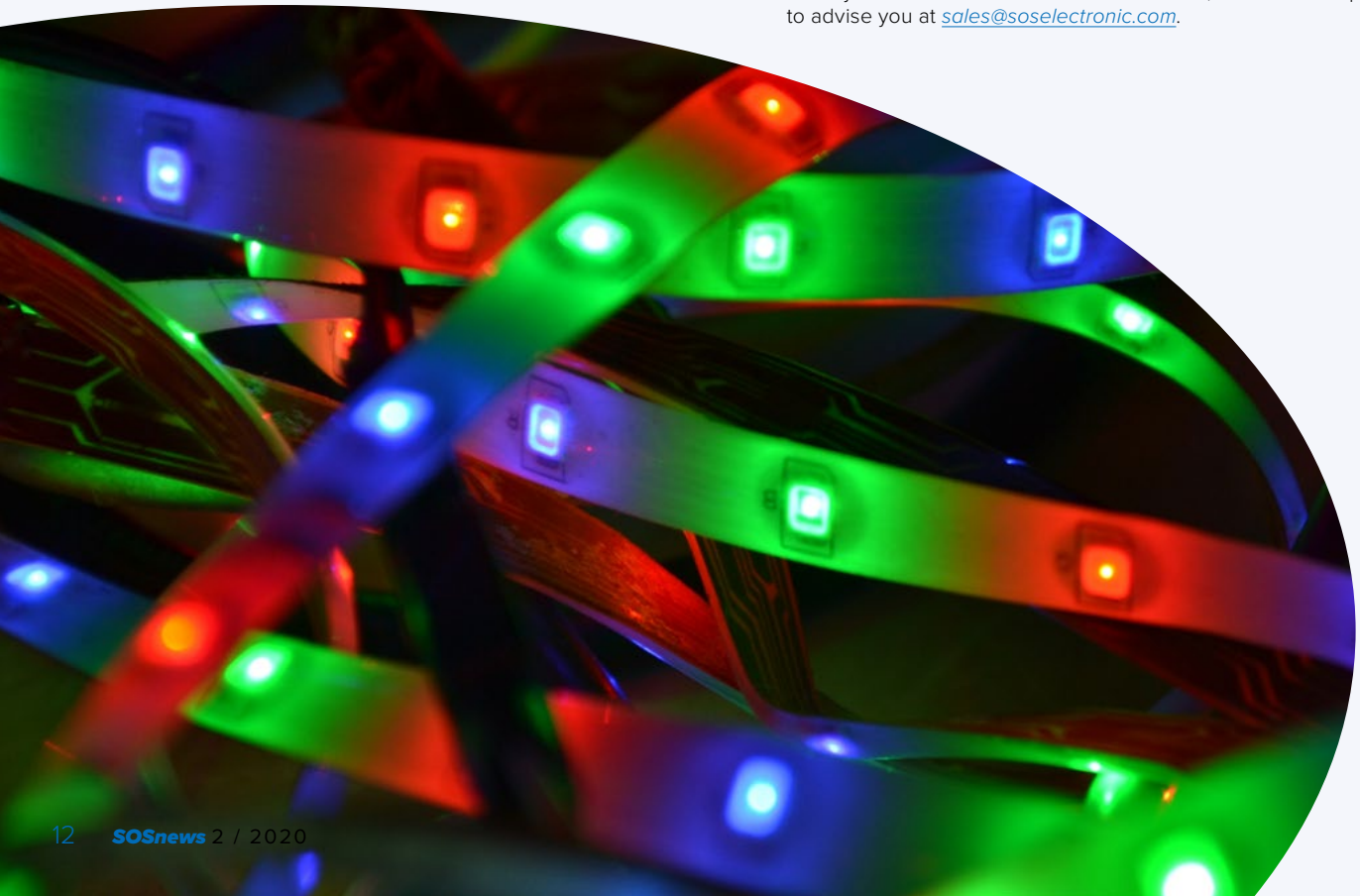
We Measure the Thermal Conductivity of Ice in Antarctica

Applied Precision
Measurement and Test Solution

You certainly have a device in your company that needs to be calibrated regularly. Do you have it under control? Slovak company Applied Precision is one of three world's leading manufacturers in the field of precise measurement of electrical quantities and calibration of measuring devices for measuring electricity. We talked with CEO Ladislav Grňo, Sales Director Miroslav Košík and Sales Manager Ján Jakabík about the current situation on markets, what awaits them in the future and how they see the development of new devices.

Although SOS electronic has been cooperating with you since 2002, how would you simply introduce your company Applied Precision to us?

Jakabík: My friends sometimes ask me where and what exactly I do. I usually answer that we produce devices and technologies for very precise measurement of electrical quantities - mainly for calibration and verification of electricity meters. We also calibrate various devices used to measure electrical energy.

When and why did you come up with the idea to establish a company?

Grňo: I worked at the Czechoslovak Metrology Institute for a long time, where I worked as a Director of Electrical Measurements. I had a lot of thoughts and ideas. And then, after easing of conditions and the takeover, way more opportunities for self-realization appeared. And it's a pity it didn't happen to me sooner (laughs). At the beginning, we were just three friends. We built up the company step by step from scratch. In those days, the old calibration stations were quite „antediluvian".

Measuring was very laborious, we used a stopwatch, etc. And so, we came up with a design of a system that included electronics, enabled automation, was controlled by computers, and was user-friendly. We have brought great technical progress to the field. At the same time, we offered decent quality at a good price, so we got a good foothold in the market.

> **We have brought great technical progress to the field.**

You say you have brought sophisticated solutions to the field. How did customers accept it? Are they demanding?

Grňo: Of course. In fact, all of them are. That's probably also because we work with accurate measuring devices and accurate measurement of electrical quantities.

Who is your typical customer?

Grňo: Calibration laboratories and electricity meters manufacturers, but we

also cooperate with metrology institutes that require the highest measurement accuracy. Due to the global presence, customers are sometimes unpredictable, they have different needs and requests. Mostly we manage to incorporate their atypical needs. We try to incorporate customer suggestions into new products and thus create universal devices.

Does that mean you create your products from the very first idea to the final product?

Grňo: Correct. These are all our designs, from devices to entire systems. We are thus creators of the software, as well as hardware.

In which countries do you operate?

Grňo: In the beginning, it was only Slovakia and Czech Republic. We gradually expanded into the world as we quickly saturated the first markets. The commodity we work with is bought for a period of approx. 5-10 years. Devices are of high quality, so there is no need to change them every year. This means that even if the functions are being added, the device

(continued)

(continued)

itself works, and there is no need to buy a new one. We currently have our products on each continent. Maybe except for Antarctica? (laughter)

Jakabík: Antarctica? We are there too. Well, not with a system for measuring electricity meters, but within the framework of one unique project, polar scientists use our device to measure thermal conductivity and other features of the ice.

How many employees do you have?

Grňo: We have 33 employees, of which about a third are developers, and the rest is production and administration. We are still focused on research and development. We have highly qualified people.

How do you manage to keep these qualified people?

Jakabík: I have been working for the company for a little over a year. What surprised me at the beginning is that most colleagues have at least an engineering degree in electrical engineering. We don't have regular programmers. In addition to programming, these people also manage demanding physical and electro-technical areas.

Košík: We work mainly on the atmosphere in the development team to keep it creative and motivating throughout the development cycle of a new product. At the beginning, we have electronics, which comes to life at the end. The competition in our field is huge; we have to keep up with developments at the technological cutting edge. That requires knowledge of a number of new development tools, processes, techniques. We need to have them mastered so that we can create our final product at the highest level, as we

measure with the highest accuracy. It is also a chance for each of us to grow professionally. In production and assembly, we also try to create an atmosphere to make our employees proud of working for the company and also give them opportunities to focus on their personal development. We see that it is important to have good local Sales Representatives in individual countries that can open doors and also provide us with thinking and feedback from people from other cultures and be a brand ambassador for our customers.

Companies that are on the market for a long time often mention the conflict of generations. The older one that started the company and the younger one, coming to the company. How do you perceive this?

Košík: We are trying to use the conflict of opinions to our advantage. Combining ferocity and enthusiasm in young people with rational experience of older people. We have colleagues who have laid the foundations, developed the company, but at the same time, we regularly hire new talented people. They bring new wind, thoughts and ideas. We try to maintain rivalry in the team, but at the same time move forward in one direction.

> ## We are active in the above 60 countries in the world.

You talk about enthusiasm of your people. How much has the coronavirus situation affected your people and their inventiveness?

Košík: At the beginning of the year, we were glad that our orders and projects were up and running. When the borders were closed, we had no problem with not having orders. Rather, we had to solve how to deliver, install and hand over our systems without us having to travel there, as it was not really possible and the situation hasn't changed yet. We tried to provide online training, remote assistance. Produce and send systems as complex as possible, so that the customer has the least possible problem with their assembling and putting them into service. To do all tests here in Slovakia, approve them

and sign protocols. Video inspections were also performed here. Fortunately, all our customers understood this, and we managed to deliver orders within May and June. During the time we spent working from the home office, we tried to prepare various videos, webinars, tutorials, etc. We always try to be closer to our customers. Our biggest partners from Asia, mainly from Indonesia, postponed all orders and decisions. Exhibitions are either cancelled or rescheduled.

Fortunately, our concept is not to sell just these big systems. We also have a group of smaller, portable and more affordable devices, the promotion and sale of which can be carried out without travelling.

So what lesson did the coronavirus situation teach you? Of course, I mean it in a positive way.

Košík: We have learnt that we can rely on partners abroad. If we prepare good documentation for them, they are able to handle things they did not dare to do before, e.g. do the training and perform the installation. So we would like to continue

with this. To be even closer to the customer and use also these times to carry on with sales. To dig deeper into the options, the digital world offers – to use tools like online trainings, webinars, or electronic tutorials.

You mentioned partners. How big is your network of partners?

Košík: We are active in more than 60 countries around the world, of which we have reliable partners in about 15 countries. We work directly with some of them, and in the rest, we cooperate with distributors, a network of agents, or service centres. We also have people who follow tenders in countries, but these are

not technically oriented companies. They are only responsible for ensuring that the tender in the local language takes place in accordance with regulations; they know the authorities or they help us with the administration.

Do you have a project that you are especially proud of?

Grňo: Throughout the company's history, we have always had products that have come to the forefront, and we have received praise for them as a top technology. We still try to have 1-2 products that are exceptional.

Jakabík: There is a saying among developers that your favourite product is always the one you have just finished. We are about to finish a new high-precision standard of electrical power RS 3330S; it has other new functions and even higher accuracy. We plan to launch it on the market at the end of 2020. We already have it in test form in some companies in Slovakia and Czech Republic.

What is so unique that makes you different from other competitors?

Grňo: Our flagship RS 3330S. Only 2-3 companies in the world manufacture such a precise device. We try to add functions and parameters to it, which will provide many advantages over classic solutions.

We try to dig deeper into electromobility, into the area of charging electric cars. We have a unique solution for measuring large direct currents that are generated by fast chargers for cars with large battery capacity. There is a complication that has not been resolved yet and is still considered a problem in the world. We have a solution, and now we are trying to get to the market with it.

It is said that the future belongs to electric cars, so fingers crossed. How do you protect your ideas? Do you use patents? It is said to be quite a difficult and expensive thing.

Grňo: Yes, it is expensive, but it gives us at least a small guarantee that no one will steal it from us. Although, we can not be 100% sure (laughs). But it's also a matter of image. When we say that we have a patent for something, it has a different aura than a usual solution. We have always had several unique solutions that we have patented. These are not just Slovak patents. We have European patents, international patents, and patents in the United States.

> **Developers also advertise that your favorite product is always the one you just finished.**

Patents only protect a part of your work. What about the rest? Were there moments from which you have learnt a lot? A failure that hurt but taught you a lot?

Košík: Of course, there were a few tenders that we failed to win, and we were sorry. In development, there are many paths that we set out on, and sometimes we have to go back. Life also brings failures and we need to learn from them and move on. It was fun when we had Indians here in 2000, and they were wobbling their heads as a sign of „no" during the whole meeting. And therefore, we explained it to them over and over again. It was only at the end of the meeting that we realized that in India, same as in Bulgaria, shaking their heads actually means yes. When we sell directly abroad, we need to have

good support, hotlines and people directly present there. It is diverse around the world, and we are learning to be more tolerant. Gradually, we learned how to pack, ship, measure and collect duty, communicate, certify goods properly. Each country has its own specifics.

Do you have any strong customer experience?

Košík: It happened when we were in the Far East. After the installation of a system and subsequent training, those people had tears in their eyes. For them, it was a huge technological step forward. Until then, they measured everything with hands covered in oil, counted everything on paper with a pencil and a stopwatch, and suddenly they began to work in clean laboratories, everything was controlled by computers. So it was a huge change for them.

What will your company look like in 10 years?

Grňo: It should be big enough to work more optimally as a whole.

Košík: We want to digitize and move more into services. That means not only to measure accurately but also to provide a greater added value in the form of analytics. To take advantage of many years of our experience in this area. To provide customers with more information, cloud solutions, machine learning… we could go on and on. Here we see a chance to be different again.

Is there anything else you would like to commend for that our readers should know about you?

Košík: We are perceived by customers as one of the world's top three manufacturers in our area. We have Swiss and German competitors, with whom we compete in foreign tenders. Our company started operating more to the east of Europe, but we are gradually succeeding in getting to the west as well, to Italy, but also to Germany. It is thanks to our flexibility. Our competitors are active on the market way longer than we are, but Applied Precision is already at such a level that both of these competing companies accept us. We focus on delivering solutions, innovations, automation, mainly for electricity meter manufacturers. We can always be active and come up with something new.

How do you like the cooperation with SOS electronic?

Jakabík: This is how we imagine cooperation with a long-term partner, where reliability and quality, whether of goods or services, come first. Last time I asked my colleagues in the purchase department what we buy from SOS electronic, I got the answer: „Almost everything".

▌▌ TRACO POWER

1W cost-effective,
top-quality isolated DC/DC converters

Thousands of different applications in industrial electronics rely on small 1W isolated DC/DC converters. To keep BOM cost low and help customers enter new applications, TRACO POWER comes to market with a cost-effective 1W SIP converters.

The TEA line consists of three unregulated 1 Watt DC/DC converters in industry-standard SIP packages, which are specifically designed to offer a low-cost solution while keeping a high-quality standard.

These new series focus on a simple but effective design approach, which minimizes component and labor cost and is complemented with a complete automatization of the manufacturing process.

An operating temperature range from −40 °C to +85 °C without derating and I/O-isolations of either 1'500 or 4'000 VDC enables them to cover many different applications.

Available in different SIP package sizes, these converters offer a broad application range in any space and cost critical application and are especially suited for high volume projects where simple but reliable products are needed.

⊘ MAIN FEATURES

- Highly cost-efficient design
- I/O isolation: 1'500 VDC or 4'000 VDC
- Operating temperature range -40 to +85 °C without derating
- 5 VDC (±10%) input voltage range
- Efficiency up to 78%
- SIP-4 or SIP-7 package
- Unregulated outputs
- 3-year product warranty

TSR 1E: 1 A
- Non-isolated (POL)
- Regulated

TEA & TBA: 1 – 2 W
- Isolated
- Unregulated

TEC: 2 – 3 W
- Isolated
- Regulated
- Wide Input

⊛ PRICE GUIDE

	TEA 1-0505	1,30 €
	TEA 1-0505E	1,50 €
	TEA 1-0505HI	1,55 €

This is a short version of the article. The whole article can be found at web. Decode the link in QR code.
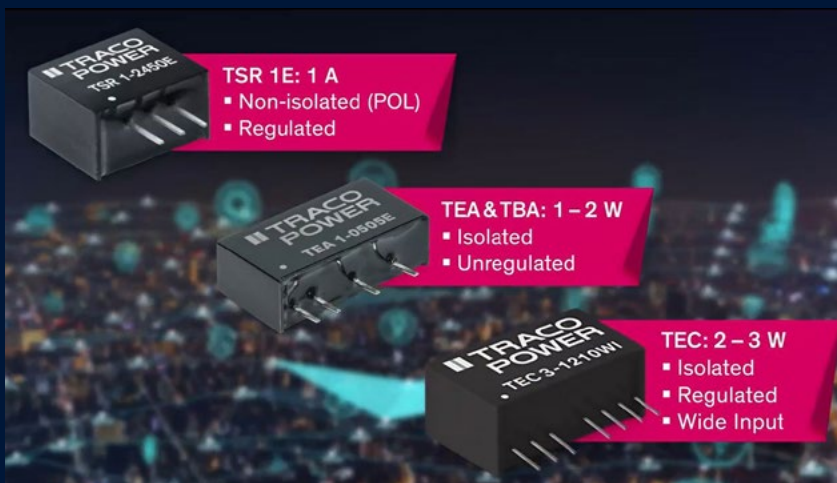
WAGO Gelbox

protects connectors from moisture

The compact box pre-filled with silicone-free gel provides IPX8 levels of moisture protection for WAGO's 221 and 2273 Series connectors. Gelbox is ready for immediate use in a wide range of low- and extra-low voltage applications. Try it out; it is our in-stock item.

Condensation, heavy precipitation, powerful water jets - these are the things that electricity does not like. Waterproof box is the usual proven short-circuit protection solution. However now we are coming up with a solution that is even faster, easier and more reliable - WAGO Gelbox!
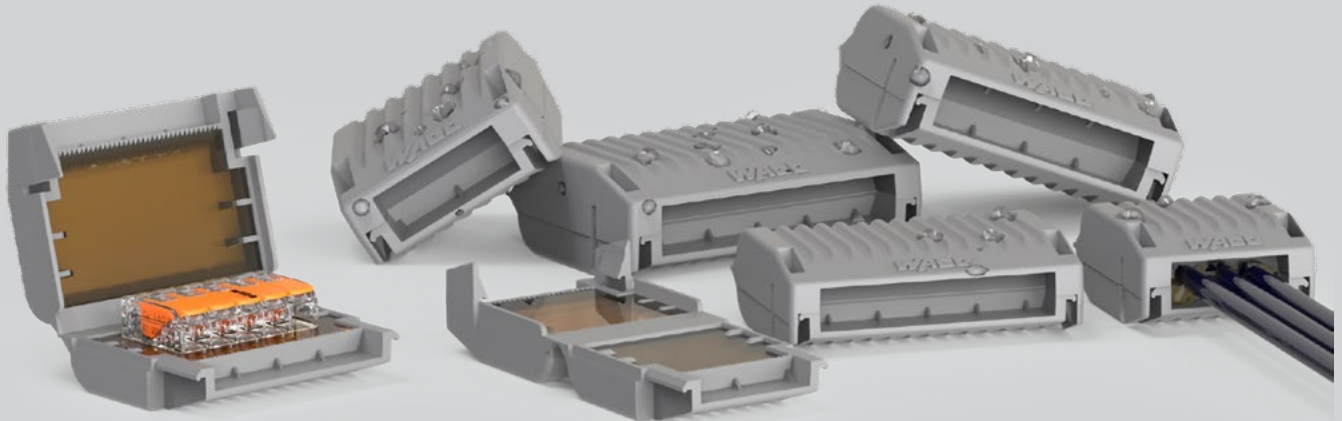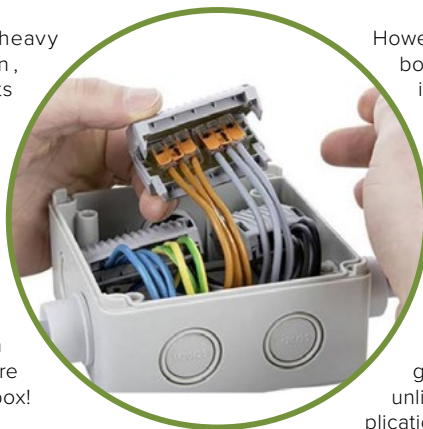
What is the WAGO Gelbox?

It is a compact box pre-filled with silicone-free gel. The Gelbox is available in six sizes and provides IPX8 levels of moisture protection for WAGO's 221 Series COMPACT Splicing Connectors and 2273 Series COMPACT Push Wire Connectors. This protection type means that the connectors are completely protected against water and can be permanently immersed in water. Conventional potting compounds like polyurethane and silicone also meet IPX8 requirements.

However, the WAGO Gelbox's distinctive feature is that it protects the electrical installation exactly where it matters – at the connection points – withoutpermanently encapsulating the junction boxes. Unlike silicone-based gel, the WAGO Gelbox's silicone-free gel supports a virtually unlimited number of applications.

Where can the Gelbox be used?

WAGO Gelbox can be used in a wide range of low and extra-low voltage applications. However, the way it is used does differ somewhat in the individual voltage ranges. For example, in low-voltage applications (e.g., 230 V), the Gelboxes are used in junction boxes together with splicing connectors. This is the only way to ensure double cable insulation to protect against electric shock, since only the conductors are encapsulated in the WAGO Gelbox. In SELV (Safety Extra Low Voltage) applications, the WAGO connectors can be used with Gelboxes without an additional junction box.

⊘ MAIN FEATURES

- Easy, fast and safe to use
- Can be used immediately and accessed again later
- Silicon-free
- Label-free
- Suitable for indefinite storage
- The complete system consisting of Gelboxes and WAGO connectors has been VDE-tested and IPX8-certified.
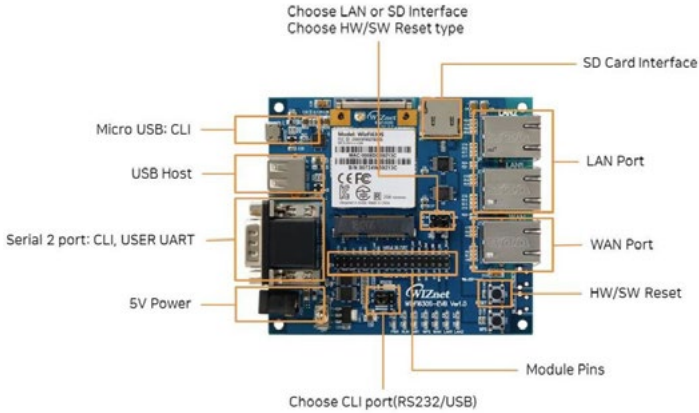
☆ PRICE GUIDE

	207-1333	7,70 €
	207-1331	5,10 €

WizFi630S
Powerful WiFi module ready for grand challenges

Gateway + router + serial converter + WIFI Bridge + OPEN WRT. All in one tiny package, including 580 MHz processor and own operating system. Just connect a sensor or a relay, and you can start the program for your application. Sounds interesting?

WizFi630S is a gateway module integrating 1T1R 802.11 Wi-Fi, 580MHz CPU, Ethernet PHY, USB2.0 host, SD-XC, I2S, I2C and other GPIOs.

WizFi630S allows a device with a serial interface to connect to LAN or WLAN for remote control, measuring, and administration. WizFi630S can also work as an IP router because of its internal embedded switch. It supports interfaces like Serial (UART), LAN, and Wi-Fi(WLAN). Functions such as **Serial (UART)-To-Wi-Fi, Serial-To-Ethernet and Ethernet-To-Wi-Fi** are supported by scripts and/or commands in **OpenWRT**.

Users can connect to WizFi630S's internal web server or use the serial commands for simple Wi-Fi settings – not only for serial devices but also 8/16/32 bit MCUs can use UART for simple Wi-Fi settings. WizFi630S can significantly reduce the procedures for wireless module design, testing, and certification. This tiny module is an ideal solution for users who lack wireless network experience. WizFi630S follows the 802.11b/g/n stan-dard and supports up to 150Mbps speed in wireless interface.

You can use the WizFi630 evalua-tion board to test the module; all needed documents are available online. Technical support is directly from the manufacturer.

WiFi modules, including WizFi630S module, are suitable for data collection for remote control or measuring the temperature, wind direction and speed, precipitation, humidity, air quality etc. Their use is also significant in saving energy in smart cities - intelligent garbage management, smart lighting, dynamic traffic management, etc.

⊘ MAIN FEATURES

- WizFi630A Pin compatible
- CPU with 580MHz Clock
- 16-bit DDR2 128Mbytes SRAM, 32Mbytes SPI Flash
- Complies with IEEE802.11b/g/n
- Gateway/AP(Bridge)/AP-Client/Client (Station)/Ad-hoc Mode, WDS/Repeater supports 1T1R RF Interface (2.4G only)
- Physical link rate up to 150Mpbs
- Built-in 3 Ethernet Ports
- 2 Serial Ports support
- Working as a WiFi Router
- WEP 64/128bit, WPA/WPA2-PSK TKIP, AES
- Router with a support of a Firewall
- Operating temperature range: -25 °C ~ 80 °C
- CE, FCC, KC, RoHS certification

⭐ PRICE GUIDE

	WizFi 630 S	32,00 €
	WizFi 630S EVB	55,00 €

This is a short version of the article. The whole article can be found at web. Decode the link in QR code.

8 USB 3.0 ports
in one compact computer

The Aaeon BOXER-8150AI provides sufficient computing power and transfer rate of the USB subsystem for image processing from eight USB cameras simultaneously. This powerful configuration is ideal for a wide range of computer vision applications.

The basis of the BOXER-8150AI AI@Edge computer is the Nvidia Jetson TX2 module that contains:

- Nvidia Tegra "Parker" system on a chip (256-core Nvidia Pascal GPU, dual-core Nvidia Denver 2 and quad-core ARM Cortex-A57 processors)

- 8GB of LPDDR4 memory with a 128-bit interface

- 32GB eMMC 5.1

- Wi-Fi 802.11a/b/g/n/ac module with two U.FL antenna connectors

- Rich set of interfaces connected to 400-pin board-to-board connector

BOXER-8150AI has 8 USB0 3.0 ports. Jetson TX2 module provides two of them. The remaining six are provided by three dual USB 3.0 controllers connected to three independent PCIe 2.0 [x1] interfaces.

Thanks to this configuration, the BOXER-8150AI is able to process images from eight USB cameras simultaneously. This powerful configuration is perfect for a wide range of computer vision applications like visual inspection, quality control, and facial recognition.

The compact computer BOXER-8150AI features an RS232 COM port for easy integration into industrial systems. It also features a Gigabit Ethernet port, two HDMI 2.0 ports, a microSD card slot,

USB OTG, prepared holes for SMA connectors and remote ON/OFF. You only need two 2 JW1302-C442B antennas, 180 mm and 100 mm cables to add Wi-Fi connectivity. Install the RP SMA connectors in the prepared holes and connect cables to Jetson TX2 Wi-Fi module U.FL connectors.

Jetson TX2 module power dissipation is up to 7,5W in Max-Q mode or 15W in Max-P mode. BOXER-8150AI has a massive heatsink that keeps the module at the safe temperature even at ambient temperature 50 °C.

This compact computer is shipped with preloaded ACLinux-4.4 based on Ubuntu 16.04 with Linux kernel 4.4 and Nvidia JetPack 3. 3. If you need a newer version, download the latest image from Aaeon web and flash it to eMMC according to the user manual, chapter 3. The image provided by Aaeon must be used because the original Nvidia image uses configuration 2 (USB3.0x1, PCIe x4) but the BOXER-81xx series uses 3 (USB3.0x2, PCIe x3). You will need a Linux computer to flash a new image.
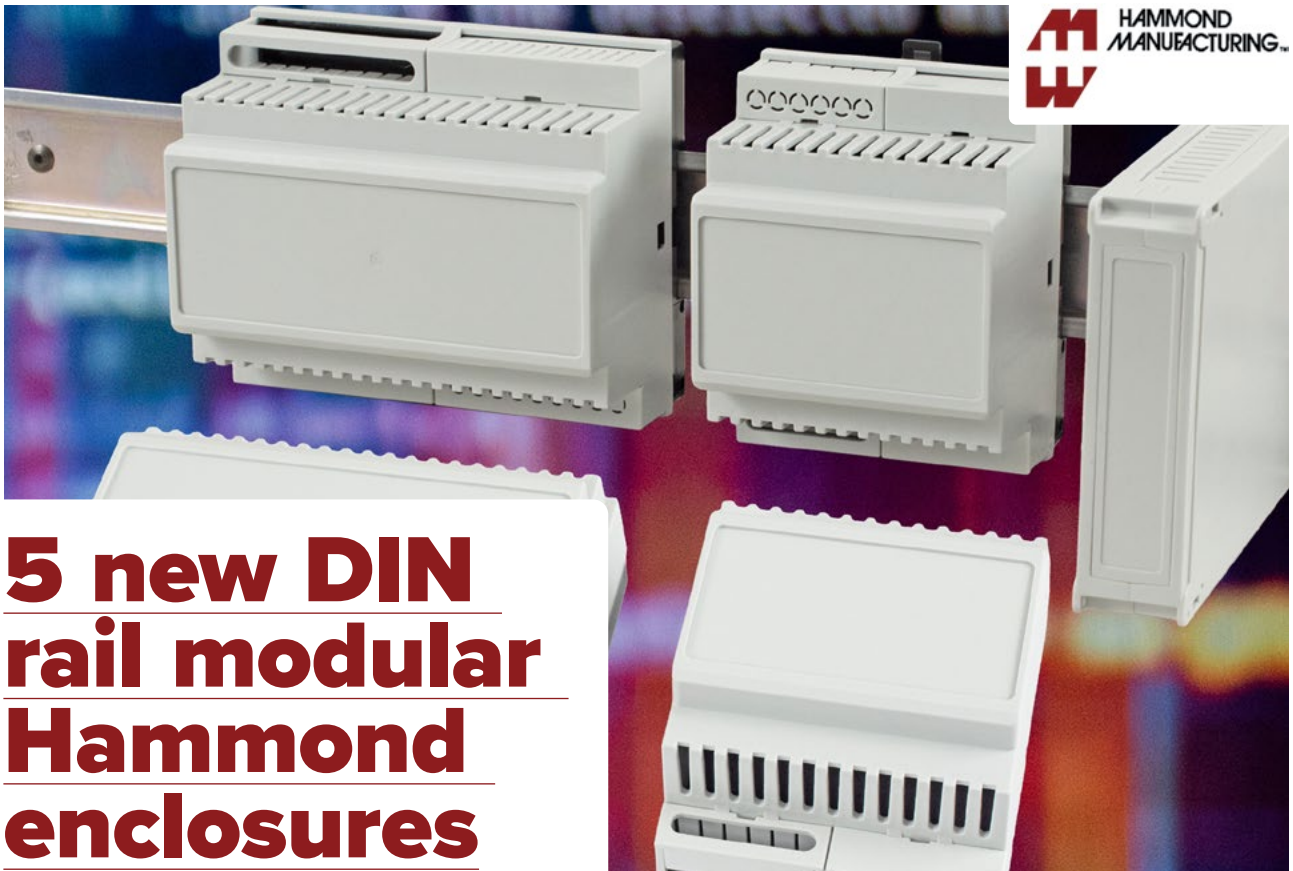
PRICE GUIDE

BOXER- 8150AI--A1-1010 — 1239,90 €

HAMMOND MANUFACTURING™

5 new DIN rail modular Hammond enclosures

Easy to use, high-quality materials and a wide range of accessories for various wiring options. 5 models of enclosures and 4 covers for standard 35 mm DIN rail. Mix and match the way you like it.

Those who have some experience with DIN rail enclosures know that every producer has its own families of products with a wide range of accessories. Usually, DIN rail enclosures are being produced in so-called width modules (1M = width of 17,5 mm). That's why, for example, a 4-Module enclosure is 70 mm wide.

Hammond Electronics, as our long-term supplier of high-quality enclosures, has introduced a useful range of **5 sizes of DIN rail enclosures**. And as it is good practice with this manufacturer, all the necessary accessories are quickly available, clearly marked and easy to use.

The enclosures are available as **2-, 4-, 6- and 9-module** wide, as well as so-called "Control box" 23mm wide. Enclosures are supplied with openings at their front and rear sides for connection of wire leads. The modular design allows configuring the enclosures to suit wide variety of requirements.

DIN rail enclosures and the covers could be combined as follows:

- left open without covers

- closed with full covers

- partially covered with knock-out covers for plug-in connectors

- partially covered with oval covers

- partially closed with vented covers

1597DIN family is made of UL94-V0 flame-retardant plastic. All sizes have two mounting positions for the terminal blocks, giving wide possibilities of I/O pins. The body contains of two horizontal PCB mounting slots and two standoffs in the base for component or PCB mounting. The 22,5 wide Slim Control box has ventilated sides and is suitable for any common types of electronics.

All models can be easily assembled and also disassembled without any tool. The front panel is recessed, suitable for further drilling, milling or just adding an identification label for example. The enclosures consist of dark grey PPO (polyphenylene oxide) base part with a polystyrene DIN rail mounting clip and the main enclosure body is RAL 7035 light grey polycarbonate.

⊛ PRICE GUIDE

	1597DIN2GY	4,80 €
	1597DIN4GY	5,40 €
	1597DIN6GY	7,00 €

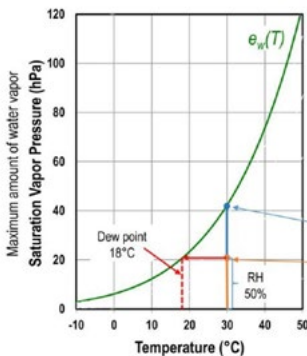# Sensirion – The Sensor Company

SENSIRION
THE SENSOR COMPANY

Overview of the basic information and our tips for CO2, VOC, humidity, temperature, liquid and gas flow sensors. If you are looking for a solution, Sensirion will not disappoint you.

Sensirion sensors measure reliably all the important environmental parameters such as relative humidity, temperature, the concentration of CO2, VOC and concentration of particulate matter. Sensirion also offers sensors for measuring liquid flow and the gas mass flow.
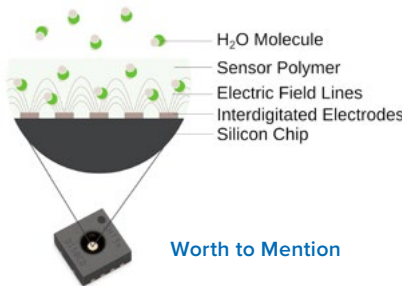
Environmental sensing
Relative Humidity and Temperature Sensors

Relative Humidity

H$_2$O Molecule
Sensor Polymer
Electric Field Lines
Interdigitated Electrodes
Silicon Chip

The Basics

Sensors are based on measuring the capacitance between electrodes placed in a porous polymer membrane. Water vapor penetrates into the membrane and changes the capacitance between electrodes.

Saturation Vapor Pressure (in hPa):

$$e_w(T) = \alpha \cdot \exp\left(\frac{\beta \cdot T}{\lambda + T}\right) \quad \begin{array}{l} \alpha = 6.112\,hPa \\ \beta = 17.62 \\ \lambda = 243.12°C \end{array}$$

Relative Humidity (in %RH):

$$RH(T) = \frac{e}{e_w(T)} \cdot 100\%$$

$e_w(T)$ = saturation vapor pressure
e = partial water pressure

→ Relative humidity is highly temperature dependent

Worth to Mention

STSx Sensors

The STS21 temperature sensor has the same parameters as SHT21 except for lower average current consumption 20uA because of T_meas=66ms instead of T_meas+RH_meas=66ms+22ms for SHT21. The sts3x temperature has the same parameters as SHT3x but they measure only temperature.

Sensors Lifecycle

SHT1x sensors are not manufactured anymore. You can, therefore, use SHT3x sensors. Migration requires PCB redesign because of the different package and SW changes since SHT3x uses I2C interface instead of S-bus.

SHT7x sensors were also discontinued. Please, use SHT85 instead. Migration requires SW changes because SHT85 uses I2C interface.

SHT2x and SHTC1 are in mass production. Even though there isn't a plan to stop the production, we recommend using the SHT3x and SHTC3 for the new projects.

SHTW1 sensor is not manufactured anymore, please use SHTW2 (different package, PCB redesign is necessary).

Battery operation

Lithium (Lithium-thionyl Chloride) battery has a nominal voltage 3V (3.6V). The battery is fully depleted when the voltage drops to 2V (cut-off voltage). All RH & T and T sensors have low current consumption and can work from a battery, but:

- SHT3X works in range 2.15 to 5.5V – can't make use of full battery capacity
- SHTC1, SHTW2 works in range 1.62 to 1.98 – they need voltage regulator and I2C level shifter
- SHTC3 works in range 1.62 to 3.6V – covers full battery voltage range

⭐ PRICE GUIDE

	SHT 30-DIS-B	1,50 €
	SLF3S-1300F	88,60 €
	SDP31	17,10 €

Unconditionally steady
XR-DIMM module

Apacer

Relying on memory modules in harsh environments during vibrations, uneven roads or violent waves is not a nightmare anymore. Reliable operations in such conditions is not a dream. Apacer released the XR-DIMM module.

This sturdy/robust memory module is the first on the market to meet the exacting standards of the US RTCA DO-160G test. It is an aviation equipment certification that marks the XR-DIMM as resistant to high levels of vibration and therefore ideal for defence and aeronautical applications.

The model is the ideal choice for manufacturers who need reliable operation through extreme vibrations and shocks.

Many defence systems, rail transit and in-vehicle systems worldwide still rely on standard memory modules; however, Apacer's XR-DIMM modules offer significant improvements on reliability, with additions. We can highlight 300-pin connectors or mounting holes to keep components in place. These allow the XR-DIMM to **remain steady even when vehicles encounter uneven roads, powerful winds, or violent waves and to deliver stable performance**.

Apacer is a manufacturer from Taiwan and benefits from access to the growing aviation industry.

Aerospace and defence manufacturers from Taiwan and the rest of the world usually look to Apacer to create cutting-edge DRAM modules and SSDs. The XR-DIMM module with RTCA DO-160G certification is just the latest in a long line of Apacer innovations in this field.

⊛ PRICE GUIDE

75.A83E2.G030B   29,00 €

Replace the character LCD module with an
OLED alternative

BOLYMIN

Bolymin OLED character displays with a high degree of compatibility with the original LCD modules are ideal not only for brand new projects, but they also serve as excellent upgrades for older projects.
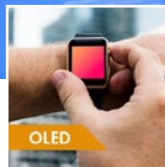
LCD or OLED? It is still a dilemma for many, but we have tried to shed more light on this in our recent article LCD or OLED - which one do you choose?

If you have already decided for a more modern and beautiful variant - OLED, then we have good news for you. In terms of mechanical design, we already have alternatives to many well-proven, character LCD modules.

These are displays of **16x2, 20x2 and 20x4** characters. Specifically, we have direct, very close alternatives to the Bolymin character modules BC1602A/A3, BC1602B, BC1602D, BC1602H, BC2002A and BC2004A.

As you can see in the table below, the mechanical differences between these LCDs and OLED are minimal.

To facilitate the search for replacement from LCD to OLED, Bolymin used relatively close nomenclature. For example, the OLED alternative for the LCD series BC1602H is called BL1602HM.
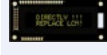
The advantage is that all these character OLED displays have the same controller - HD44780 (with 4/8 bit 6800 MCU interface, simple 5V power supply) and thus any migration between individual types will be trouble-free.

You can find them in our stable stock offer in yellow and white colour, i.e. in the two most important and recommended colours in terms of long display lifetime (100k/70k hours) and good readability.

To preserve the longest possible lifetime and even "wear" of the pixels of the characters, it is very convenient if you can use (at least partially) scrolling text in your application.

As most industrial OLED displays on the market today, the BL-series modules can also operate within an extremely wide operating temperature range of **-40 to +80°C**. However, high long-term operating temperatures shorten the life of all OLED displays.

PRICE GUIDE

	BL1602AMERN-JU68J$	16,90 €
	BL1602DMERN-JU68J$	15,40 €
	BL2002AMWRN-JU68J$	21,90 €
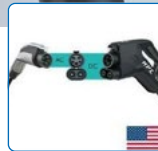
Say goodbye to public EV charging stations

With growing number of electric vehicles on the roads, a demand for sufficient amount of available charging stations is increasing as well. Having your own is one of the options. HOME charging technology starter pack from Phoenix Contact is ready-to-use solution.

There are still voices questioning the ecological side of electromobility, but it is certain that the number of electric cars on the roads is increasing.

Therefore, there is a growing need for charging points. Even though you can't do without public charging points when travelling longer distances, home charging will suffice daily traveling to work and for shopping.

One of the most important European players in the field of electromobility, Phoenix Contact, comes up with a set that can be used to build a charging station near a family house or company building.

This so-called starter pack contains all the necessary components and installation instructions. Once assembled, the station is ready to charge electric cars with alternating current with type 2 charging sockets.

In the process of developing electromobility, several specifications have emerged, including the specific geometry of the connectors, which have been adopted in various regions of the world.

And thus we have **three standards** accepted today:

1. For North America - **CCS type 1** (Combined Charging System) The term "combined" means that the same connector is for both AC mains (single and 3-phase systems) and for fast DC charging.

2. For Europe - **CCS type 2**

3. For China - **GB/T**

W A R N I N G!
As this is a connection of the device to the distribution network, the installation can be performed only by a person with appropriate education and authorization (electrician).

This is a short version of the article. The whole article can be found at web. Decode the link in QR code.

Reliable
OEM scanning
solutions
from Opticon

☰ OPTICON

The scanner modules and fixed-mount scanners from Opticon are miniature in size and can be easily integrated into your device. They are an ideal solution for devices such as vending machines, kiosks, parking systems and much more.

More than 40 years ago, Opticon has been one of the first companies in the world to specialize in the manufacturing of barcode scanners. Opticon delivers solutions combined with the latest technologies and focuses on delivering high-quality products.

They offer a complete range of OEM scan engines, ranging from entry-level, cost-effective engines to high-performance 2D imagers, allowing you to select the module that best suits your application for the lowest possible cost.

SCANNER MODULES

2D CMOS Sensor Based Modules

The modules consist of a CMOS sensor with a small len, a high-performance microprocessor with a large memory, which processes the images supplied by the camera, decodes them and provides the decoded data via serial UART or USB interfaces.
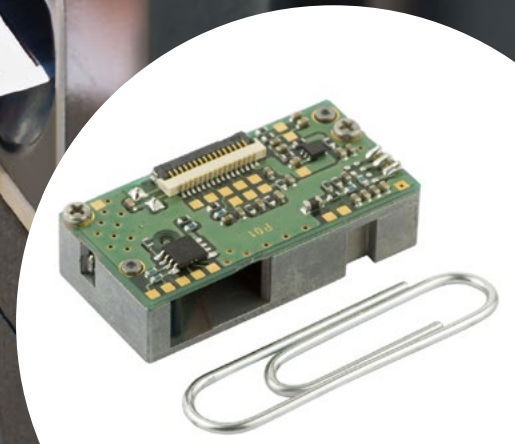
CMOS sensor is similar to the sensor commonly used in smartphones; however, it comes with a few important differences, making the Opticon scanner module much more suitable for reading 2D barcodes than a smartphone.

1D CCD Sensor Based Modules

The CCD module has a built-in LED that illuminates the barcode. The reflected light is captured by a single-line CCD sensor, which converts the light into an electrical signal. This signal is then amplified and led to a microcontroller, which decodes it and provides the decoded data via UART or USB serial interfaces.

Advantages of CCD modules:

- Extremely robust because they have no moving parts
- Cheap due to the relatively simple construction
- Compact dimensions
- Low power consumption

Disadvantages of CCD modules:

- Limited depth of field (DoF)
- Less suitable for high-resolution labels
- They are not able to read 2D codes

1D Laser Modules

The module contains a laser aimed at a vibrating or rotating mirror, which changes the point to a laser line. This laser line is aimed at a barcode that reflects light back into the module. The same mirror as used to create the laser line is then used to direct the reflected laser light to the photodetector. The output from the detector is then amplified, filtered and led to a microcontroller, which decodes the signal and provides the decoded data via UART or USB serial interfaces.

⊛ PRICE GUIDE		
	MDC-100A	33,10 €
	MDI-4100-STD	89,50 €
	NLV-1001-US-BHID	153,00 €

User-friendly smart displays in a miniature size

New series of uniTFTs intelligent touch displays from Electronic Assembly, coming in sizes from 2" to 4.3", offers extremely short development of highly sophisticated HMIs.

The uniTFT series from Electronic Assembly family has so far consisted of really highest-level intelligent displays with extremely wide capabilities, available in sizes from **5.0" to 10.1"**. They are suitable for high-level applications usually produced in low quantities. The great saving at development compensates a higher cost of the display module.

On the other hand, for many common projects, some more affordable but still very capable series of displays would be more suitable. Because of this, Electronic Assembly developed the new **uniTFTs** series with the display size ranging from **2", 2.8", 3.5" and 4.3"** sizes.

Wide viewing angle IPS displays with 1000 cd/m^2 luminance offer great-contrast images even in bright sunlight. Capacitive touch panel enables comfortable usage.

To be able to deploy all graphic power of the modules, Electronic Assembly developed **Uni TFT Designer software** tool that can be downloaded for free. This powerful software IDE combines comprehensive environment, many pre-defined widgets and intuitive way to develop the graphic interface.

The displays of UniTFTs series are ideal for home automation and for use as control panels. Together with USB interface, they come with RS232, SPI and I2C interfaces. Digital I/O ports (8/expandable up to 136), 4 analogue inputs and a PWM output offer wide possibilities to control connected peripherials.

MAIN FEATURES

- 2.0" 320x240 / 2.8" 320x240 / 3.5" 480x320 / 4.3" 480x272
- Superbright LED backlight over 800 cd/m^2
- Object-oriented screen layout
- Change object during run-time: size, shape, colour, content
- Animation and move of objects
- Alfa-blending
- Single supply 3.3 V or directly through USB
- Serial Interfaces: USB, RS232, SPI, I^{2}C
- Time (RTC), battery-buffered
- Flash-memory as storage for pictures, fonts, menus and log-files

PRICE GUIDE

	EA uniT-FTs020-ATC	80,60 €
	EA uniT-FTs028-ATC	83,70 €

This is a short version of the article. The whole article can be found at web. Decode the link in QR code.

Professional equipment at an exceptional price
especially for schools

ROHDE&SCHWARZ
Make ideas real

Rohde & Schwarz oscilloscopes with the basic 50/70 MHz bandwidth with a full package of all available SW options, including decoding of most buses, are now available especially for high schools and universities at very advantageous prices.

Rohde & Schwarz coming up with a new promo „Full Bench, High value"! From 1. 10. 2020 to 31. 3. 2021, the German manufacturer offers oscilloscopes, analyzers and power supplies in full equipment at exceptional prices with a discount of up to 50%.

At the same time, there is yet another and even more advantageous „EDU Edition" offer for high schools and universities for selected oscilloscopes with significantly lower prices.

It concerns these three oscilloscopes - RTC1002, RTB2002 and RTB 2004 also with a full package of all available SW options, the so-called PK1 App bundle. This means that in addition to the rich basic equipment, it additionally also includes:

- Triggering and decoding for: I^2C, SPI, UART/RS-232/RS-422/RS-485, CAN and LIN buses.

- Possibility to generate your own waveforms and samples "arbitrary and pattern generator."

- Moreover, R & S®RTB2002 and R & S®RTB2004 come up with history, segmented memory and frequency analysis (Bode plot)

Overview of available oscilloscopes from the EDU offer:

- **RTC1002:** 50 MHz, 2 channels, PK1 App Bundle, **790 €**
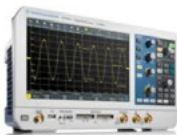
- **RTB2002:** 70 MHz, 2 channels, PK1 App Bundle, **1190 €**

- **RTB2004:** 70 MHz, 4 channels, PK1 App Bundle, **1790 €**

Usually, these oscilloscopes in the same equipment are available for at least twice the price. How do the oscilloscopes for schools differ from the same devices from the current Rohde & Schwarz "Full Bench, High Value" offer? The oscilloscopes for schools are in the basic bandwidth of 50/70 MHz (but not the maximum). For school measurements, this range is, in most cases, perfectly sufficient. However, if necessary, you can additionally expand the bandwidth at any time in the future by purchasing an SW license. Thanks to this, you can measure with professional equipment even at school.

The Rohde & Schwarz offer for the EDU sector is valid until 15. 12. 2020. With this special offer for high schools and universities, you can save up to 30-50% compared to a regular EDU discount.

If you have any further questions, do not hesitate to contact us. We will be happy to advise you or help you choose a suitable device for your school.

Ask for more information about Rohde & Schwarz products at _sales@soselectronic.com_.

2J NB-IoT Antenna for a permanent and stable connection

The connector mount external LTE antenna, 2J0B24, was designed to improve signal strength allowing uninterrupted connectivity, better signal quality, and reliability while providing increased data throughput.

This series of 2J antennas is suitable for GSM, CDMA, DCS, PCS, GPRS, WCDMA, UMTS, HSPA, EVDO and LTE (NB-IoT) technologies operating within 4G LTE, 3G, and 2G standards.

Typical applications are:
- Infotainment systems
- HD video transmission
- Dash cameras
- Connected cars
- Self-driving cars
- Fleet management
- Gateways
- Routers
- Public transportation
- Logistics

Compatibility Standards:
LTE Connection - CAT 1 2 3 4 5 6 8 9 10 11 12 - NB-IoT, LTE-NB1, CAT-M1, CAT-M2 - WCDMA, UMTS, HSPA, EDGE, GPRS, GSM, CDMA

☆ PRICE GUIDE	
2J0B24-C884G	2,70 €
2J0B24-C885G	2,50 €

xPico 200 Series - Safe wireless solution for industrial IoT

LANTRONIX®

The xPico 200 family of Lantronix WiFi modules is a reliable solution for wireless communication requiring a robust connection, advanced data security, easy integration and thus reduced costs for the overall industrial IoT solution.

Dual-band Wi-Fi (2.4 & 5GHz), antenna diversity, Enterprise Wi-Fi security and robust wireless connectivity management deliver higher performance and scalable deployment within noisy industrial and enterprise settings.

The xPico 200 series makes it easy to deploy robust Ethernet, Wi-Fi and Bluetooth connectivity without writing complex software. The industry-leading compact SMT footprint of the xPico 200 series allows its reliable operation in extreme environments and adaptation to any design.

It is possible to completely offload application of MCU, if xPico200 operates as a network co-processor, or use it as a wireless microcontroller with the provided SDK.

Field-tested TruPort® Serial supports transparent pass-through of hundreds of proprietary serial and standard Fieldbus protocols and TruPort® Socket enables complete control over multiple connections via TCP, UDP or TLS. Configure and control the gateway operation from the host microcontroller side using command mode or the network side with Web Service APIs and XML configuration data.

☆ PRICE GUIDE	
XPC240100B	31,90 €
XPC240200B	31,90 €
XPC240300S	35,60 €

This is a short version of the article. The whole article can be found at web. Decode the link in QR code.

# Powerful WiFi modules at affordable prices

ESPRESSIF

ESP32-S2-WROOM and ESP32-S2-WROOM-I are two powerful, generic Wi-Fi MCU modules that have a rich set of peripherals. They are an ideal choice for a wide variety of application scenarios relating to the Internet of Things (IoT), wearable electronics and smart home.

The basis of these modules is **ESP32-S2**, an Xtensa® 32-bit LX7 CPU that operates at up to 240 MHz. The chip has a low-power co-processor that can be used instead of the CPU to save power while performing tasks that do not require much computing power, such as monitoring of peripherals.

ESP32-S2 integrates a rich set of peripherals, ranging from SPI, I²S, UART, I²C, LED PWM, LCD, Camera interface, ADC, DAC, touch sensor, temperature sensor, as well as up to 43 GPIOs. It also includes a full-speed USB On-The-Go (OTG) interface to enable USB communication.

ESP32-S2-WROOM comes with a PCB antenna and **ESP32-S2-WROOM-I** with an IPEX antenna. They both feature a 4 MB external SPI flash.
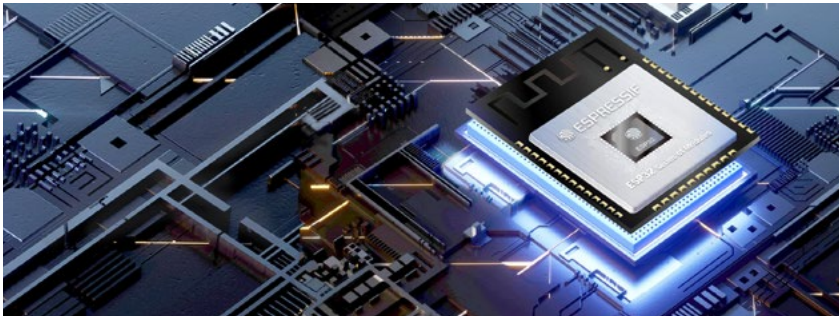
✓ MAIN FEATURES

MCU

- ESP32-S2 embedded, Xtensa® single-core 32-bit LX7 microprocessor, up to 240 MHz • 128 KB ROM
- 320 KB SRAM
- 16 KB SRAM in RTC

Wi-Fi

- 802.11 b/g/n
- Bit rate: 802.11n up to 150 Mbps
- A-MPDU and A-MSDU aggregation
- 0.4 µs guard interval support
- Center frequency range of operating channel: 2412 ~ 2484 MHz

☆ PRICE GUIDE

	ESP32-S2-WROOM	2,50 €

Batteries with solder terminals 3 times differently

FANSO

If you lack a battery holder on the PCB or if you want to connect the battery to the application with a cable, the simplest solution is batteries with solder terminals from Fanso or EVE manufacturers.

There are three basic versions of solder terminals.

Either conventional wire terminals designed for direct soldering to PCBs or solder tabs (flat terminals) that can be soldered to a printed circuit board or connected to each other by spot welding.

The third option is the solder tab with a lug, for connecting a cable or for soldering to PCB. Simply said, a solder lug.

Our product portfolio offers several basic types of batteries with solder terminals from various manufacturers. The well-known lithium Li-SOCl2 batteries FANSO ER34615 and ER17505 with solder lugs are our stock products. Or we also offer batteries with axial terminals, ER14505 P of the brand EVE.

☆ PRICE GUIDE

	ER34615M CNR	8,80 €
	ER17505/T	2,30 €

Little Big ROCKER

MARQUARDT

A small device needs a small switch, large device requires big one, and a device powered from a three-phase network needs a huge switch. And somewhere in between, there is an inconspicuously standard Marquardt 1935.3135 rocker switch for 400Vac with IP65 protection.

The model 1935.3135 is capable of switching **400Vac** and is therefore intended for devices that are supplied with Line voltage (Class II). (FYI: Voltage between phase and neutral = Phase voltage. The voltage between two phases = Line voltage.) Typical devices are welders or heaters.

Rocker switches from the 1935 series are originally designed for switching the standard mains voltage 230Vac and their distinguishing feature is a rubber sealing flange, which provides **IP65** protection from the actuator side.

The switch is illuminated by a neon lamp, which is logically also designed for 400Vac, the colour of the actuator is green and its two positions are marked with "0" and "I".

✓ MAIN FEATURES

- Double-pole rocker switch, DPST
- Ratings: 10(8)A / 400Vac 5E4 20(4)A / 250Vac 1E4
- Terminals - 4 x Faston 6,3x0,8mm
- Body colour: black, actuator colour green transparent
- Backlight: neon lamp 400Vac

☆ PRICE GUIDE

	1935.3135	4,25 €
	1935.3112	3,40 €

Industrial piezo speaker SCS-32 with Wago terminals

sonitron®

Well proven, dust-proof, water-proof and even shock-proof piezo loudspeakers Sonitron SCS 32 are now available with Wago spring clips for quick and efficient assembly without the need for soldering.

Sonitron is a Belgian company specializing in the development and production of piezo converters for over 30 years.

The SCS series of flat loudspeakers is one of the best available on the market and is one of the best we can find in the field of flat piezo speakers.

SCS series comes up in three sizes- SCS-17, SCS-24 and SCS-32.

In particular, they have the following features:

- Resistant to dust, water and vibration
- Solid and stable construction
- Capable of operating in a wide temperature range: -40...+85 °C
- Wide frequency range at small sizes
- Can be used as a speaker or as a microphone
- About 60% higher acoustic performance at small dimensions compared to electrodynamic speakers
- Long lifetime

The manufacturer has added one more to these features. SCS 32 is now available in the SCS-32 CON SP02 version with the well-known WAGO 2060 series SMD spring clips, which we introduced in our article. So far, SCS loudspeakers have been available only with THT pins for PCB mounting or with SMT terminals. In both cases, however, it was necessary to place the speaker on the PCB.

What does the implementation of WAGO 2060 terminals bring?

Above all, easy connection. There is no need for soldering, no (auxiliary) PCBs, and it is a vibration-resistant solution. Conductors with a cross-section of 0.20... 0.75 mm^2 can be used.

Of course, the original SCS versions for PCB mounting have their merits, and if you prefer, for example, mounting directly on the main PCB, then it is still the easiest solution.

As it is clear from the laws of electroacoustics, loudspeakers with larger diaphragms naturally have better performance at lower frequencies and usually also a higher efficiency. Therefore, when designing a device, it is needed to consider what audio content a given speaker should transmit and choose one of the three available sizes accordingly.

☆ PRICE GUIDE

	SCS-32 CON SP02	6,30 €

Benefits of programmable power supplies GENESYS+

TDK·Lambda

Built-in microprocessor guarantees advanced performance and functionality. GENESYS+ series has the highest power density and lightest weight available for its size with a comprehensive set of user-friendly interfaces. Really just pros! Genesys+ Series from TDK-Lambda.

The Genesys+ series of programmable DC power supplies uses Digital Signal Processing (DSP) technology to improve performance, functionality and efficiency by up to 93%.

TDK-Lambda programmable power supplies are used in applications such as components testing, aerospace and automotive testing, semiconductor fabrication, water treatment, plating and solar array simulation.

Main functions:

- Constant current, constant voltage or constant power modes
- Internal resistance simulation
- Accepts three-phase 170-265Vac, 342-460Vac or wide range 342-528Vac inputs with active Power Factor Correction
- 1U high, 19" (483mm) wide rack
- 20 voltage models available, from 0-10V/170A to 0-600V/0-8.5A

Improvements over standard Genesys range

- Two user-programmable output control pins can activate external devices, such as load disconnect relays

- Arbitrary waveform profiles (e.g. car battery simulation at vehicle start) of up to 100 steps
- Advanced parallel master/slave system allows a multi PSU system to achieve dynamic response, ripple and noise performance comparable to a single power supply
- Up to four units can be connected in parallel using a data link cable. The master and slave units automatically detect the parallel data connection and set their parameters accordingly
- Faster up and down programming response times speed up operation with user adjustable voltage and current slew rate control

⭐ PRICE GUIDE

	GEN10-240-1P230	2860,00 €
	GEN10-330-1P230	3260,00 €

Strong cleaning and degreasing Citro Cleaner

CRC

Heavy-duty industrial cleaner based on natural orange terpenes and alcohol for safe cleaning of machinery and equipment during maintenance activities with strong decontaminating properties.

CRC Citro Cleaner is an ideal alternative to traditional solvents and highly alkaline cleaning agents.

It is a powerful cleaning and decontaminating solution with an extremely high alcohol content that removes contamination, dirt, viruses, bacteria and germs from most common surfaces.

Since it is safe on all metal surfaces and on most rubbers, plastics and coatings, it is one of the most versatile cleaners available for industry, traffic,

as well as for office (for example for door handles, phones, keyboards, tablets, touch screens, tables, chairs and toilets).

Thanks to its content of natural citrus extract it has, together with isopropanol, strong cleaning properties and pleasant citrus smell. This combination makes it a very favourite product.

The universal cleaning and disinfectant CRC Citro Cleaner is available in two packages. In a practical 500ml package and in a larger 5L package.

✓ MAIN FEATURES

- 2 in 1 product - cleans and protects
- Removes contamination from majority of surfaces: metal, stone, fabrics and majority of plastics
- Contains up to 90% of alcohol
- Neutral PH
- Pleasant citrus scent

⭐ PRICE GUIDE

	Citro Cleaner 500 ml	6,80 €

Voltcraft VC-337 multimeter with ultra-slim clamps

VOLTCRAFT.

TRMS current clamps VC-337, thanks to their size and shape, are ideal for measuring in dense installations of distribution boxes and cars. Find them in our assortment.

If you have ever measured in a distribution box, for example, the leads to individual circuit breakers, you have probably encountered a similar situation - conventional clamp multimeters have pliers that are too wide, and thus it is very difficult or even impossible to measure the current flowing through individual conductors close to the circuit breakers.

Clamp multimeters with an extra narrow shape of pliers, to which the Voltcraft VC-337 also belongs, elegantly solve this problem.

Besides narrow jaws, the device is relatively small and narrow itself, so it fits your hand very well. The VC337 **can also measure DC current at 1mA**, making it an ideal instrument for measurement in conventional DC equipment as well as in automotive installations.

Maximum display reading is 3999, and the range selection is automatic. The VC337's high price/performance ratio is enhanced by the fact that the instrument measures the true effective value (TRMS) of AC values.

⭐ PRICE GUIDE

	VC-337	50,00 €

Fluke T5 - Tester with the advantages of a clamp multimeter

FLUKE

It fits in your hand just right, it can even withstand a fall from 3 meters, you don't have to open the pliers to measure the current, and you can easily do all of it even with gloves on.

We're sure you have more measuring instruments, and yet you most often reach out for just one, your favourite.

According to the feedback from real users, **Fluke T5** instruments are becoming these privileged first choice testers thanks to the comfortable operation, resistance to rough handling, resistance to impact, dust, dirt or other factors.

Fluke T5-600 and Fluke T5-1000 meet all of these criteria.

Comparing them to conventional testers, they have permanently open **"U"** -shaped jaws in the front part. On the other hand, comparing them with clamp multimeters, they have the shape of a classic tester.

Fluke was able to technologically handle current measurement with sufficient accuracy, even with fixed U-shaped open jaws, so they eliminated the riskiest mechanical factor in their design - the opening mechanism.

You do not risk measuring completely incorrect values due to imperfect jaw-closing caused by dirt/deposits when measuring in harsh conditions.

✓ MAIN FEATURES

- Current measurement up to 100A without a need to open circuit
- Automatic detection of AC or DC voltage
- Measurement of resistance and continuity up to 1000 Ohm
- Long and narrow measuring tips for measuring even in confined spaces
- Withstands a fall from a 3m height
- Auto Power-off
- Measurement and control with one hand or in gloves
- Powered by two AA 1.5V alkaline batteries

⭐ PRICE GUIDE

	Fluke T5-600	173,00 €
	Fluke T5-1000	176,00 €

This is a short version of the article. The whole article can be found at web. Decode the link in QR code.

Industrial pocket-sized IR camera ◆FLIR®
with Cloud connectivity

Flir C5 brings all the best from older C3 but features several major improvements. The main are 4x higher IR resolution (160x120px) and the WiFi + Bluetooth connectivity. Simply put, the ideal thermal camera for the fieldwork.

If you liked the popular pocket-sized industrial thermal cameras Flir C2 and C3 Series, you would certainly love the new C5.

Naturally, even the Flir C5 features MSX function for overlaying images in an infrared and visible spectrum for easier identification.

It's worth to say that in contrast with some cheaper types of infrared cameras on the market, stored images are fully thermometric, i.e. the stored image file carries information about the temperature of every pixel measured with IR camera with the possibility to post-process in Flir tools SW.

With Flir C5, you can edit images and use the Cloud feature to create and share reports directly from the measurement point much faster and easier. In many cases, you do not have to sit by the computer, but create a report from the measurement directly in the field.

⊘ MAIN FEATURES

• 4x higher IR resolution (160x120px) comparing to C3 model

• Instant backup of your images to Flir Image Cloud Ignite (FREE 1 GB Storage, software available on PC and mobile).

• Automatic or Manual setting of level and span of temperatures of your measuring object? All available at one click.

• 3,5" LCD screen (+36% more area in comparison to C3)

• 5MPx visual camera

☆ PRICE GUIDE

	FLIR C5 (89401-0202)	637,00 €
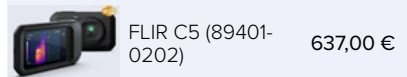
Could visitors measure their own temperature
when entering your premises?

If you have a K3 IR, they certainly can. Fast and reliable, non-contact IR thermometer for temperature measurement at the entrances to buildings saves time and doesn't need human assistance. It can be mounted on a wall or a tripod. It is a practical and ready-to-use solution at a reasonable price.

Currently, we often need to measure people's body temperature at entrances to various buildings. There are several ways to do it, but most often we use a hand-held, non-contact thermometer, such as the handy thermometer **YHKY 2000**.

A more convenient, but also much more expensive solution is a measurement using an IR camera with immediate evaluation and display on a monitor. The disadvantage of this „high-tech" solution is the price and also the need to place the camera, PC and monitor in a suitable place, which is quite difficult in many small shops.

However, there is an elegant compromise. It is the measurement with an **automatic IR thermometer K3 IR**, which does not need the help of an operator and in case of increased temperature, it significantly indicates it - optically and acoustically.

**Quick measurement, accurate feedback and fever alarm**

It works really easily. Just approach your face to the thermometer at a distance of 5-10 cm, and it will automatically measure your body temperature. The measured data is displayed on a sufficiently large 3-digit LED display and the green LEDs on the sides light up. If the temperature is higher than 37.3°C, the thermometer emits an acoustic warning tone and the LED lights up red.

⊘ MAIN FEATURES

• Test distance 5 - 10 cm

• Fever warning (above 37.3°C)

• Tripod mounting hole: 6.3 mm (1/4 inch)

• Surface mode measurement range 0 to 50°C.

• Standby operation: Approx. 1 week with 2500 mAh Li-Ion 18650 rechargeable battery

• Connections: Micro USB / USB 2.0

☆ PRICE GUIDE

	K3 IR Thermometer (2265919)	162,50 €
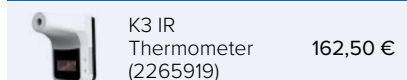
Integrated WiFi solution with ESP8266 and minimal consumption

HOPERF

The WiFi module HM-WF8266 from HopeRF ensures stable long-distance transmission and wide coverage with low power consumption. In addition, with its compact design and a great price, it is the ideal solution to meet the different requirements in a wide range of applications.

HM-WF8266 module integrates a very popular ESP8266 chip with an enhanced version of the Tensilica's L106 Diamond series 32-bit core processor, with on-chip SRAM with frequency support of 80 MHz and 160 MHz, and RTOS support.

HM-WF8266 can use GPIO external sensors and other devices to achieve the minimum system resources in an early development and operation.

Key Features:

- UART/GPIO/ADC/PWM/I2C interfaces
- Built-in one 10 bit high precision ADC
- Support for serial local upgrade and remote firmware upgrade (FOTA)
- Deep sleep current: ≤20uA
- **4MB** Flash memory
- Security mechanism: WPA/WPA2
- Encryption type: **WEP/TKIP/AES**
- Upgrade firmware: UART Download/ OTA (via network)

- Network Protocol: **IPv4, TCP/UDP/ HTTP/FTP/MQTT**
- User Configuration: AT+ Instruction Set, Cloud Server, Android/iOS APP
- Dimensions 24 x 16 x 3 mm
- Typical areas of application: sensor networks.

⭐ PRICE GUIDE

HM-WF8266 4MB	3,80 €

Diagonal fan EBM-Papst with 2 useful additional features

ebmpapst

In addition to lower operating noise and high pressures, the DV6224 / 17P-00240 diagonal fan also offers PWM input for speed control and Alarm signal at a price even more advantageous than the standard model.

At first glance, the diagonal fans differ only slightly from the axial ones. Intake is axial, whereas exhaust is diagonal. Due to the conical shape of the wheel and housing, the air in the diagonal fan is more compressed.

In direct comparison with axial fans of the same size and comparable performance, these fans are distinguished by the lower operating noise at high pressures.

We're bringing you one attractive version of the standard diagonal fan DV6224 from EBM-PAPST directly from our warehouse.

⭐ PRICE GUIDE

DV6224/17P -00240	107,00 €

This is a short version of the article. The whole article can be found at web. Decode the link in QR code.

Finder 41.61 relay or high current in a small case

finder

One of the most popular types of power relays in a compact design with a current of 16 A. The main advantage of the European manufacturer is a wide range of models with AC as well as DC coil.

Finder is one of few manufacturers who are producing most of the relays in Europe. And so you can be sure that your relay did not have to travel a long time and in difficult climatic conditions, which definitely would not do any good.

The 41 series relay is one of the most common power relays on the market. It is produced by almost every manufacturer and it is popular because it has compact standardized dimensions and reasonable performance. Thanks to the standardized dimensions, the sockets are then also available, both for PCB and DIN rail.

In series 41, relays with 1 changeover contact for 12 A (41.31) and 16 A (41.61 with different terminal layout) and relays with 2 changeover contacts 2x8 A (41.52) are available.

So far, the most popular is the relay for 16 A type 41. 61.

Unlike most Asian relay manufacturers, Finder is significantly more responsive and flexible. They do not require high MOQs even for less common coil voltages, we can even provide non-stock types relatively quickly and often from 1 piece. Try us.

MAIN FEATURES

- Power relay for PCB or socket (socket for PCB or for DIN rail)
- 1 pole
- Maximum current: 16A
- Maximum load: 4000VA (resistive load)
- Coil: AC (24-230V): 0,75VA / DC (5-6-12-24-48-60-110V): 0,4W
- Mechanical life: 10 mil. cycles
- Electrical life: 50 000 cycles
- Dielectric strength between open contacts: 1000 V
- Insulation between coil and contacts: 6000 V
- Dimensions (WxLxH): 29x12,6x15,7 mm
- Ambient temperature range: -40°C...+70°C(AC)...+85°C(DC)

PRICE GUIDE

41. 61. 9.024.0010   2,90 €

SL102 – Smart Reader to Speed Up Your Processes

StrongLink

Whether you are a small business or a bigger company with more employees, you will certainly welcome a possibility to speed up your manufacturing/logistics processes. How? Simply, conveniently and effectively with Stronglink smart reader.

SL102 is an easy to use compact RFID reader with HID USB interface and it is acting like a keyboard when connected to a PC.

If employees are required to enter, e.g. password during your manufacturing/logistics processes, you can easily replace the keyboard with this small RFID reader and spare a few seconds every time a keyboard input is required.

In the end, you could save tens of minutes every day!

Features / parameters:
- Tag supported: EM4100 compatible class
- Frequency: 125KHz
- Integrated antenna
- LED and Beep
- USB keyboard emulator
- Plug and Play
- Working current less than 100mA @5.0V
- Operating distance: Up to 80mm, depending on tag
- Operating temperature: -20 °C ~ +70 °C
- Dimension: 104mm × 68mm × 10mm
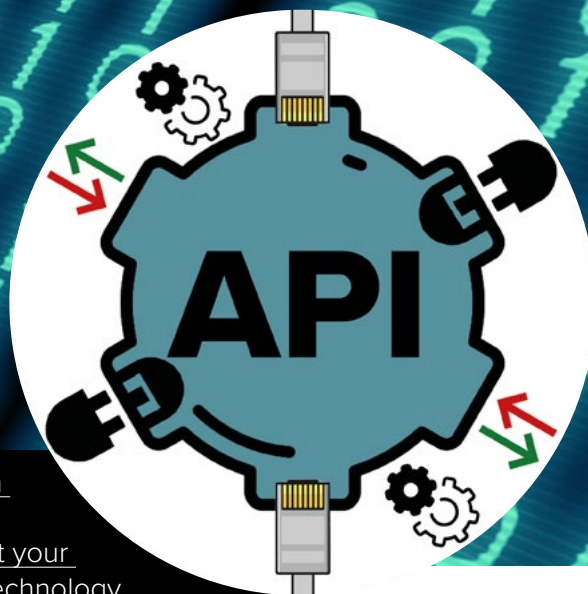- Output format: can be customized (default is 5-bytes hexadecimal)

PRICE GUIDE

SL 102   19,00 €

Access SOS electronic via REST API interface

We bring you the possibility of automated communication without human intervention. We will provide you not only detailed data about the goods, but also information about your orders and invoices. Request API access and REST API technology will take care of the rest.

You can use **API** (Application programming interface) to communicate with us automatically.

The software on your side communicates with the software on our side. This way we can provide you with, e.g. data about the goods, their price and the number of pieces we have in stock.

Communication is done using the HTTP protocol, it is secured by an SSL certificate, and the data in requests as well as in responses are sold in JSON format.

What can our API do?

We have a first functional, so called beta version of the API. There are several basic features already available.

- Product search in the SOS electronic database

- Detailed information about goods

- List of your open orders

- List of invoices

Before the actual call, user authentication is required. It is carried out using the OAuth2 protocol.

We have the documentation for programmers ready in the English language, and it is available at
https://api-customer.sos.sk/docs.

The most frequently used API method is to search for goods in the database. The attached image shows the output of our API. This is the information about the goods you will receive.

How to request access to API?

It is very simple. Request access details from our salesman with whom you communicate. You can find his name, e.g. even after logging in to the e-shop at the top right of the screen.

We will then create a **login name + password** for you and send them to you along with instructions on how to start automated communication. And REST API technology will take care of everything else.

We will be happy to respond to your comments and suggestions at
webmaster@soselectronic.com.

Adrián Lipták
webteam manager

Searching for Similar Products

If you need a product that we do not currently have in stock, or the price does not suit you, you can just find an alternative. Choose the basic parameters and find a similar product from the list.

This functionality is available on the **Product Detail** page. As an example, let's take the DC/DC converter TBA 1-1211.

There are active checkboxes in the **Specifications** section. Mark those parameters of the inverter that you need to keep.

Confirm your selection with the Show similar items button and you will see a list of the converters that meet the selected conditions.

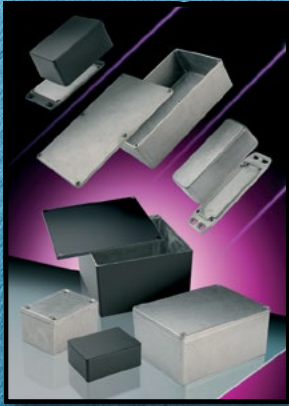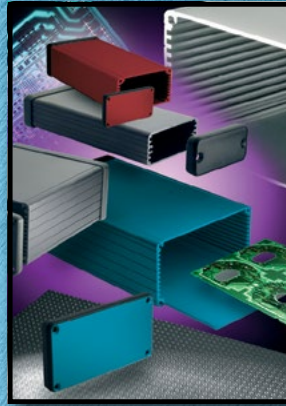We have chosen the following 4 parameters in our example:

• output voltage
• power
• output type
• case

The final list contains 9 products, from which you can choose the one that suits you the best. Whether according to price, availability or other technical parameters.

For an online preview, click on this link with a list of suitable converters, or try it straight away and find a suitable alternative to your product.

If you are interested in this topic or have any comments and suggestions, we will be happy to answer you at
webmaster@soselectronic.com.