

Cover Story

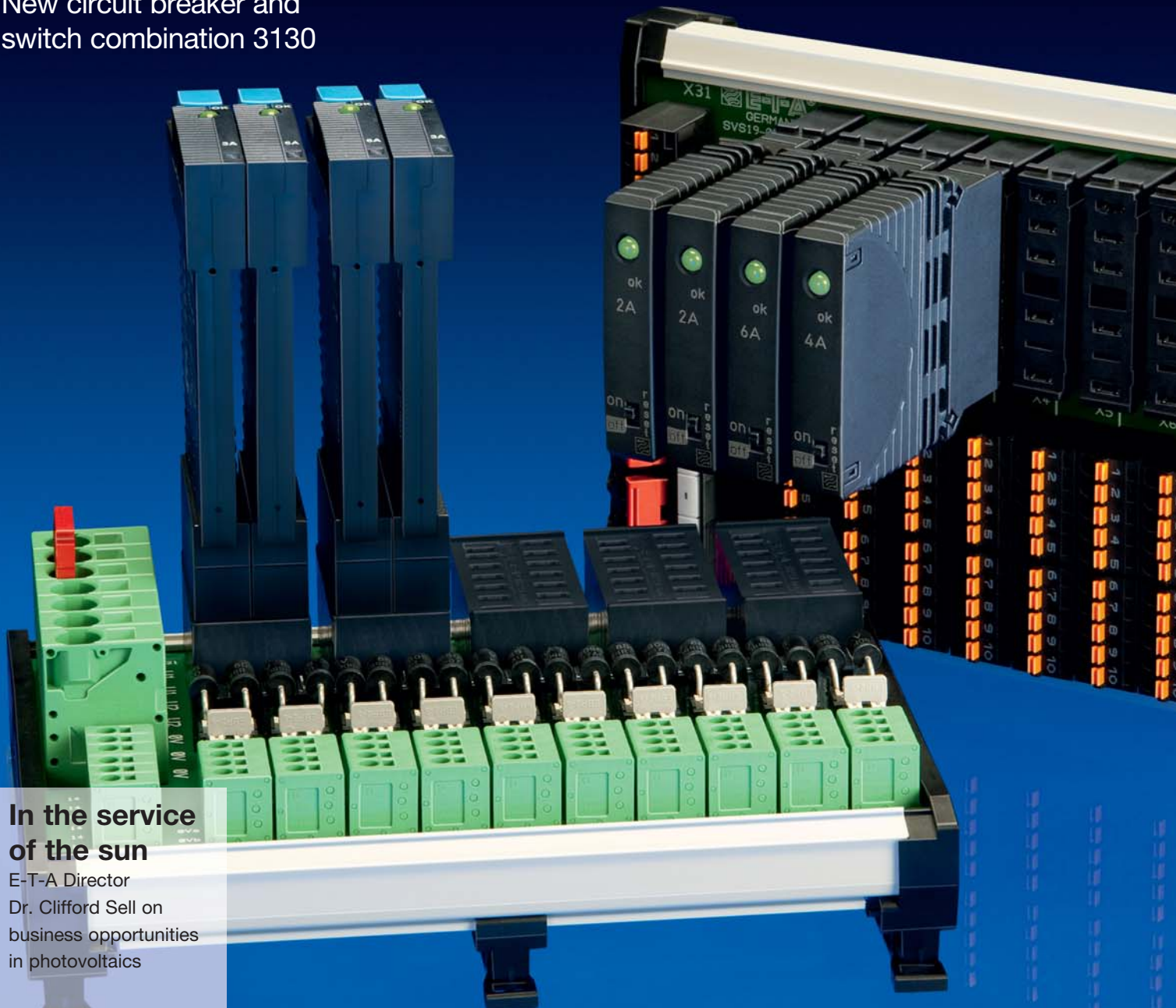
Combinations in a modular system
Power Distribution Systems SVS18 and SVS19

Explosion-proof

Electronic Circuit Protectors
ESX10 and ESX10-T

Protecting air-conditioning systems:

New circuit breaker and
switch combination 3130



In the service of the sun

E-T-A Director
Dr. Clifford Sell on
business opportunities
in photovoltaics



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Explosion proof
Electronic circuit protectors
ESX10 and ESX10-T



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Combinations in a modular system
Power distribution systems
SVS18 and SVS19



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FAQ – Frequently Asked Questions
All you ever wanted to know about
E-T-A products



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For protection of air-conditioning systems
New circuit breaker and switch
combination type 3130

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Power distribution systems
SVS18 and SVS19

Impressum

Current, Customer Magazine of
E-T-A Elektrotechnische Apparate GmbH

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Responsible:
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Layout:
E-T-A Communications Department

Circulation:
16.000 Copies

Concerns about global warming and the limited supply of other traditional forms of energy are making it necessary for companies to develop and introduce new products using wind, water and the sun to generate power.



The PVDIS disconnect switch was first launched at Intersolar 2011 in Munich and immediately gained momentum with the engineering community because of its potential to increase the reliability and safety of photovoltaic systems. The positive reaction at Intersolar for the PVDIS reinforced our opinion E-T-A engineers

The expansion of new alternative energy initiatives offers a wealth of opportunities to industries worldwide. However, before these technologies can be fully adopted, there are new technical challenges to solve and investments in infrastructure to take place. E-T-A recognizes these challenges and large-scale investments; and uses this information when researching and designing products to specifically meet the unique, and often demanding, requirements of protecting sources of alternative energy.

are focusing their efforts on products that not only meet the needs of the market but also excite engineers working on alternative energy projects today.

If you would like to learn more about E-T-A's photovoltaic solutions, approvals or require more detailed technical information please do not hesitate to contact your local E-T-A office.

We look forward to working with you in the future and wish you a very happy and healthy 2012.

In the service of the sun

Most recently, E-T-A launched a high voltage DC disconnect switch, the PVDIS, which is the first product in its portfolio designed specifically for use in the photovoltaic industry. Designed with an extraordinarily high rupture capacity, the PVDIS disconnect switch is equipped with the technology to disconnect a running photovoltaic system in the event of a fire. This feature solves an existing problem in the photovoltaic industry and as a direct result, limits the potential of injuring first-responding emergency personnel.

Dr. Clifford Sell
Executive Committee
E-T-A Elektrotechnische Apparate GmbH



At a glance – the ESX10 versions for ATEX zone 2 applications:

- Approval to IEC/EN 60079-0 General Requirements and IEC/EN 60079-15 ignition protection class »n«
- Product marking Ex II 3G Ex nA II B T4 Ge X
- ESX10-.... **E** : rated voltage DC 24 V, current ratings 0.5A ...12A, for terminal block Module 17plus
- ESX10-TA/-TB.... **E** : rated voltage DC 24 V, current ratings 0.5A ...12A, for rail mounting
- ESX10-TC.... **E** : rated voltage DC 12 V, current ratings 1A ...10A, for rail mounting

The electronic circuit protectors **ESX10** and **ESX10-T** have now the ATEX approval.

Explosion proof

Since 1 July 2003 protection devices and systems used in potentially explosive areas have to meet the requirements of the EC directive 94/9/EC. This product directive is frequently called **ATEX** (from French »**AT**mosphère **EX**plosible«).

The directive distinguishes equipment into groups: group I for mining and equipment and group II for all other areas which could hold an explosion risk through gas (coding G) or through dust (coding D). The ATEX-approved 3G category of ESX10 and ESX10-T are intended for the use in Ex zone 2. This is an area where – under normal operation conditions – a hazardous potentially explosive atmosphere with a mixture of air and flammable gas, vapour or mist will normally not occur or only for a short period of time. Documentation that the relevant standards for explosive areas are being met is provided by a manufacturer's declaration or an EC Type Approval as well as by internal production control and final inspection.

E-T-A now offers a special ATEX version for Ex zone 2 expanding the product range of our electronic circuit protectors type ESX10 (pluggable onto power distribution system Module 17plus) and ESX10-T (for rail mounting), particularly intended for applications in Process Control in the chemical, petroleum and gas industry. The space-saving design of the ESX10-T is available for DC 12 V or DC 24 V applications and provides the best possible protection of loads (controls, sensors, transformers, solenoid valves etc.), which are fed by switch-mode power supplies or battery-buffered power supplies. Despite a width of only 12.5

mm, type ESX10-T offers a sophisticated busbar concept. Line entry and load connection to the protected plus pole and neutral line are established with a screw terminal up to 10 mm² directly on the devices. The screw terminal consists of a high-strength copper alloy and is designed according to the patented Reakdyn principle which ensures a reliable and safe cable connection.

Reliable selective load protection

The selective load protection of the ESX10-T with fixed current ratings of 0.5 A through 12 A exclusively disconnects the faulty path in the event of an overload or short circuit in the load circuit without any repercussions on the DC supply. In the event of a fault in a single circuit, it is ensured that there is no voltage dip which would cause all loads connected to the switch-mode power supply to fail and even cause a system stoppage. The ESX10-T limits the short circuit current to 1.3 to 1.8 times the selected rated current and disconnects the faulty circuit after 100 ms. Inrush peaks are tolerated so capacitive loads of 20,000 µF plus do not present a problem. In the event of an

overload, the ESX10-T will disconnect at 1.1 times rated current after 3 sec which is not possible with conventional branch protectors (MCBs) and long cable lengths.

Remote control, international approvals

Besides the standard versions with potential-free signal contact there are special ESX10 versions available with electronic status output and control and/or reset input. So when using peripheral IP 65 systems in the field, the electronic circuit protector can be reset after overcurrent trip via a corresponding remote control signal without requiring a technician on site.

Additional Ex approvals such as UL 1604 Class I Div 2 and CSA 22.2, No: 213 as well as the approval for industrial applications to UL 508 and UL 2367 make the ESX10 products fit for global use in the process control industry.



Electronic circuit protectors type ESX10 and type ESX10-T

*DC 24 V power distribution all of a piece:
printed circuit boards optimise wiring
in control cabinets*

Power distribution systems **SVS18** and **SVS19**

Combinations in a modular system

In mechanical engineering and plant construction there is a great number of very different requirements regarding power supply and distribution in DC 24 V systems.

More and more design engineers today are specifying the various power distribution systems type SVSxx, which accommodate E-T-A plug-in type circuit breakers 2210-S, ESS20 and ESX10. What would you do if the best possible solution were a combination of existing SVS systems?

No problem, because now the »SVS modular system« consists of a mounting rail, with a size and shape that can optimally be adjusted to specific control cabinet concepts. The profile includes accommodation of the carrier pcb for the plug-in type circuit breakers and electrical contacting of line entry, load and signalling level via screw terminals or spring-loaded terminals. Additional components such as diodes, LED displays, measuring instruments or electronic modules can easily be integrated. After a joint analysis of the existing electric diagram, modern CAD tools help to establish 2D and 3D drafts of an optimised power distribution solution. All electrical and mechanical key data will be summarized in a product brief. In the next step, a new schematic diagram is established transforming the previous wiring concept into correspondingly sized circuit tracks and insulation distances on a multi-layer printed circuit board. Thermal imaging of SVS prototypes, fitted with circuit breakers, shows how the entire

system will behave under full electrical load plus 50% overload and the maximum ambient temperatures to be expected in a control cabinet. This procedure allows special mechanical, electrical and thermal conditions to be taken into consideration very early on when planning and designing a control cabinet.

The 10 ways of power distribution system SVS18-10 for redundant protection of DC 24 V loads are specifically designed for applications in process control industry and power plants. Line entry is via two voltage potentials U1 and/or U2, which can be bridged among one another. Each way or slot has two integral redundancy diodes in the protected load output L+ - allowing control units, all I/O sub-assemblies and also additional field modules or bus modules to be protected redundantly.

The SVS19-08 power distribution system is used mainly in conventional machine construction and helps to optimise the distribution of the DC 24 V control voltage where up to 10 load current circuits are protected by one circuit breaker or protector. In addition there are 35 integral terminals for the return conductors of the loads. This helps to reduce connection

points significantly so the space beside the switch-mode power supply can be used for overcurrent protection plus power distribution. Moreover, an even and consistent temperature distribution is provided on the SVS19 printed circuit board (see fig. 1 and 2).

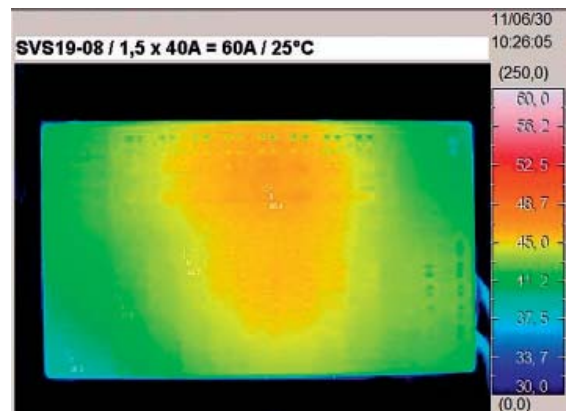


Fig 1: power distribution system SVS19-08 at 25 °C ambient temperature and 1.5 times rated load

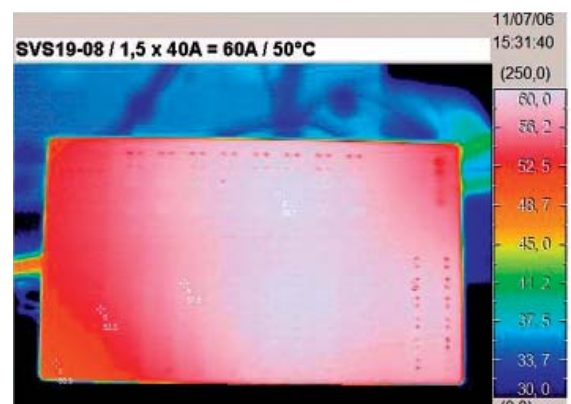


Fig 2: power distribution system SVS19-08 at 50 °C ambient temperature and 1.5 times rated load

Pick the right order and be on the safe side!



Sven Ronneberger,
Production Manager at
the Gollmann
Kommissioniersysteme
GmbH

*The Gollmann
Kommissionier-
systeme GmbH
(QS certified to DIN
ISO 9001) designs,
plans, produces and
sells dispensaries
for pharmacies
and industrial
applications. More
than 160 pharmacies
in Germany and
abroad have*

*successfully been using their patented
robotic dispensing system. It provides
extremely high stock density and allows
comprehensive inventories with ease of
access where space is at a premium.*

*For information visit www.gollmann.com
The E-T-A Current talked with Production
Manager Sven Ronneberger about using
E-T-A's electronic circuit protectors.*



Gollmann dispensary systems are setting the pace in pharmacies and help to deal with the complex ordering picking processes.

Current: How did you hear about E-T-A?

Sven Ronneberger: We were looking for a working protection concept for controlling our order picking systems. Internal tests had shown the branch protectors (MCCBs) we were using did not disconnect reliably in the event of an overload or short circuit. A failure in the current circuit caused the power supply to switch into current limitation shutting down the output voltage. These voltage dips caused line stoppages without identifying or detecting the faulty circuit. This problem was solved by using E-T-A's Electronic Circuit Protectors.

Current: What is your experience so far with the circuit protectors?

Sven Ronneberger: Experience is actually split. Using the electronic circuit protectors was the right step from the technological point of view, but at first sight it led to increased costs.

Subsequently we tried to cut back part of the increase by using switch-mode power supplies with power boost function together with the standard protection concept.

Current: This means there were times when you did not use the circuit protectors?

Sven Ronneberger: Yes, we relied on the power boost function of the power supplies and re-designed the protection concept again to accommodate branch protectors. However, we again experienced the overload failure which I described earlier.

Current: What did you do then?

Sven Ronneberger: A new test with E-T-A's electronic circuit protectors removed the problem. We now wanted to get down to the nitty-gritty of the problem and together with an application specialist

from E-T-A we carried out professional measurements in our system.

Current: How did the measurements go and were you able to make use of the results?

Sven Ronneberger: The results were utterly convincing. From a certain cable resistance in the circuit, the power boost of the power supply no longer influenced the tripping behaviour of the protective element, as the overload current is solely determined by the entire load circuit resistance. At this point the special benefits of the E-T-A Circuit Protector ESX10 are fully brought to bear. They provide reliable disconnection even for far longer cable lengths and ensure stable DC 24 V voltage even in the event of an overload.

Current: Thank you for your time.

Jill Andreu



Jill Andreu, Business Development Manager – Communications, joined the E-T-A US Sales & Business Development team in September 2010. Before joining E-T-A, Jill spent seventeen years as product line manager at Emerson Network Power. This experience gave Jill a wealth of knowledge in the sale and marketing of power management solutions and made her the perfect candidate to work directly with E-T-A's US Regional Sales Managers to penetrate new areas of the communications market.

Jill also supports key account relationships - most recently at Alcatel-Lucent and Google - and works closely with the US engineering team to develop new solutions for telecom and datacom applications. Jill's knowledge of the market and creativity in presenting solutions based products continues to elevate E-T-A's presence in the industry as a power management solutions provider.

Moriyuki Tsukahara



Moriyuki Tsukahara (37) joined the Japanese subsidiary in 2010. His present responsibility is to provide professional engineering service for our customers in the Tokyo region. One of his projects is the development of Energy Harvest solutions. In the future, he plans to move to Osaka to continue the establishment of our Osaka/Kyoto office. Once having arrived there, Moriyuki will take care of our customers in Kyoto area with sales engineering support.

Moriyuki is a graduated Electrical Engineer and carries a double degree from Osaka Communication University in Japan. Moriyuki will focus on both the extension and the deepening of existing business relationships as well as the enhancement of the established sales territory by attending to the great number of industries being served by E-T-A.



Our FAQ pages are meant to intensify the dialogue between manufacturer and customers. They will deal with topics arising from practice and answer relevant questions as shortly as possible and as detailed as necessary.

Do you have any questions you need answer to?

Send it to us – we are looking forward to hearing from you.

E-T-A Elektrotechnische Apparate GmbH

Keyword: [Current FAQ](#)

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Switching at frequencies of 50 Hz plus (part 1)

What's important when using E-T-A circuit breakers?

There are a number of applications requiring switching operations at frequencies which are higher than the standard supply frequency in Europe. Increasingly, there are parts with a multiple of the basic frequency of the supply voltage due to system perturbations caused by non-linear loads such as switch-mode power supplies and power converters (see fig. 1). This raises the question: Are our products generally suited to such applications?

What are the physical effects of higher frequencies?

For low frequencies, the ohmic losses in a switching device are generally independent of the frequency. Caused by the proximity effect, not the entire cross sectional area of a conductor will be used for the current flow in the event of higher frequencies. Magnetic effects cause the current to be pushed to the surface and only uses a thin layer for the current flow ("skin effect"). The penetration depth of the current decreases with the frequency so that the resistance will rise. However, this will only clearly take effect with frequencies significantly higher than 10 kHz. At 100 kHz the resistance of a coil has already gone up some 20 % on the d.c. value. The change of the magnetic

field induces a voltage in the iron of the magnetic circuit which in turn provokes a current flow whose height depends on the specific resistance of the iron used. These so-called eddy currents cause losses and thus an increase in temperature in the iron. The permanent re-magnetising of the "Weiss domains" in a ferromagnetic material following the rhythm of a frequency causes additional hysteresis loss.

Is there an effect of the North American standard frequency of 60 Hz?

At 50 Hz the magnetic losses caused by eddy currents and permanent magnetising and de-magnetising are negligible compared to the ohmic losses. However, at a frequency of 1 kHz the magnetic losses have already been reduced to half as high as the ohmic losses. Only at

significantly higher frequencies will the magnetic losses prevail. At some point, the skin effect will also have to be taken into consideration. So whether we use 50 Hz or 60 Hz as a mains frequency it hardly influences the losses.

Is there an effect of a 400 Hz frequency usual in on-board and isolated networks?

Yes – the magnetic circuits will heat up due to eddy currents when using standard devices with magnetic trip mechanism. In addition the trip curve will be shifted as there will be less magnetic force available due to the losses. The breaker will no longer protect the system as the trip curve shifts to the right and it will overtime fail due to overheating.

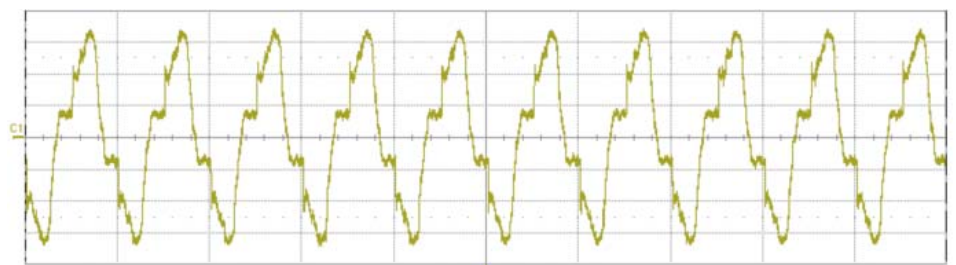


Fig. 1: Typical curve of the input current of a switch-mode power supply

The footprint – our top priority



Richard Mehl is the Head of the E-T-A's Communications and Systems Division.

More space for functional equipment – this is what customers are ready to pay for. Normally, standard telecommunications equipment and server-based technologies are fitted with a “top-rack-unit”, i.e. a power distribution unit, e.g. a Power-D-Box, is installed as a system unit directly beneath the roof of the control cabinet.



“Zero U” optimises the footprint of your equipment.

E-T-A applied a state of the art installation method for AC systems when working with Nokia Siemens Networks. The control cabinet did not allow even a single unit of height – “Zero U”. To solve this, E-T-A designed a vertically structured **Power-D-Box**® System for placement on the side of the control system - allowing access from the rear.

Server control cabinet concepts, normally have an installation depth of 800 mm or 1000 mm and use the rear part primarily for the cooling function. Server racks or blade servers are usually fitted with axial fans which are then re-directed so that a cold air column is created. Therefore our **Power-D-Box**® systems are mounted redundantly on the left and right side wall.

The advantages are obvious:

- Negative turbulences are reduced to a minimum
- Height of the cold air column will only minimally be affected
- Cable connections are possible directly at the termination area (rear

side) of the functional equipment (short distances and cable lengths)

- Functional equipment, server racks or blade servers can be installed with top priority on the height units accessible from the front
- Extensions and additional installation space can be made available to the customer at very low expense, a change or expansion of system racks is not required
- Supply of the **Power-D-Box**® is optionally possible from the bottom or top
- The power distribution systems can be mounted side-by-side, i.e. they have a modular design so the required number of loads can be optimised to the demand of the application
- Screw terminals provide a clear arrangement and exact adjustment of cable lengths and superfluous cables do no longer have to be tucked away.

In a nutshell: an E-T-A power distribution system can be installed where and how it offers the most benefits for the customers.



Vertical Power-D-Box mounted on the rear side

E-T-A solutions for many products

E-T-A offers tailor-made solutions for a wide range of industries and products. Here are some interesting examples.

Application: Film stretching and casting
E-T-A type: ESX10-TB

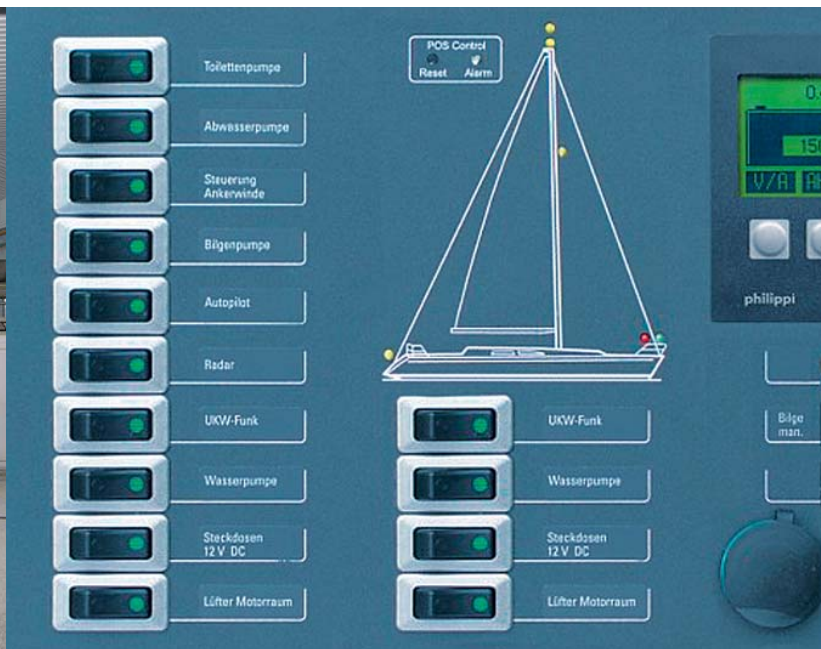
The German company Brückner Maschinenbau GmbH & Co. KG located in Siegsdorf is the world's major manufacturer of production equipment for mono- or biaxial stretching and casting of top-quality films. The equipment can be up to 200 m long and produces films with up to 10 m width which serve as packing material and are also used in technical applications, e.g. capacitors or flat screens. In order to achieve maximum availability of the production equipment, Brückner uses the electronic circuit protector series ESX10-TB to selectively protect all DC 24 V load circuits. Its special benefit: active electronic current limitation in the event of a short circuit and reliable overload disconnection commencing at 1.1 times rated current, i.e. they always trip reliably even in the event of long load lines being installed.



Application: Dashboards for watercraft
E-T-A type: 3130, 3131, 1140-F

The name Philippi is synonymous with for professional electrical systems intended to use in motor and sailing yachts. Their product range includes all products providing reliable power supply and distribution on board: from batteries to chargers, from power management boxes to complete shore power connection units and circuit distributions. All these components are perfectly matched and make the well-known Philippi on-board system. With regard

to the circuit breakers fitted in the circuit distributors, Philippi has been relying on E-T-A for many years. They use our single pole reset type 1140-F and single pole and double pole versions of the 3130 and 3131 series. What all circuit breakers have in common: a very robust design, reliable mechanism, attractive styling and appearance.



Applications

Application: Telecommunications E-T-A type: **Power-D-Box**® S350

The German Telekom AG is one of the world's major service companies in the telecommunications and information technology industry. The group intends to invest considerable sums in Germany over the next few years in: glass fibre networks, new mobile radio technologies and IT processes – offering its customers more speed and new products. For many years, the German Telekom has been using E-T-A's circuit breaker type 2210-S291 for telecommunications applications and the pertinent power distribution rail X2210-S0606J, both supporting innovative plug-and-play telecoms products.



Energy demand in network access technology is constantly increasing so Telekom is also using type 8345-C01A-W0M1-DB1B2B for higher current ratings. In addition, E-T-A is also known as a supplier of system solutions by supplying the E-T-A **Power-D-Box**® 19BGT-1-8345-02R4SW-B0-S350. This completed our product range offered to the German Telekom and helped to establish our reputation not only as a supplier of components, but also as a supplier of solutions.

Application: Hydraulic Mining Excavator E-T-A Typ: E1048-8D

Komatsu Mining Germany is the European production facilities of the Japanese company Komatsu for extremely powerful hydraulic excavators. They are the second largest manufacturer of construction machinery and vehicles and in their Düsseldorf factory they produce gigantic excavators with a weight up to 750 tons and a bucket capacity of 42 m³. In these excavators they use E-T-A Smart Power Relay E-1048-8D.

As mining excavators have to work reliably around the clock, Komatsu was looking for an extremely reliable electronic relay as a switch for the refill pump for hydraulic oil. In the end Komatsu decided to specify the E-1048-8D as it is absolutely maintenance-free and has an integral protective function. In addition its extremely good shock and vibration values helped to convince Komatsu.



E-T-A circuit breaker type 3130 helps to reduce components.

New circuit breaker and switch combination for protection of air-conditioning systems

Design engineers today are trying to systematically reduce individual components. This is a key factor of cost-efficient design.

Normally less components also means more space which is enabled by the design of compact products. In order to support Design Engineers in their search for parts reduction, E-T-A offers a combination of circuit breakers and switches. These are thermal circuit breakers providing overcurrent protection and serves as an ON/OFF switch for devices, machinery and equipment at the same time. E-T-A is the world market leader in circuit protection and offers a wide range of circuit breaker and switch combinations. It does not only include various designs and actuating methods, but also a wealth of colour, marking and illumination options.

New: type 3130 with push button operation

The latest model in the circuit breaker/switch combination range of E-T-A is the single pole thermal circuit breaker type 3130 with push button operation. The design was initiated by our French customer Legrand who uses E-T-A's circuit breakers in installation frames of on/off switches for air-conditioning systems. The 3130 provides overcurrent protection for the installation cables leading from the switch frame to the air-conditioning system. In the event of an overcurrent the E-T-A circuit breaker trips, goes into OFF position and reliably disconnects the air-conditioning system and its cables from the supply network. Another feature of type 3130 with push button operation is a new option for electrical connection: it can be ordered with 45° angled screw terminals with M4 screws and clamping piece. This makes the 3130 a valuable and highly suitable component for installation technology.



The new installation frame "Dismatic" made by LEGRAND

A choice of applications

E-T-A circuit breaker and switch combinations are suited for a wide range of applications due to their robust and reliable design, including medical equipment, professional tools, household appliances and gardening tools. For example in France, E-T-A products are used by manufacturers of floor sanding machines and concrete vibrators. Another application field is sailing yachts where the E-T-A circuit breakers are installed in central dashboards. They serve for switching on and off of all loads on board such as the bilge pump, the anchor light or the interior lights. At the same time they protect cables and loads against possible damages caused by overheating in the event of overcurrents.



New E-T-A circuit breaker version type 3130 with two push buttons

Typically French: »Daube de bœuf provençal«

Popular in southern France, daubes (pronounced "dōb") are slow-simmered stews traditionally cooked in a special pot called daubière.



A culinary specialty from France: »Daube de bœuf provençal«

Beef or lamb are marinated in wine and herbs for a day or two, then simmered in a slow oven until meltingly tender. As with much French food, everyone agrees that a daube should be made just so, yet each region has its own variation. The version here is popular in Provence. This stew is a wonderful dish to make early in the day – or even a day ahead of time – to allow the complex flavours to mellow and develop.

Preparation

Chop garlic, onions (shallots) and carrot. Sweat these in 1 tablespoon of the olive oil. Add finely crushed peppercorns, mushrooms and herbs (leave approx. ½ teaspoon of herbs aside), deglaze with Cognac. Add water and wafer-thin strips of orange zest. Simmer for half an hour and put through a sieve.

Heat the remaining olive oil plus a bit of butter oil and shallow fry the meat, add salt and pepper, some of the wine, bay leaves and simmer over medium-high flame. When the wine has boiled away, new wine has to be added once in a while. This may take at least three hours.

During the last third of the cooking time add stock and wine and let boil away. Add the remainder of the herbs shortly before serving.

Serve with steamed rice or butter noodles.

Prep time: 24 hrs

Cook time: 3 - 4 hrs

Ingredients:

- 1 kg stewing beef, cubed
- 1 garlic bulb
- 5 shallots or 2 -3 onions
- 50 g dried mushrooms
- 5 black peppercorns
- 2 tablespoons fresh thyme, finely chopped
- 1 tablespoon fresh rosemary, finely chopped
- 1 carrot
- 2 bay leaves
- 0.25 l Cognac
- 2 litres red wine
- 0.25 l water
- 3 tablespoons olive oil
- ½ unwaxed orange
- salt and pepper

