



OVERCURRENT PROTECTION AND POWER DISTRIBUTION

for the process industry
and machine construction



WELCOME TO E-T-A

E-T-A was founded in 1948 and is the world market leader in the overcurrent protection and power distribution area today. In our four production factories in Germany (Altdorf and Hohenfels), Tunisia and Indonesia, we produce a wide range of circuit breakers and electronic circuit protectors, power relays and system solutions for the global markets.

One thing is always at the heart of our endeavours: E-T-A products protect lives and assets. In everything we do, with each and every unit we produce that our customers install in their applications, we protect man and machine against the effects of overcurrent and short circuit.

For this purpose we offer mechanical and electronic solutions, single components or entire systems, standardised or customer-specific products. We ensure that the current, without which our modern life is simply unthinkable, remains manageable.

We know that you want to offer your customers the best possible solution. You'll manage even better by using E-T-A's high quality solutions. We hope to make the world a little safer by supporting you with our products.

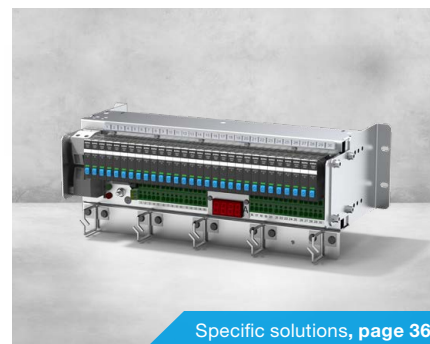
Please do not hesitate to get in touch.

Christian Kube
Managing Director

Dr. Jennifer Sell
Managing Director

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Managing Director

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CHALLENGES

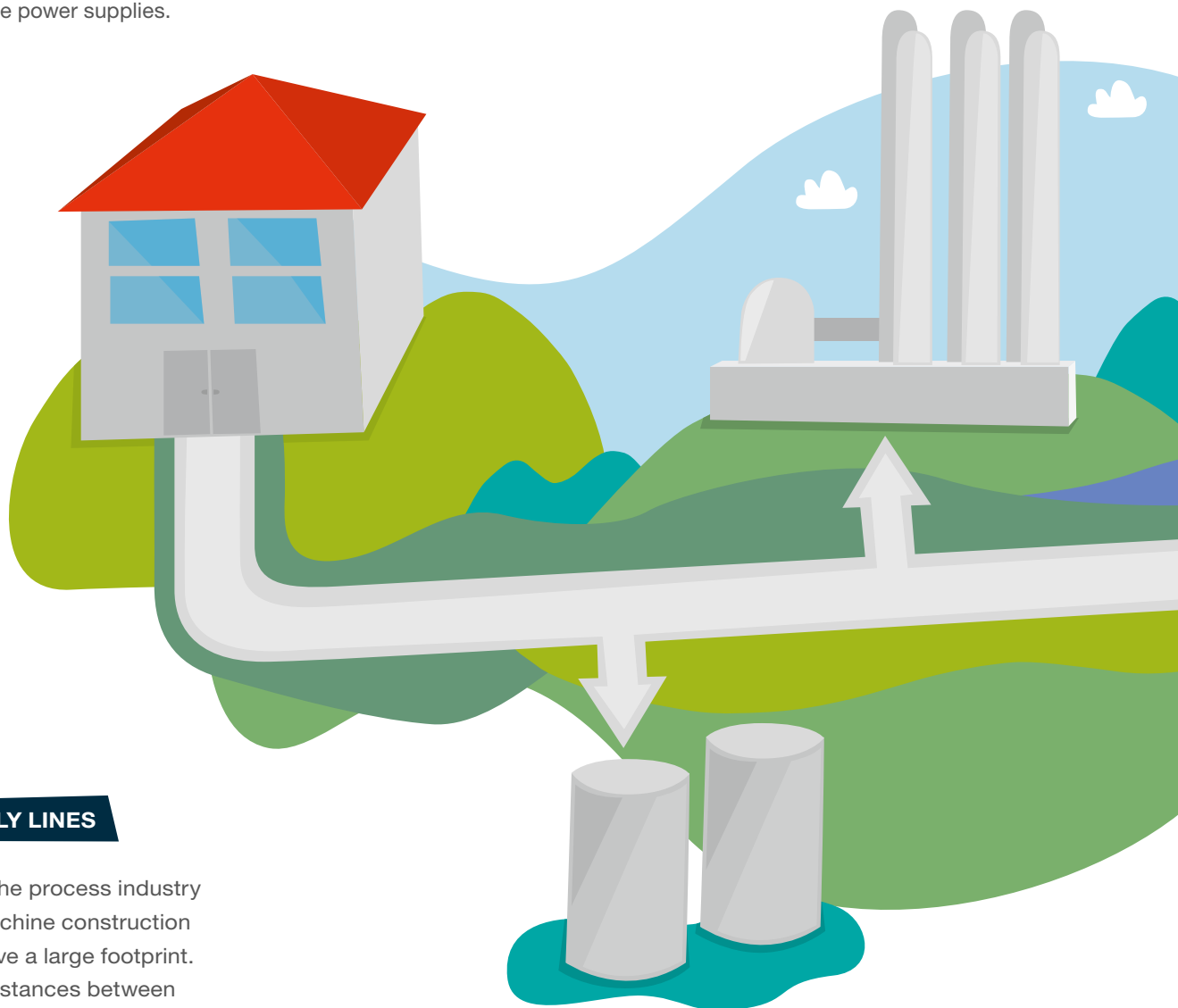
for the power supply in the process industry and the machine construction area

PROTECTION DOWNSTREAM OF THE SWITCH MODE POWER SUPPLY

Electronic circuit protectors offer significant advantages for load protection downstream of switch mode power supplies.

HIGH CURRENT RATING PROTECTION

Battery packs or AC 230 V voltage level protection requires a higher switching capacity. Mechanical circuit protectors are perfectly suitable for these applications.



LONG SUPPLY LINES

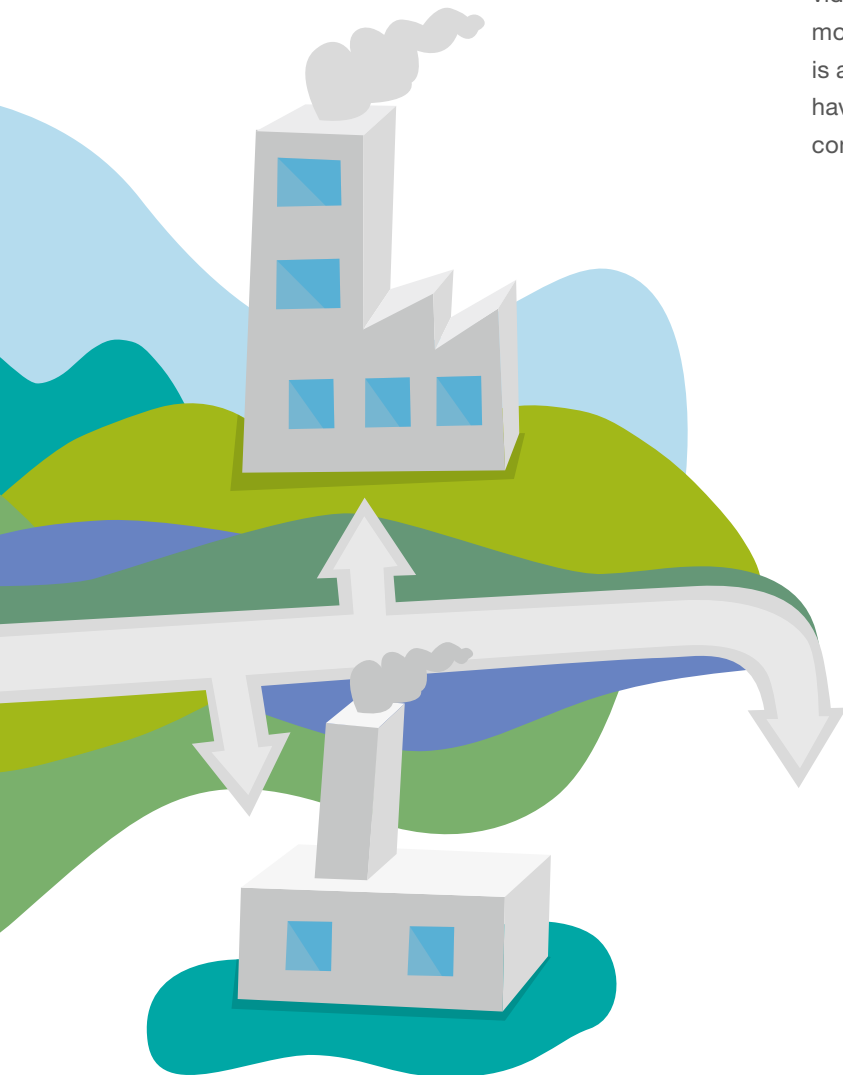
Machines in the process industry and in the machine construction area often have a large footprint. As a result, distances between e.g. individual sensors, actuators and the power supply, are quite long, resulting in long supply lines with the associated problems.

POWER DISTRIBUTION FOR STANDARD APPLICATIONS

Well-proven solutions are often used in standard applications, reducing project planning efforts and stock keeping. E-T-A's power distribution systems offer well-suited solutions.

MODULAR AND FLEXIBLE

Production facilities often run non-stop. Plug-in type circuit protectors with suitable modules are the ideal solution for system extensions, making it unnecessary to shut down the entire system for the extension process.



INCREASED SYSTEM AVAILABILITY THROUGH TRANSPARENCY

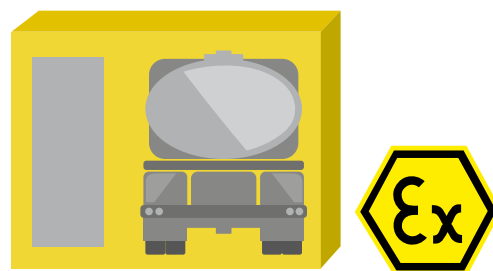
Modern power distribution systems not only provide the status of the circuit protectors, information about the current condition and the machine work load, but reduce system downtimes through targeted error detection.

PHYSICAL ISOLATION INCREASES SAFETY

The electronic overcurrent protection provides a significant benefit for the use of switch mode power supplies. The physical isolation is already integrated and the user does not have to do without it for actual physical disconnection of the load circuits.

PROTECTION IN THE ATEX ZONE 2

Due to the decentralised design of the power supply concept, distribution cabinets and boxes fall into the Ex-area. This requires new solutions for the protection of the connected loads.



COMPLETE SOLUTIONS FOR THE CONTROL CABINET

The compact complete solutions for the control cabinet allow fast and clear system protection.

INTELLIGENT OVERCURRENT PROTECTION

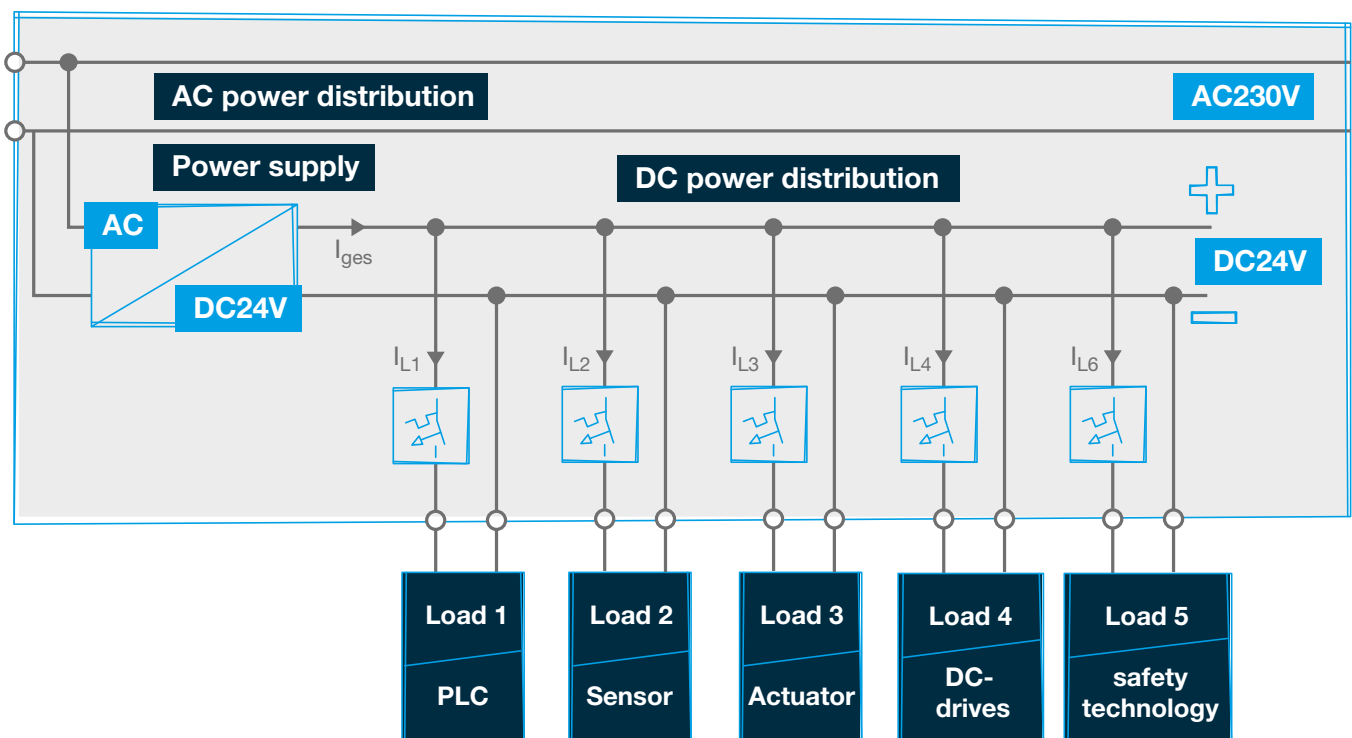
for protection downstream of the switch mode power supply

In the modern machine construction area, the DC 24 V voltage supply is often done via switch mode power supplies. This both offers benefits and challenges.

The different loads are connected at the secondary side of a switch mode power supply. In the example figure, there are five circuits. The total current of the switch mode power supply is a sum of the individual currents from I_{L1} to I_{L5} . It must be taken into account, that the sum of individual currents must not be higher than the maximum available total current of the switch

mode power supply. The switch mode power supply overload capacity is often only 1.1 to 1.5 times the rated current. This means that a 20 A switch mode power supply can only provide a maximum current of 30 A for a short time. If this maximum current is exceeded, the switch mode power supply will cut the output voltage and switch into the self-protection mode.

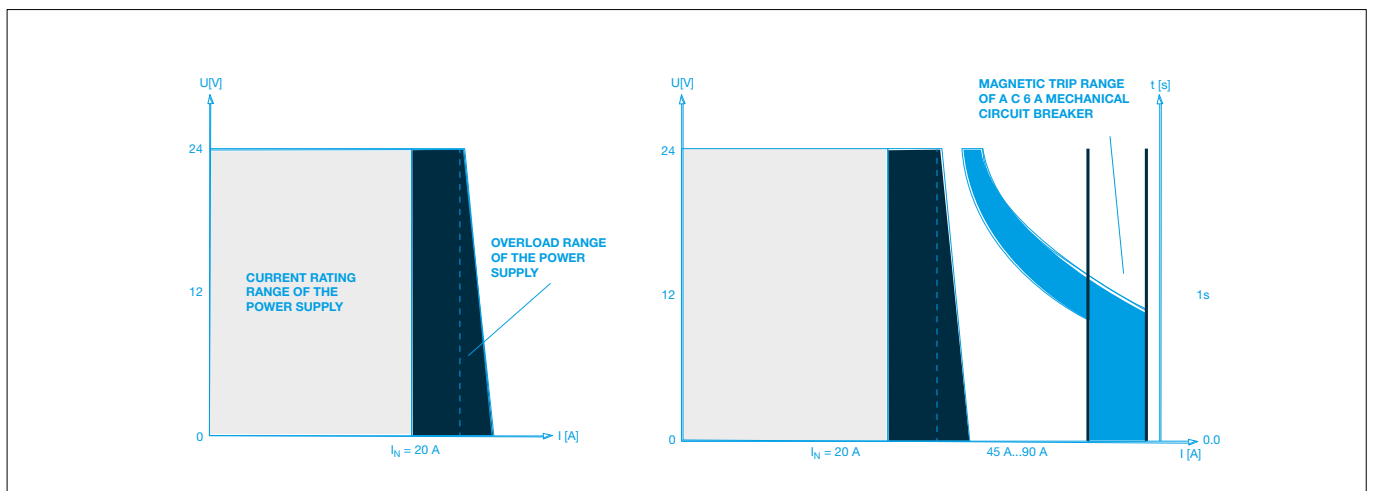
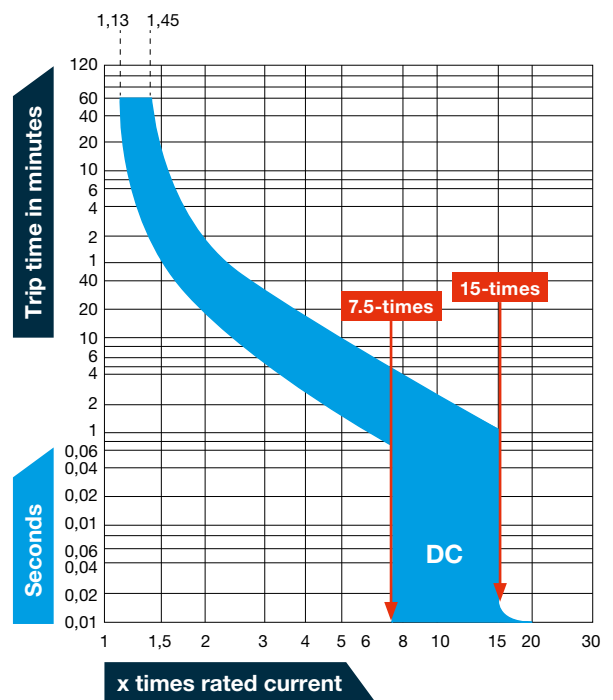
This leads to an insufficient supply of all connected loads, which will fail as a result and cause undefined and critical machine conditions. Needless to say, a switch mode power supply overload and the associated down regulation of the output voltage must be prevented.





When using a thermal circuit breaker, the current flows through the circuit protector and heats a bimetal. The higher the current, the greater the deformation. The relation between current rating and duration is shown in the characteristic curve. Compared to thermal circuit breakers the magnetic tripping reacts very fast. In the event of a short circuit the faulty circuit is interrupted nearly without delay. The magnetic characteristic curve shows that tripping at DC voltage only occurs at 7.5 to 15 times of the rated current. This means, that the switch mode power supply must supply this high amperage for a fast, magnetic trip.

Therefore, a C6A mechanical circuit breaker needs a trip current of 45 A to 90 A. The power supply cannot provide this amperage and switches off, disconnecting the supply voltage for all connected loads. This can lead to undefined conditions in the entire system.



The work area of a switch mode power supply and a circuit breaker often do not correspond. This results in power failures and undefined behaviour.

OVERLOAD PROTECTION

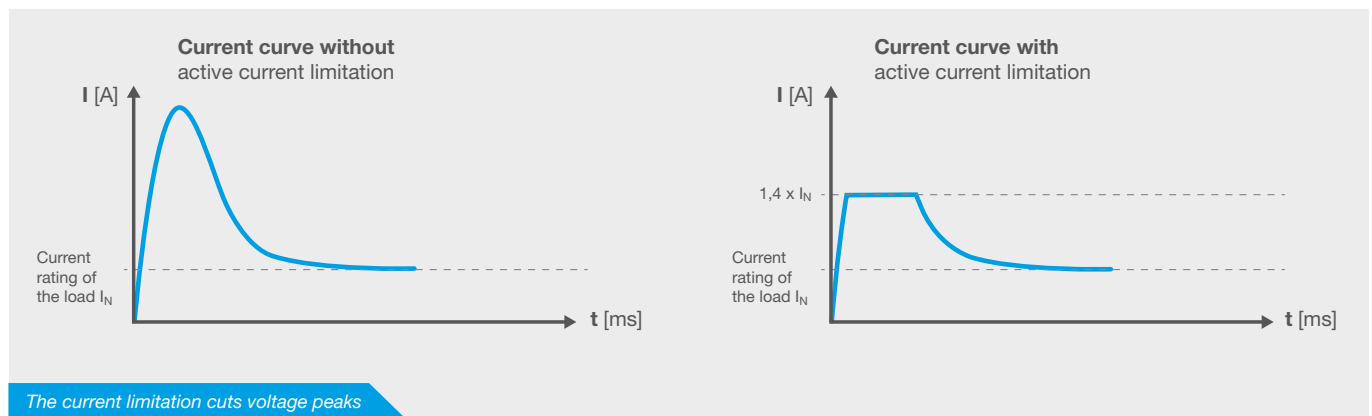
through active current limitation in long supply lines

Circuit protectors with active current limitation effectively protect the switch mode power supply against overload.

Using electronic circuit protectors with active current limitation is the perfect solution for circuit protection downstream of switch mode power supplies. They cut the current in the event of overload or short circuit and also protect the switch mode power supply against overload. This particularly applies for the protection of electronic control components, such as industrial PCs or magnetic valve distribution with

a high input capacity, leading to high inrush currents. This can overload the switch mode power supply. Using a mechanical circuit breaker can lead to undefined conditions in the system. Starting a motor can lead to similar conditions, because the motor starts with a high inrush current, which overloads the switch mode power supply, that will cut the output current and the motor will stop.

When the overload of the switch mode power supply stops, the connected loads will be supplied again, the motor will restart and the whole process starts all over again. This leads to undefined conditions in the entire system, complicated trouble-shooting and increased downtimes. The active current limitation prevents high inrush currents and ensures a reliable power supply.



LONG LINES LIMIT THE MAXIMUM CURRENT

Industrial systems in the process industry often have a large footprint. As a result, supply lines for components such as sensors, pumps or valves, are quite long, sometimes up to several hundred meters.

As explained before, a fast magnetic trip of a CBE depends on the load current level. The Ohm's law is important for determining the maximum current that can flow through a line.

MAX. SHORT CIRCUIT CURRENT

If a short circuit occurs in a damaged load supply line, the resistance of the load R_V is omitted. This means, that the resistance is reduced to the sum of the supply line resistance and the internal resistance of the circuit protector. Therefore, the maximum possible current $I_{max} = 13.2 \text{ A}$ (see calculation below) is defined by the circuit protector.

$$I_{max} = U_B / R_{Ges}$$

$$I_{max} = U_B / (R_L + R_i + R_V)$$

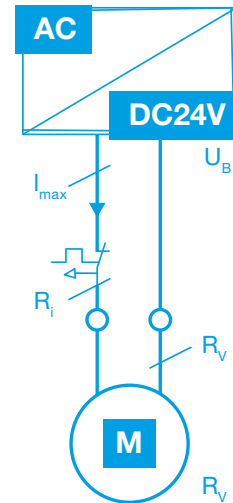
$$I_{max} = 24 \text{ V} / (1.78 \Omega + 0.041 \Omega + 0 \Omega)$$

$$I_{max} = 13.2 \text{ A}$$

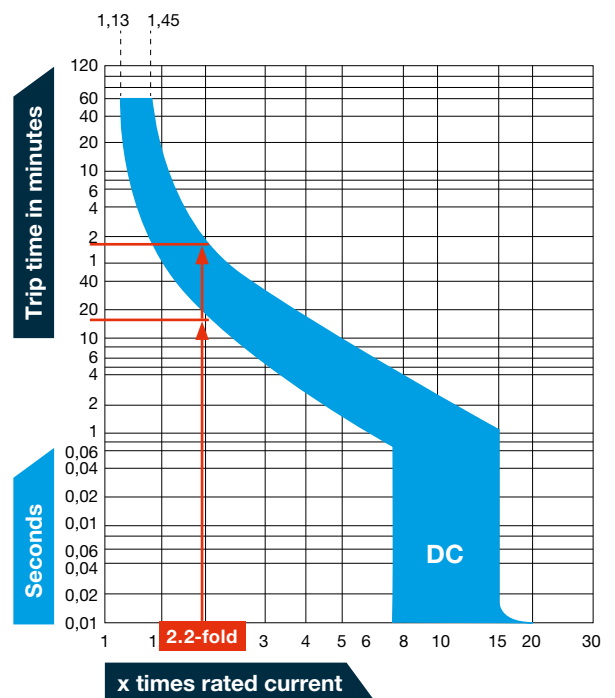
R_L = Line resistance of a 100 m long copper wire with a cross section of 1.0 mm²
 R_i = Internal resistance of a 3600 thermal-magnetic circuit breaker

INSUFFICIENT MAXIMUM CURRENT

Let's have a look at the characteristic curve of the thermal-magnetic circuit protector again. The magnetic range switches very fast and protects the application in the event of a short circuit. In the calculated example, a maximum current of 13.2 A flows through the line. The rated current of a C6A protector is 6 A. Therefore, the maximum short circuit current is 2.2 times the rated current. According to the characteristic curve this is a trip time of about 15 to 60 seconds. But in the event of a short circuit, a fast tripping is not possible in the magnetic range of the characteristic curve, due to the low current level.



U_B = Operating voltage
 I_{max} = Maximum current
 R_i = Internal resistance
 R_L = Line resistance
 R_V = Load resistance

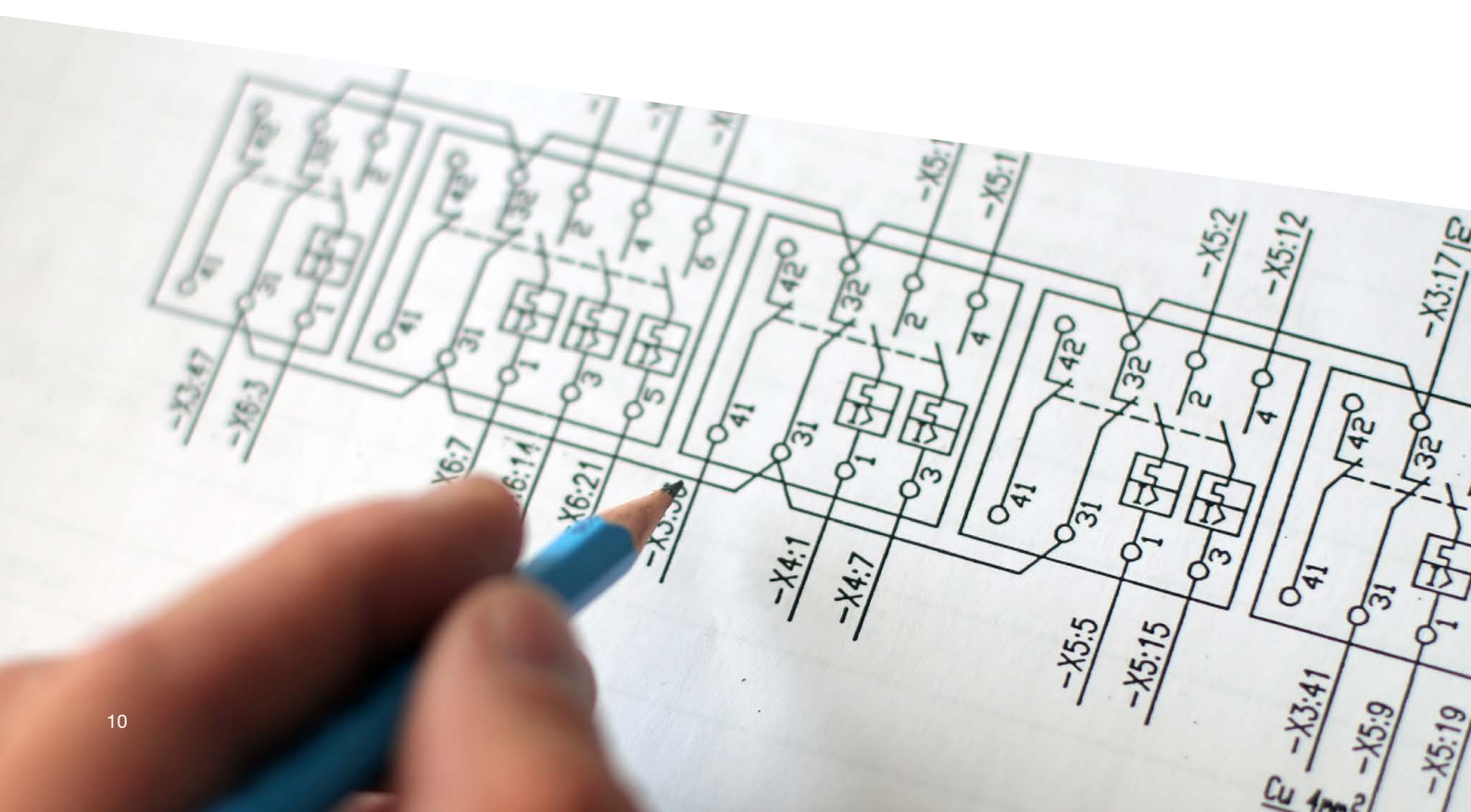


E-T-A CALCULATION TOOL

Perfect protection for your loads

PROTECTION MADE EASY

The E-T-A calculation tool provides the engineers various information to help them design the power distribution and protection for different loads and to select a suitable circuit protector to provide best protection against overload and short circuit. You can download this tool on the Homepage by scanning the QR code:



ESS30

Electronic circuit breaker with physical isolation

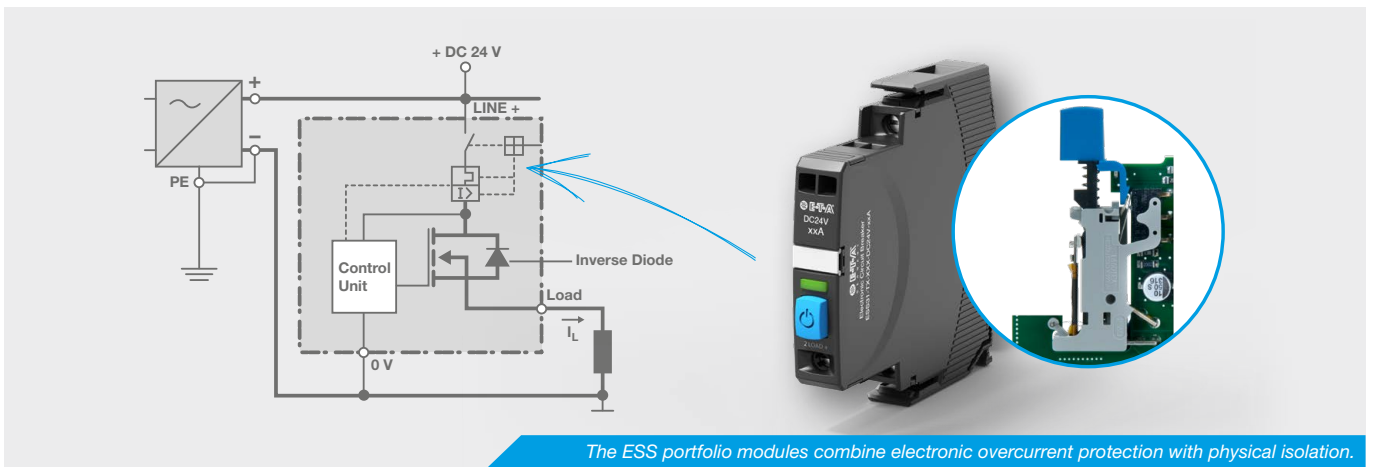
ENHANCED SAFETY

Electronic circuit protectors continuously measure the load current, preventing a residual current from exceeding a defined value. This provides an easy rule of thumb for electrical planning. When the load current exceeds a defined value, the active current limitation takes effect. This functionality is carried out by a certain semi-conductor component. If the load current is not reduced automatically, the circuit protector will trip. Additionally, all devices in the ESS portfolio have an integral, fully-fledged bimetal component or a relay. It is connected in series to the semi-conductor

component, completing the unit. In the event of a failure it additionally provides a physical isolation of the load circuit. In the event of an overcurrent, the load circuit is electronically disconnected first. A few seconds later, the integral mechanical trip element ensures disconnection by physical isolation. This completely excludes hazardous machine conditions and enables facilitated trouble-shooting.

REQUIREMENT ACCORDING TO IEC/EN 60934 AND UL1077 FULFILLED.

The requirements for circuit breakers for equipment protection in Germany, Europe and North America are defined by the EC/EN 60934 and UL 1077 standards. They make sure that function, behaviour and safety of the circuit breakers for equipment protection comply with unified standards. According to these standards, also DC 24 V load circuits must be equipped with a physical isolation in the event of a failure.



YOUR BENEFITS

- **The load circuit is physically isolated with an air gap** providing a clear disconnection
- **Increases your system availability** through clear failure detection and signalling
- **Flexible use of the devices** through various international approvals

An offshore oil rig is shown in the upper right portion of the image, extending over the ocean. A large, bright orange flame is visible at the top of the rig's structure. The sky is a mix of blue and white, suggesting a clear or slightly hazy day. The ocean is a deep blue with some whitecaps.

ESX10 AND ESX10-S

Plug-in type electronic circuit protectors

FACILITATED ELECTRONIC PLANNING

The ESX10 portfolio has an electronic trip curve to ensure best protection in the event of a failure. The trip curve of the ESX10 modules includes an active current limitation. It cuts the residual current to a determined value.

SINGLE OR GROUP SIGNALLING

Individual or group signalling of the protectors is a must for many applications to enable monitoring and displaying the status of each individually protected load circuit at any time. The ESX10 portfolio includes devices with many different signalling and displaying options.

The ESX10-T and the pluggable ESX10 feature fast and flexible mounting of the modules and allow free planning

options. The wiring at the socket can be done in advance. The user can plug in the overcurrent protection just upon start-up. The device also facilitates current rating adjustments for changing load ratios. Thanks to its electronic trip curve with active current limitation all load types can be selectively protected. With a width of only 12.5 mm, but with current ratings up to 16 A, even powerful loads can be easily protected.



THE COMPACT ESX10-T ELECTRONIC CIRCUIT PROTECTOR FOR DIN RAIL MOUNTING

The compact ESX10-Tx electronic circuit protectors are equipped with integral power distribution and DIN rail mounting. Thanks to their many versions and the electronic trip curve with

active current limitation, all DC 12 V, DC 24 V, DC 36 V and DC 48 V load circuits can be selectively protected. By using busbars, modular devices are turned into multi-channel solutions. This also reduces wiring efforts. Signal bars allow easy configuration of individual or group error signals. The

device and the component mechanics enable a minus load return directly to the module.

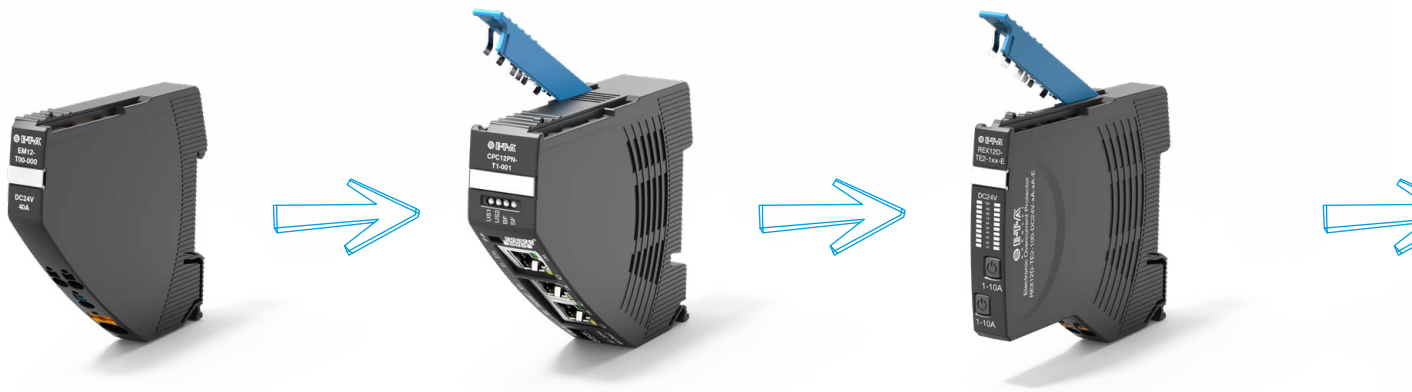


YOUR BENEFITS

- **Increased machine uptime** through clear failure detection and stable voltage supply
- **Simplifies planning** through clear planning variables
- **Saves costs and time** through fast and flexible mounting including integral power distribution

THE REX SYSTEM

Your »All-in-one« solution



Supply

The supply of DC 24 V applications has never been so easy. Whether plus or minus supply, BASE or COM system - the EM12 modules are a vital part of the REX all-in-one solution. They are tailor-made to the requirements of mechanical engineering and require no further accessories, such as jumpers or busbars, for the mechanical or electrical connection of the individual modules. This helps save components, time and money!

Bus Controller

The CPC12 and EM12D **ControlPlex**® Controllers connect the REX system to the superordinate communication interface via **PROFINET, EtherCAT, Ethernet-IP** and **Modbus-TCP**.

The bus controllers record all status information and measuring values of the circuit protectors and enable their control and parametrisation. With the CPC12 **ControlPlex**® Controllers it is possible to visualise data via the web server and use it as service interface.

Overcurrent protection

Overcurrent protection with globally unique features: this is how the REX12 (time-current characteristics) and the REX22D (situational active linear current limitation) electronic circuit protectors present themselves. One or two channels, with fixed or adjustable current ratings, these devices can be perfectly adapted to the respective application and easily connected electrically via the integral connector arm without further accessories.





Power distribution

The REX system's PM12-T potential distribution modules can be divided into two main groups. Not only the + DC 24 V distribution, but also the 0 V minus distribution (GND) can be easily realised in the same system. The slim modules save space and allow direct assignment of the power distribution in the system. The direct assignment can be easily displayed functionally in the related ePlan providing support during wiring and trouble-shooting.

REX system

E-T-A's compact and flexible REX system represents a comprehensive DC 24 V protection and power distribution solution for the machine construction industry under the headline »all in one«. It is a perfectly matched system, completely obtained from one source. The REX12 product group with optimised functionalities requires amazingly few modules featuring considerable time and cost savings.



YOUR BENEFITS

- **Increases system availability** – through clear error detection, high transparency and remote diagnosis
- **Provides flexibility** – through facilitated mounting/dismounting, modularity and adjustability
- **Saves time of at least 50 %** – through innovative and flexible connection technology
- **Saves costs** – as no further accessories, such as jumpers or busbars, are required
- **Saves up to 65 % space** – through 12.5 mm slim modules



THE REX SYSTEM

REX12 and REX22D difference

The REX circuit protectors meet all technical and economic requirements of the machine construction industry.

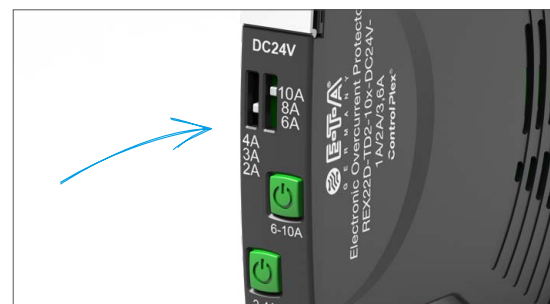
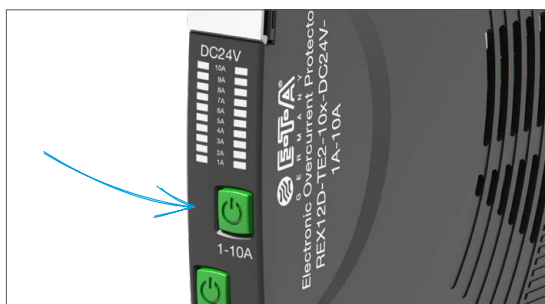
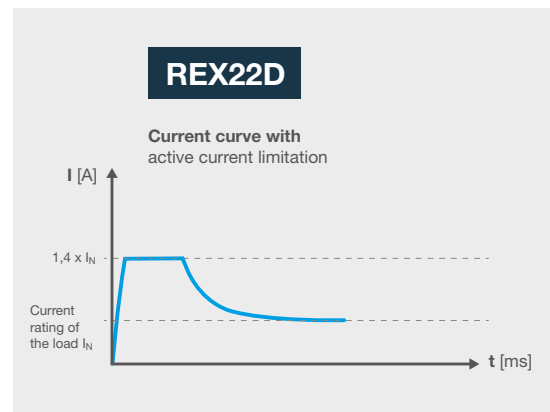
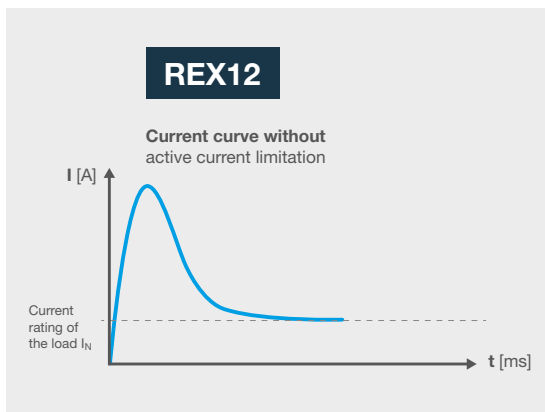
The REX12 modules are available in all standard fixed and adjustable current ratings from 1 A to 10 A. The REX22D circuit protectors are available with fixed current ratings at 12 A, 16 A and 20 A, and with adjustable current ratings from 1 A to 20 A.

The REX12 time-current characteristic is particularly attractive due to its unique cost efficiency. It provides effective, selective overcurrent

protection for many DC 24 V applications. The REX12 reaches cut-in capacities of up to 20,000 μF .

The REX22D actively limits the output current when powerful loads are switched on or in the event of a short circuit. In this case, the limitation causes the max. current (I) to set at a defined rated current value for a certain time (t). Since the current is calculated quadratically into the

transmission energy, they are also called “ I^2t limiters”. This limitation provides an effective protection even for switch mode power supplies with low current reserves and long cables with low cross sections. In order to be able to switch on powerful loads easily, the limited current is made available for a longer time period. Cut-in capacities of $\geq 40,000 \mu\text{F}$ are no problem.



In the BASE mode, the current ratings of the REX12D-TE2 / REX22D-TE2 circuit protectors can be parametrised via push button and read directly at the module. In the COM mode, it can also be set via the control.

The rated current of the REX22D-TD can also be adjusted in dead-voltage condition via slide switch and read directly at the device.

REX12 – AT A GLANCE

- Reduced downtimes through clear failure detection, high transparency and remote diagnosis
- Flexibility thanks to fixed or adjustable current ratings
- Cost-saving as no accessories such as jumpers or busbars are required
- Space-saving through 12.5 mm slim modules and elimination of additional minimum mounting distances

REX22D – AT A GLANCE

- Provides all benefits of the REX12
- Increased transparency and flexibility through adjustable current ratings via slide switch
- Reduced failure risk through calculable limited max. current during current limitation
- Versatile use through current ratings between 1 A - 20 A

COMPACT. MODULAR. COST-EFFECTIVE.

18plus – Power distribution system

The **18plus module** is a complete mounting and power distribution system with state-of-the-art push-in technology for DIN rail mounting. It has a fully-fledged potential distribution and is suitable for wiring of all load cables and signal lines of the DC 24 V control voltage.

The **18plus module** is suitable for decentralised power distribution systems as well as centralised system concepts. It consists of three different

basic components which are 13 mm wide and allow a quick and modular set-up.

The user configures a modular distribution system directly on the symmetrical rail by means of the supply module, the connection module and the signalling module in only a few simple steps.

It is extremely flexible with the exact number of channels required. No additional terminals and connecting

cables are required. The maximally equipped version of the system covers 30 slots. The **18plus** power distribution system can then be fitted with various single pole E-T-A circuit breakers and protectors.

Do you wish to export your system? No problem. International approvals according to UL1059 and the design according to EN 60947-7-1 make the **18plus module** ideally suitable for the use in international applications.

18plus-EM
supply module



18plus-AM
connection module



18plus-SM
signalling module



18plus module
power distribution system





Do you want to learn more about the **18plus module**? Please scan the QR code!

Modular “compact” system for rail mounting as a complete package, containing:

- Load wiring with integral terminals without additional potential distribution
- Plug-in type overcurrent protection for all requirements in the DC 24 V area
- Integral power distribution up to 80 A, max. 20 A per slot
- Integral group signal wiring, make contacts
- Push-in terminals for reliable wiring, even in case of shock and vibration.
- »Universal« system: future bus connection for **Control Plex®** applications

The 18plus module includes electrical connectors with screwless push-in terminals.

- All conductors can be plugged in easily and without tools
- Reliable contact making
- Firm connection of the conductors due to high pull-out forces
- Easy actuation with any tool
- Contact reliability in the event of shock and vibration
- Gas-tight electrical connection
- Maintenance-free
- Four different colours are available for the pushers (red, blue, orange, grey)



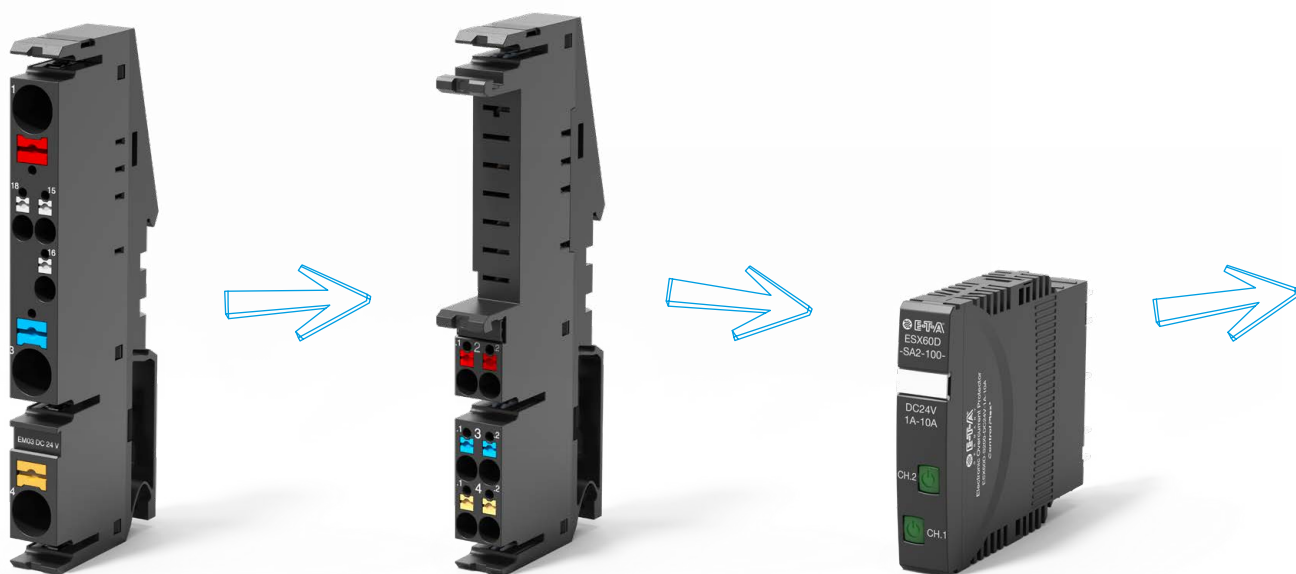
YOUR BENEFITS

- **Flexible handling** through plug-in type circuit breakers with modules that can be mounted side by side
- **Modular design** through various functional sub-assemblies:
 - »Compact« for conventional power distribution
 - »Universal« for intelligent **ControlPlex®** systems
- **Cost savings** through facilitated electrical design, quick wiring, reduced inventory of parts



VERSATILE AND INTELLIGENT DC 24 V PROTECTION AND POWER DISTRIBUTION

for your individual requirements



A MODULAR DESIGN PROVIDES MORE FLEXIBILITY

The modular design of the **CPC20 ControlPlex®** system allows individual adjustment of the DC 24 V power distribution to the system operator's requirements. It combines selective protection of the various loads with the flexibility of the terminal block system and smart bus controllers, enhancing transparency and system availability.

The **ControlPlex® 18plus module** is the basis of the power distribution system. Up to 16 modules can be added to the connection module side-by-side. It has a fully-fledged 80 A potential distribution. The screwless push-in technology for DIN rail mounting significantly reduces wiring time.

The user plugs the **ESX60D** circuit protectors into the modules.

The **ESX60D** is an intelligent electronic circuit protector. It offers active current limitation to enable protection both of capacitive and inductive loads. Despite its small width of only 12.5 mm, it provides two channels. The status can be seen per channel via an LED directly on the device. In addition, the **ESX60D** transmits status and measuring values to the superordinate control unit. The **ESX60D** is parametrisable which makes it particularly flexible in use.



The **CPC20** bus controller is the brain of the entire system. Its interfaces offer the perfect connection to the superordinate systems. On the field level, it connects the power distribution system with the connected CPUs and HMIs via its **PROFINET** or **EtherNet/IP** interface, enabling the required data exchange. On this basis, measuring values and status information can be visualised for the operator and the maintenance personnel.

QUICK ACCESS THROUGH INTEGRAL WEB SERVER

A web server is included on the bus controller. It allows direct access to the data of the DC 24 V power distribution. The maintenance personnel can directly access all measuring data and status information without using the field bus interface. Especially during the initial start-up or a machine downtime, this allows quick access to the required information.

YOUR BENEFITS

- Maximum system availability through comprehensive diagnostic functions
- Improved protection against voltage dips through selective load protection
- Increased flexibility of system planning through a modular terminal block system

QUICK ACCESS AND TRANSPARENCY

thanks to the integral web server

DIRECT ACCESS TO DATA

The integral web server ensures direct access to all measuring values and parameters of the circuit protectors. All data is displayed on the web server and at the same time transmitted to the superordinate control systems. The user gets a quick and detailed overview of the DC 24 V power distribution status by displaying each individual channel. This helps detect errors at an early stage and initiate counter measures.

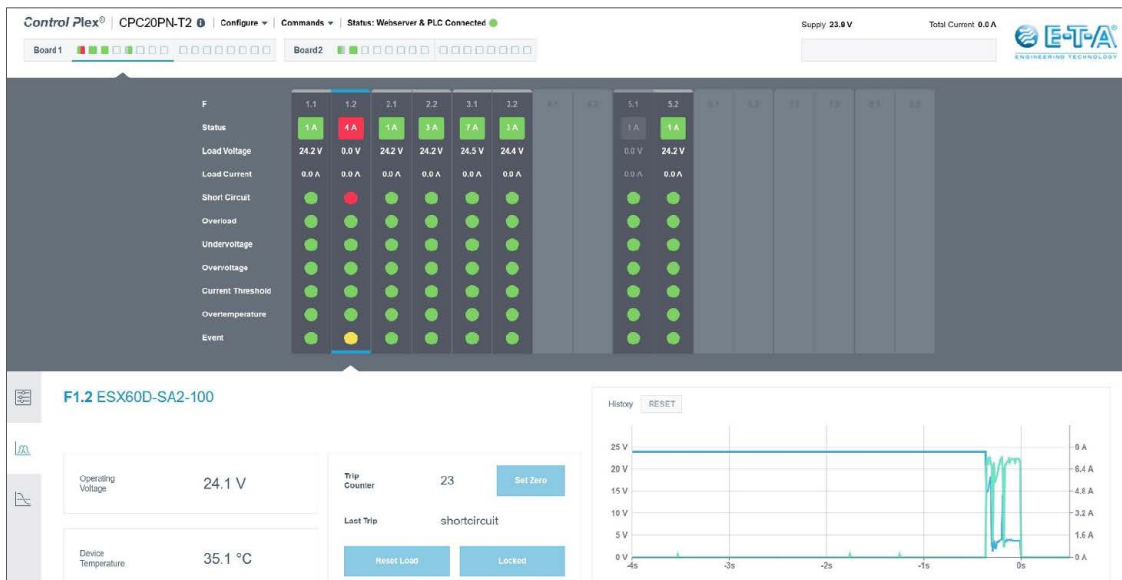
EARLY ERROR DETECTION IN THE SYSTEM

Thanks to the continuous load current measurement, deviations of the current consumption of the loads can be detected at an early stage. If the freely parametrisable limit value is exceeded, this will be displayed directly at the circuit protector and also transmitted to the superordinate control. The maintenance personnel can react quickly and avoid load disconnections in advance, increasing system availability thanks to this functionality.

FAST RESTART THROUGH CLEAR FAILURE DETECTION

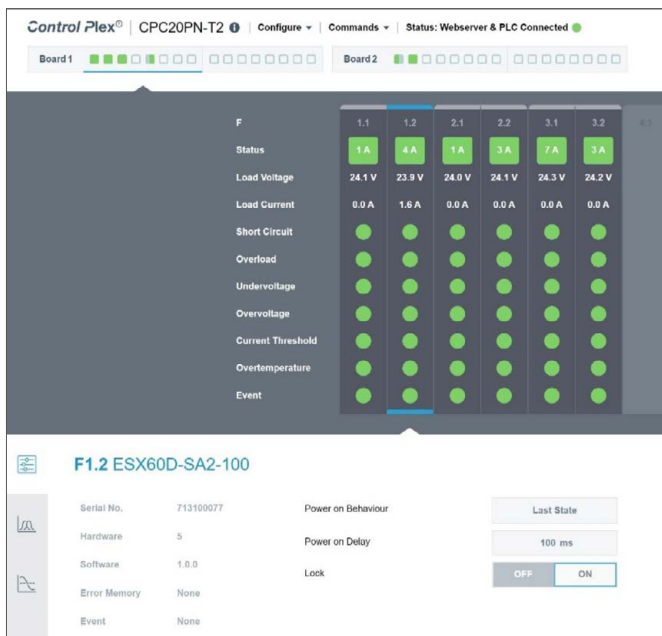
If the circuit protector trips due to a short circuit or an overcurrent event, this is also displayed. This facilitates trouble-shooting and decreases downtimes. Most short circuits are caused by a damaged load supply line, e.g. through a damaged line insulation at the cable track. In this case, the trouble-shooting starts in the control cabinet and ends at the load.





Recording status information and measuring values increases transparency at the control voltage level. The user gets a quick overview and can

quickly and precisely react in the event of a failure. This reduces downtimes and increases system and machine availability.



The web server visualises the status of each circuit protector and displays all recorded measuring values. This provides the user all current information of the DC 24 V power distribution and indicates possible changes of the system conditions.



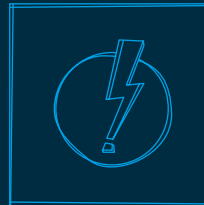
INCREASED SYSTEM AVAILABILITY THROUGH INCREASED TRANSPARENCY

Status information and measuring value transmission
as well as remote control

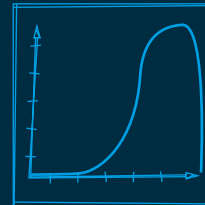
STATUS INDICATION



Status indication

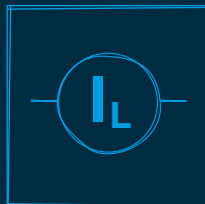


Short circuit

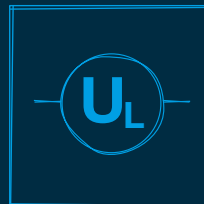


Overcurrent

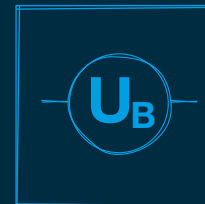
DATA LOGGING



Load current

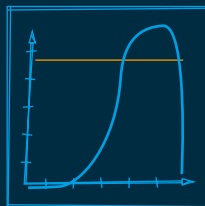


Load voltage

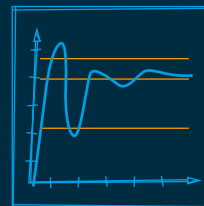


Input voltage

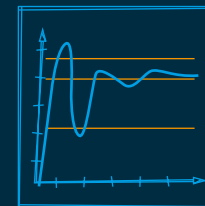
DATA ANALYSIS



Limit value

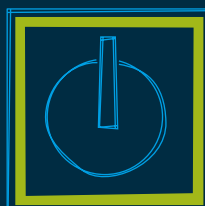


Current curve

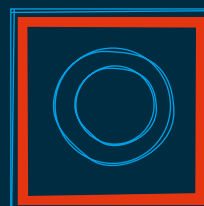


Voltage curve

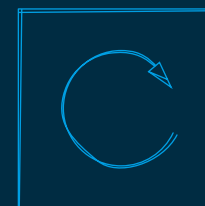
CONTROL UNIT



Control ON

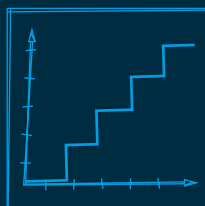


Control OFF

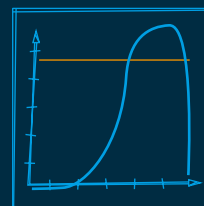


Control RESET

PARAMETRISATION



Current rating
adjustment



Limit value

USE IN EXPLOSION-PROOF AREAS

Electrical circuit protectors

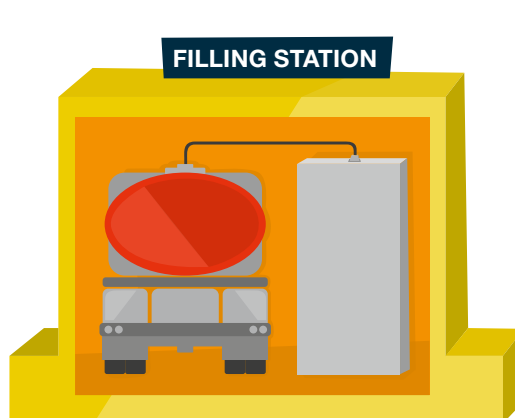


PROTECTION IN THE ATEX ZONE 2

The range of applications for explosion-proof equipment increases worldwide. In addition to conventional areas, such as the oil & gas industry, it is more and more being used in the paint and pharmaceutical industry. It is increasingly important for new energy sources, such as biogas and hydrogen. The focus is always on the protection of lives and assets. In the process industry, new power distribution concepts on the DC 24 V voltage level result in a Zone 2 requirement

for control cabinets. This is why it is so important to have the appropriate approvals for the used equipment to be operated in these system areas. Complicated relocation of external supply lines is omitted. The devices from the ESX10 portfolio with an -E suffix are Ex-Zone 2 approved according to ATEX and IECEx.

In addition, the circuit protectors are approved according to Class I, Div 2 for use in the North American region. The circuit protectors are available for either DIN rail mounting or plug-in mounting. The circuit protectors can simply be plugged onto the 17plus and 18plus power distribution modules. This enables fast and easy replacement or extension in the systems through pluggable circuit protectors.



- Zone 0**
Gas mixture always present or over longer periods of time or frequently
- Zone 1**
Gas mixture occasionally present in normal duty
- Zone 2**
Gas mixture not present in normal duty or only for a short time

TRANSPARENT AND CONVENIENT

The SVS24 power distribution system

POWER DISTRIBUTION FOR STANDARD APPLICATIONS

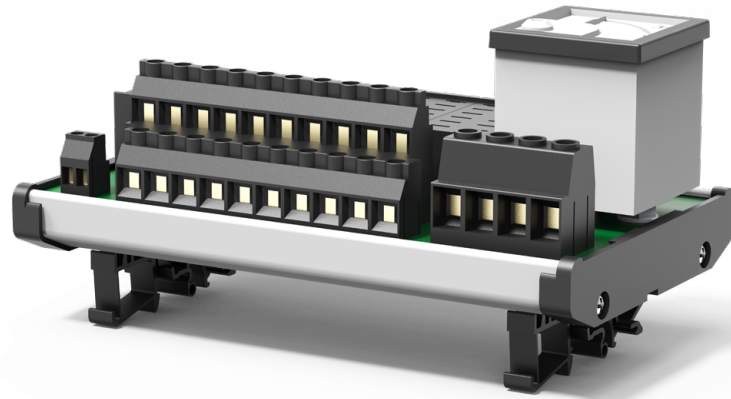
In the process industry's large systems it is often helpful for the service personnel to get a quick overview of the DC 24 V power distribution condition. The total current consumption of the protected devices highly contributes to this. The SVS14 power distribution module provides this supportive function through its analogue panelmeter. A short glance at the panelmeter is enough to learn the actual current consumption of the total power distribution system. If several power distribution modules are in use and mounted side by side, the total current consumption can be compared quickly and deviations can be detected.

The compact design of the power distribution module allows space-saving installation. The SVS14 is directly mounted onto the DIN rail system and can accommodate up to 10 electronic or thermal-magnetic circuit breakers. You can select between the thermal-magnetic 2210-S211, 3600-P10 and 3900-P10 circuit breakers, or the

electronic ESX10-103 and ESS30-S003 circuit protectors for load protection.

The maximum supply current provided for the power distribution system is 25 A. This is sufficient to protect transmitters, actuators, valves, decentralised PLCs, intelligent terminals etc. on the field level. Especially in systems with a high number of sensors/actuators the SVS14 power distribution system enables a space-saving and cost-effective design of protection control cabinets.

Any load circuit which might be disconnected due to overload or short circuit generates a single signal which will be summarised in a group signal directly on the power distribution system and which will be fed back directly to the control unit. The cables are connected via screw-type terminals. This ensures a reliable and stable connection.



YOUR BENEFITS

- **Quick overview** through total current display with analogue panelmeter
- **Saves wiring time** through power distribution on the PCB
- **Saves space** through compact and transparent design of the power distribution



RELIABLE RUPTURE CAPACITY

201 thermal-magnetic circuit breaker

YOUR BENEFITS

- Space and weight savings through a very compact design with an installation width of only 12.5 mm
- **Reduced complexity** through a single characteristic curve for all load types
- **Quick and easy mounting** on DIN rail



TYPICAL APPLICATIONS

- Simple applications in the machine construction and process control, infrastructure, apparatus engineering, vehicles
- Current limited AC and DC circuit protection

APPROVALS AND STANDARDS

- IEC/EN 60934
- UL 1077
- CSA

The **201** is a single pole, thermal-magnetic circuit breaker with manual release button for DIN rail mounting. The very compact device is perfectly suited for basic applications without auxiliary contact. The **201** can be switched on via the black push button. It can be switched off via the separate red manual release button.

When the device has tripped due to an overcurrent or a short circuit, or if it was switched off manually, it can be switched on again via the black push button any time. Thanks to its resettable device significantly increases the system availability compared to conventional blade fuses.

Technical data

Current ratings	0.5 ... 16 A
Rated voltage	AC 240 V/DC 65 V
Number of poles	1 pole
Auxiliary contact module	without
Mounting method	DIN rail
Width	12.5 mm



SMART FUSE REPLACEMENT

1180 thermal circuit breaker



The **1180** is a thermal circuit breaker in a very compact design. It is intended as a replacement for tripped conventional blade fuses. The **1180 thermal circuit breaker** features a reliable switching behaviour, a powerful snap action and a positively trip-free mechanism. Thanks to its resettability and pluggability it significantly increases

the system availability compared to conventional blade fuses. This plug-in type solution is designed for fuse holders for DIN rail mounting. Various accessories, such as bridging connectors or jumpers for fast and easy wiring of LINE or GND are available for the **1180**.

Technical data	
Current ratings	0.1 ... 10 A
Rated voltage	AC 250 V/DC 65 V
Number of poles	1 pole
Auxiliary contact module	without
Mounting method	Pluggable onto terminal block
Width	8.2 mm

YOUR BENEFITS

- **Increased system availability** through resettability after tripping
- **Space and cost savings** through very compact design with only 8.2 mm installation width
- **Flexibility in the system planning** through modular plug-in design for standard fuse holders

TYPICAL APPLICATIONS

- Simple applications in the machine construction and process control, infrastructure, apparatus engineering and vehicles
- Current limited AC and DC circuit protection

APPROVALS AND STANDARDS

- IEC/EN 60934
- UL 1077
- CSA
- CCC



1180 thermal circuit breaker

FLEXIBLE MOUNTING, WIDE RANGE OF APPLICATIONS

2210 thermal-magnetic circuit breaker

The **2210** is a thermal-magnetic circuit breaker with toggle actuation and integral auxiliary contact. It can be used in an extremely wide range of applications thanks to its many mounting options. The very compact design of only 12.5 mm helps save space of up to 54 % compared to conventional mechanical circuit breakers.

The **2210-T** is suitable for DIN rail mounting and features a particularly high rupture capacity of up to 2.5 kA. Fine current rating increments and a range of different trip curves ensure

precisely working overcurrent protection - specified in accordance with the load.

The pluggable **2210-S** is highly attractive for its small installation width including integral auxiliary contact. The device is perfectly suitable for the use in the process automation, power plant technology and automotive production thanks to the plug-in option onto power distribution systems (**17plus and 18plus modules**). It is universally suitable for AC and DC applications.

Typical applications

- Demanding applications in the machine construction and process control, apparatus engineering, vehicles, infrastructure and rail engineering
- Current limited AC and DC circuit protection

Approvals and Standards

- IEC/EN 60934
- UL 1077
- CSA
- CCC

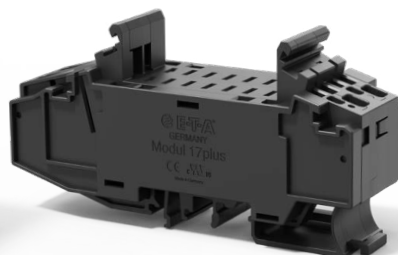


YOUR BENEFITS

- **2210-T: Maximum machine uptime** thanks to fine current rating increments and a range of different characteristic curves
- **Globally deployable** thanks to approvals according to UL 1077 and IEC 60934
- **2210-S: Space-savings of up to 54 %** compared to mechanical circuit breakers
- **Reduced maintenance effort** through completely screwless connection technology



Thermal-magnetic circuit breaker
2210-S and 2210-T



power distribution system
18plus and 17plus modules

FLEXIBLE RACK FOR 19" MOUNTING

Flexible *Power-D-Box*®

The flexible *Power-D-Box*® system is a well-designed power distribution system for DC applications up to 65 V. The 19" rack with only two rack units enables many different configuration options. The system is delivered completely pre-wired, saving time when connecting the loads to the power distribution system. The rack is installed in the control cabinet with only four screws. Applications in the process industry often require a redundant

supply. This was considered as an option for the *Power-D-Box*® which is why it includes two redundant supply feeds of 100 A each.

You can choose between two plug-in type devices as fuse elements. First, there are the 2210 thermal-magnetic circuit breakers, available as single pole or 2-pole version. Then, there are the ESS30 electronic circuit protectors with additional physical isolation,

increasing the device's reliability. Each connection position can be operated with maximum 16 A load current.

For optimum utilisation of the available installation space, different group signalling and terminal connection options are available, as well as an optional, freely configurable system redundancy.



YOUR BENEFITS

- **Compact, space-saving, clear design** through efficient utilisation of installation space and PCB technology
- **Significantly reduced number of individual components** through pre-assembly
- **Facilitated system extension** through plug-in type circuit protectors



MODULAR AND ACCESSIBLE AT THE FRONT

The flexible Power-D-Module

The flexible Power-D-Module is a modular DC system perfectly adapted to the control cabinet mounting plate, but also suitable for rack installation thanks to its rotatable mounting flanges.

The Power-D-Module is available as redundant or non-redundant version for DC applications up to 65 V, providing up to 50 A per supply. By selecting either the pluggable 2210 thermal-magnetic circuit breaker as

single pole or 2-pole version or the ESS30 electronic circuit protector as fuse element, you can safely operate loads up to 16 A.

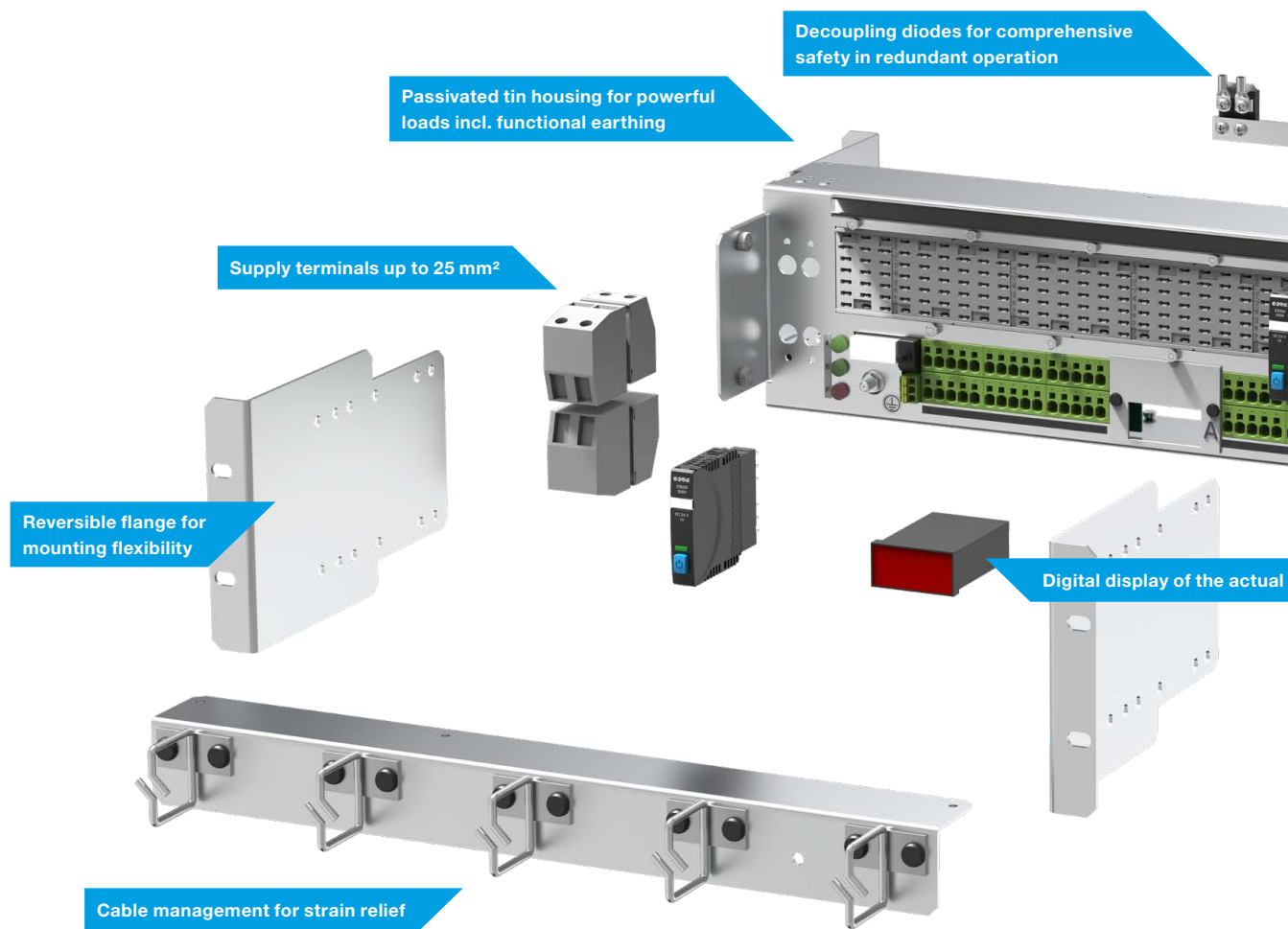
Thanks to integral PCB technology and optimised pre-wiring, the available installation space is efficiently utilised. You can order the standardised Power-D-Module with additional configurations via the ordering number code, such as various signalling and

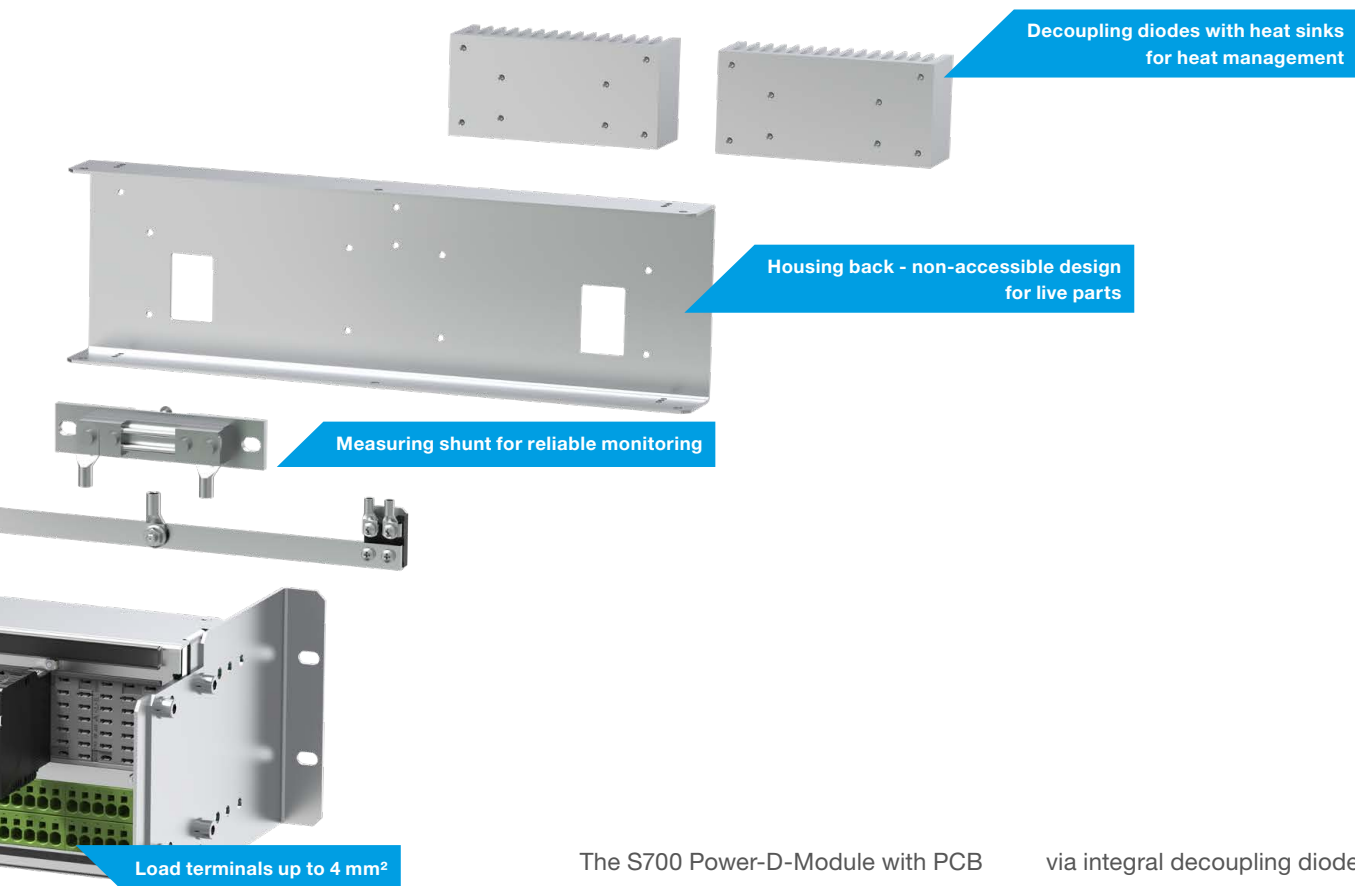
operating functions, and additional options. The design of up to 3 HU (133.35 mm) allows complete access from the front. The connection concept and the operability in your control cabinet can be easily designed. The optional cable management (+1 HU) works as strain relief during the installation of the Power-D-Module.



THE PROCESS INDUSTRY SPECIALIST

The flexible S700 Power-D-Module





total current

The S700 Power-D-Module with PCB is a compact power distribution system particularly adapted to the system requirements in the chemical, pharmaceutical or oil and gas industry. The power distribution system for DC 24 V is designed for control cabinet installation (mounting plate) or as 19" rack with 3 HU. It has 30 channels for plug-in type ESS30 electronic circuit protectors. The supply is provided non-redundantly or redundantly

via integral decoupling diodes. The integral group signalling works via quiescent current actuated relay, which drops in the event of tripping or disconnection of a circuit breaker. A free slot does not cause a message. The entire internal circuitry is designed as a printed circuit board. Optionally, the system can be extended with a digital total current display and a cable organizer (1 HE) with shunts.

CUSTOMER-SPECIFIC SOLUTIONS

Special solutions up to the control cabinet

In addition to our comprehensive standard portfolio, we are continuously developing system solutions. In short project lead times and in close cooperation with our customers we are planning and realising specific projects starting from one piece.

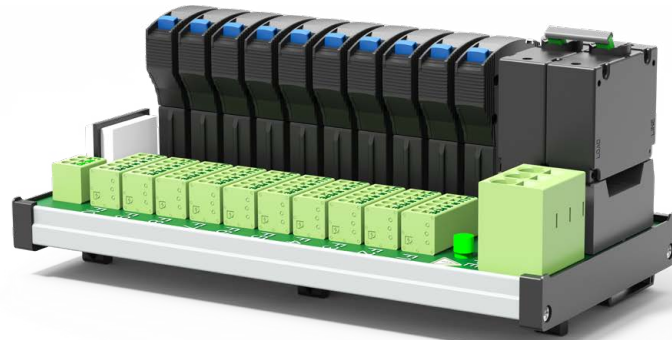
The process industry in particular often

requires individual solutions for customised applications. A special challenge is the integration of protection solutions into new complete solutions. Our know-how ranges from decentralised PCB solutions and individual 19" rack systems to complete control cabinets.

Based on decades of design experience and the respective vertical production range on site, a special solution can quickly become your own series product.

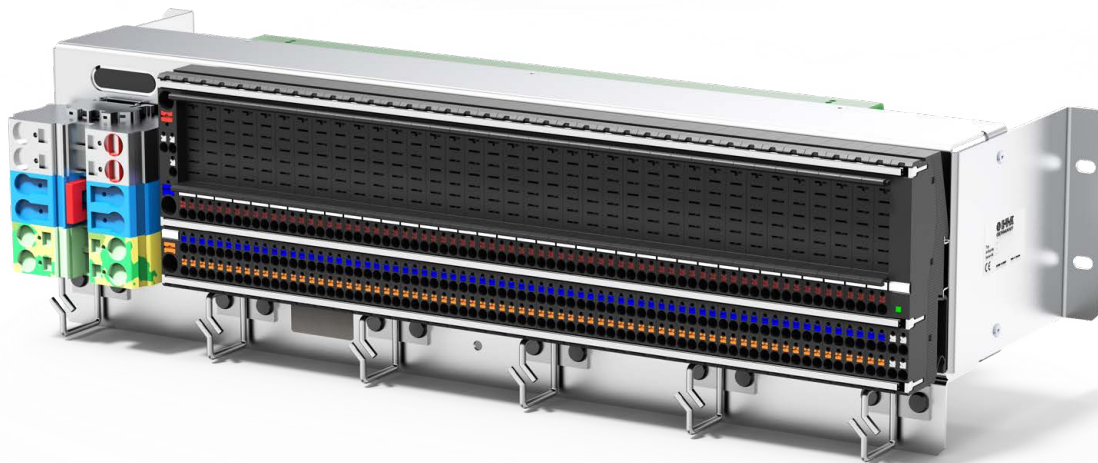
“POWER BOARD MODULE” SPECIAL SOLUTIONS

- PCBs for decentralised DIN rail mounting
- Power distribution incl. 24 V DC - 230 V AC protection
- Individual PCB layout



POWER-D-BOX® AND POWER-D-MODULE SPECIAL SOLUTIONS

- Special solutions in a 19" metal rack with different dimensions
- Power distribution incl. 24 V DC - 230 V AC protection
- Load protection from 0.1 ... 125 A per channel
- Total currents up to 300 A
- Integral decoupling diodes for complete system redundancy
- Various terminal and protection technology options
- Intelligent current systems with pre-wired **ControlPlex®**



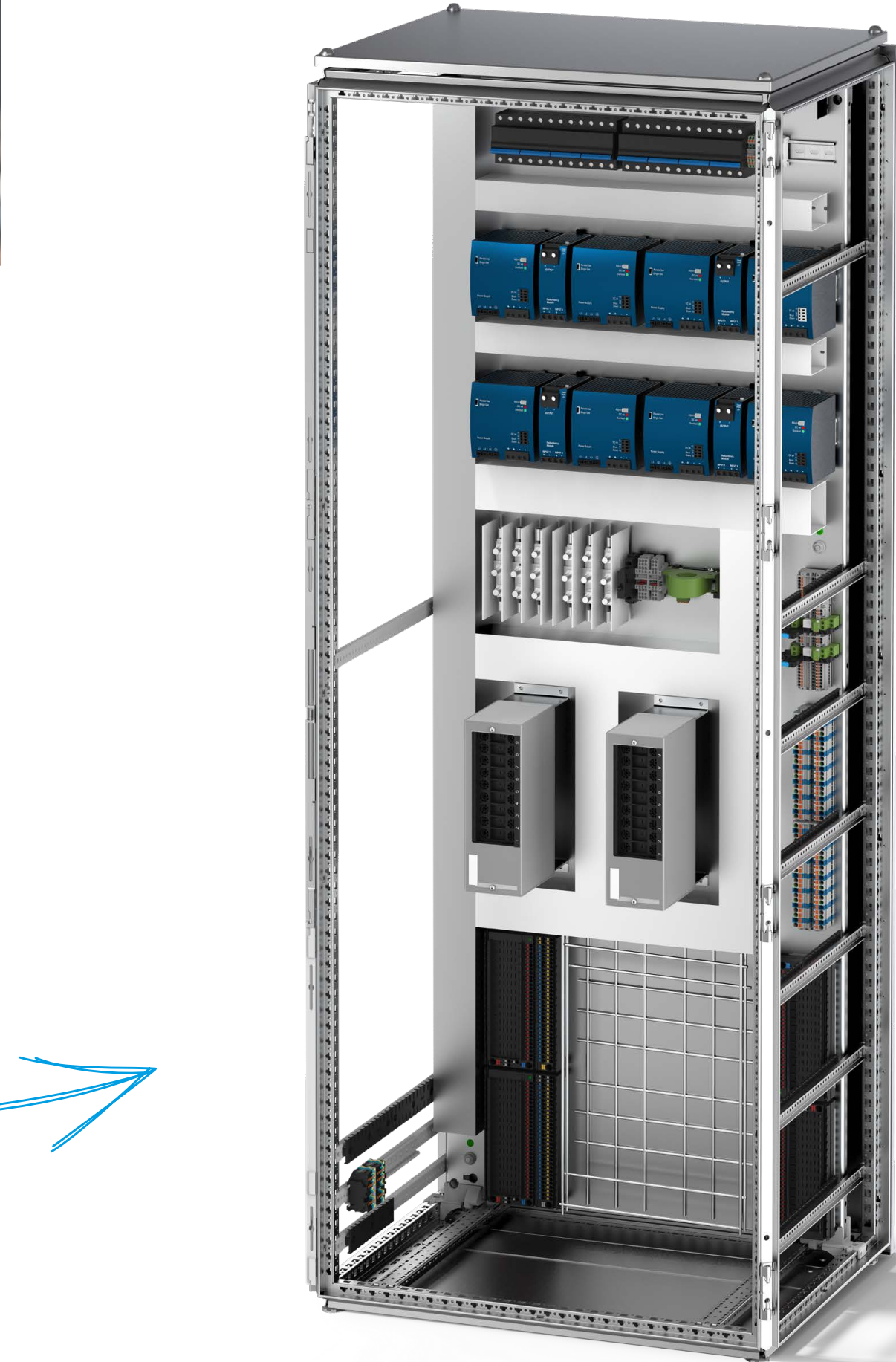
STANDARDISED CONTROL CABINETS

From the component to the total solution

CONTROL CABINET TOTAL SOLUTION

- Industrial control cabinets with integral E-T-A system solutions
- Redundant DC supply up to 150 mm²
- AC 400 V supply combined with integral DC 24 V power supplies and redundancy modules
- Total current indication
- High current protection for decentralised sub-distribution up to 125 A
- Electronic overcurrent protection of 0.1 ... 10 A
- High number of load outputs
- Group signalling options





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