E-T-A® current

Newsletter of E-T-A Circuit Breakers

Fall/2006

Cover Story
E-1048 Power Controller

Safety first past the post
Selective overcurrent protection plus compact power distribution

Transportation products
E-T-A rides the rails with Nordco

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current
Newsletter of E-T-A Circuit Breakers

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Editorial

Welcome to another great edition of E-T-A *Current*. *Current* is a forum to share product and application stories, a place to discover innovative solutions for your circuit protection needs and an avenue to explore topics that face our customers and industry alike.

This is just a sample of the interesting articles you will find in this issue. Future issues will continue to bring you interesting articles from around the world and will introduce you to new products and circuit protection technologies.

In this issue you will discover how integrating electronics into circuit protection devices can increase your equipments performance through new control possibilities while protecting your equipment from the devastating effects of prolonged overload and short circuit conditions.

E-T-A is committed to developing innovative products and solutions that allow our customers to properly safeguard their designs while enhancing the functionality of their products. Whether you want to properly protect a design or need a complete power management system developed, our engineers are available to assist you.

Committed to developing innovative products

"E-T-A Rides the Rail" features how Nordco, a leading manufacturer of railroad track maintenance equipment, overcame multiple design obstacles by incorporating E-T-A's E-1048 Solid-State Remote Power Controller into critical rail repair equipment.

"The ESS20 and ESX10: Slim and Powerful" article introduces a multitude of benefits one can achieve by combining an E-T-A "smart" circuit protection device with an E-T-A system solution design.

Your opinions and ideas are important to us. Please let me know what you think of the articles in this issue and share with me any ideas you have for future editions. Alternatively, fax back the enclosed form.

Best Regards,

Bill Stewart
General Manager

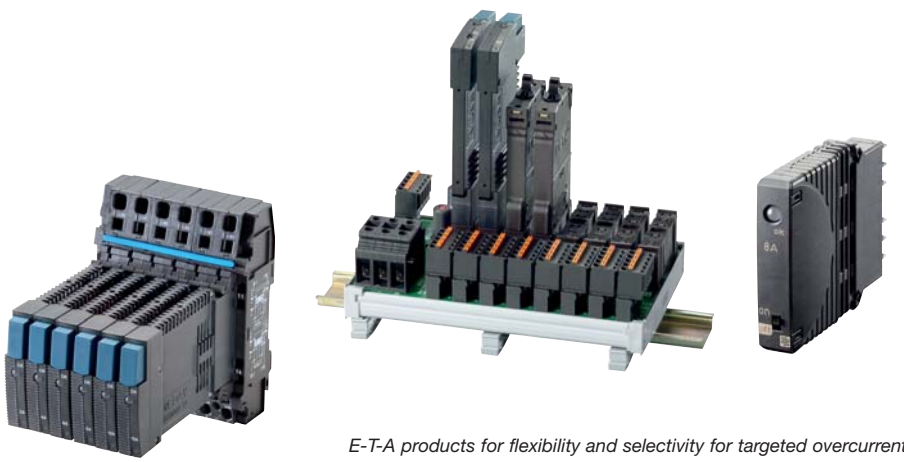
Safety first
past the post

Selective overcurrent protection plus compact power distribution – all from one source: the ideal combination for an enhanced DC24V system.

To prevent downtime of machinery and production plants, a stable DC24V supply of PLC, field bus modules and actuators are required. Optimized 24V power distribution in a control cabinet will remain a vital issue for every electrical engineer to save space, costs and time. E-T-A has developed a holistic system with plug-in type overcurrent protection that will fit into various power distribution systems – unique to the automation industry.

Decentralized control cabinets are expected to become ever smaller and more compact. Therefore the space-saving wiring of load signal lines becomes more and more important. The **power distribution system Module 17plus** with its two-way sockets offers the option to fit a modular distribution system directly onto a DIN rail and to connect via spring-loaded cage clamps. Thus multi-way protection solutions may be done quickly and cost-effectively as the required circuit breakers only need to be plugged into the prepared slots. The plug-in 2210 and 3600 thermal-magnetic circuit breakers also offer a practical solution for many of these applications. The 1610 circuit breaker together with socket type 12-P10 provides a convenient replacement for a fuse block with blade fuse and LED. The joint LINE input of the 24V supply is bridged on the Module 17plus by means of plug-in type busbars.

Require more flexibility? The power distribution system SVS02 offers special features to allow versions tailored to customer's needs. Multiple supply terminals for the DC24V supply as well as distribution terminals for the load potentials, such as protected load output and protected signal terminals are available. Thus wiring may be done on the SVS itself to save space and costs. An external sub-distribution is superseded by means of additional potential distributors on the rail.



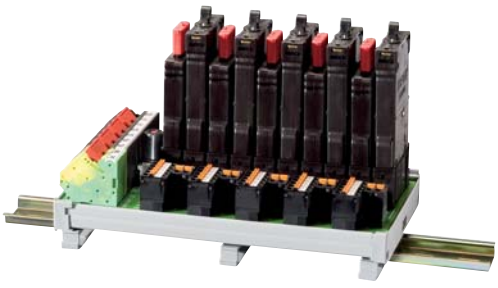
E-T-A products for flexibility and selectivity for targeted overcurrent protection and customized solutions: Electronic Circuit Breaker ESS20 in Module 17plus, Power Distribution System SVS02 and Electronic Circuit Protector ESX10

At a glance –
features and benefits of the DC24V concept:

- selective overcurrent protection for all DC24V applications
- customized power distribution provides flexibility
- a choice of ready EPLAN macros allows a perfect design
- ease of wiring through integral feed and distribution terminals for all signals
- space-saving installation by concentrating all distribution and protective functions
- cost reduction through compact control cabinets

The load output terminals, designed as plug-in type cage clamps, may also be used as potential disconnection terminals when trouble shooting. Overcurrent protection is provided by the same circuit breakers as with Module 17plus. Their small width of 12.5 mm helps to save up to 50% of the required space on the DIN rail.

Electronic circuit breaker ESS20 in combination with power distribution system SVS04



E-T-A's 2210 circuit breaker (type 2210) and adapter 12-P10 together with power distribution system SVS03

E-T-A's Remote Power Controller
Utilizes smart circuit breaker technology

Advanced device has built-in protection plus unique analog output

The E-1048-800 smart circuit breaker is designed with solid state technology to provide relay control and is the first device of its kind to combine solid-state switching, electronic circuit protection, analog signal output, and diagnostic functions. Now design engineers using relays and circuit breakers (or relays and fuses) can replace those two devices with a single compact unit, plus get the benefits of emerging "smart" circuit protection technology. The E-1048 saves space and time, increases reliability, and provides unprecedented protection.

The E-1048-800 power controller is suited for switching DC loads in automotive and automation applications, and for low voltage DC or multiplex control systems used in power circuits on boats and other vehicles.

Unique Smart Relay Control
Its most unique feature is a 0-5V analog output that is proportional to the current flowing through the device. If this output is connected to a control system such as a programmable logic controller (PLC) or ASIC microcontroller, the signal can be used to provide intelligent relay control. For example, a PLC may be programmed to turn off the device if the circuit current reaches a predetermined and programmable threshold.

Programmable Trip Point
Normally, the trip point of a circuit breaker is defined as a range, but with the help of a PLC, the trip point of the E-1048-800 can be precisely defined and set remotely. This means one E-1048-800 device can be used for any current rating from 1 to 25A. Traditional circuit breakers do not offer this flexibility or this degree of precision.

Whether remotely controlled or not, the E-1048-800 will trip off automatically at its current rating. If higher current ratings are required, multiple units may be mounted in parallel.

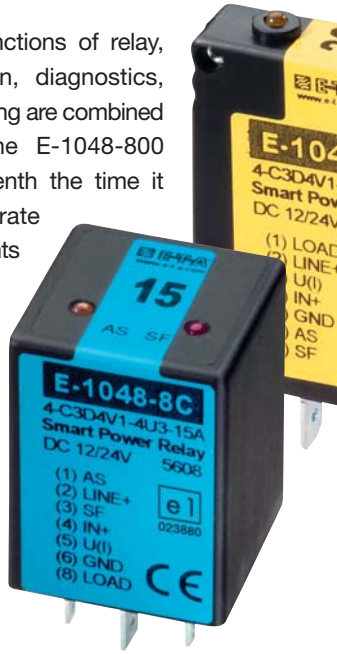
Unique Current Limiting Technology
A traditional circuit breaker will respond to a short circuit within milliseconds, but in that brief time, high amperage may pass through the circuit. In contrast, the circuit protection in the E-1048-800 is current limiting. Solid state technology limits the maximum short circuit current to approximately 50A. This feature is especially important for sensitive control components. Unlike some competing products, it provides precise delay that prevents nuisance tripping caused by inrush currents associated with solenoids and motor loads.

Transistor Diagnostic Signal
In addition to the analog output, the E-1048-800 provides visual indication and a transistor output that can be used in a control system as the input for an alarm. In this way, the device can alert operators to problems such as overload, no load, or a broken circuit caused by broken wires or resistive elements. In addition, the unit provides LED indication of overloads, wire breakage detection, and status of load and line. Not all SSRPCs supply detailed diagnostic information, which is increasingly required by controls systems as a way to reduce downtime.

Amplifies PLC Outputs
The E-1048-800 protects PLCs from overloads and short circuits while it also provides power amplification of PLC output signals, without the need to change PLC output cards. It minimizes costly downtime by protecting PLC output circuits and monitoring PLC output status.

Convenient Form Factors
The E-1048-800 is available in three forms. The CUBIC and DICE versions are a direct replacement for relays that plug into standard automotive relay sockets. The INLINE version is a plug-in style commonly used in industrial applications. Industrial uses include process control and automation equipment used in the food, pharmaceutical, petrochemical, and power utility industries. OEM applications include buses, trucks, boats, and off-road vehicles.

Because the functions of relay, circuit protection, diagnostics, and current sensing are combined in one unit, the E-1048-800 installs in one-tenth the time it takes to integrate these components separately.

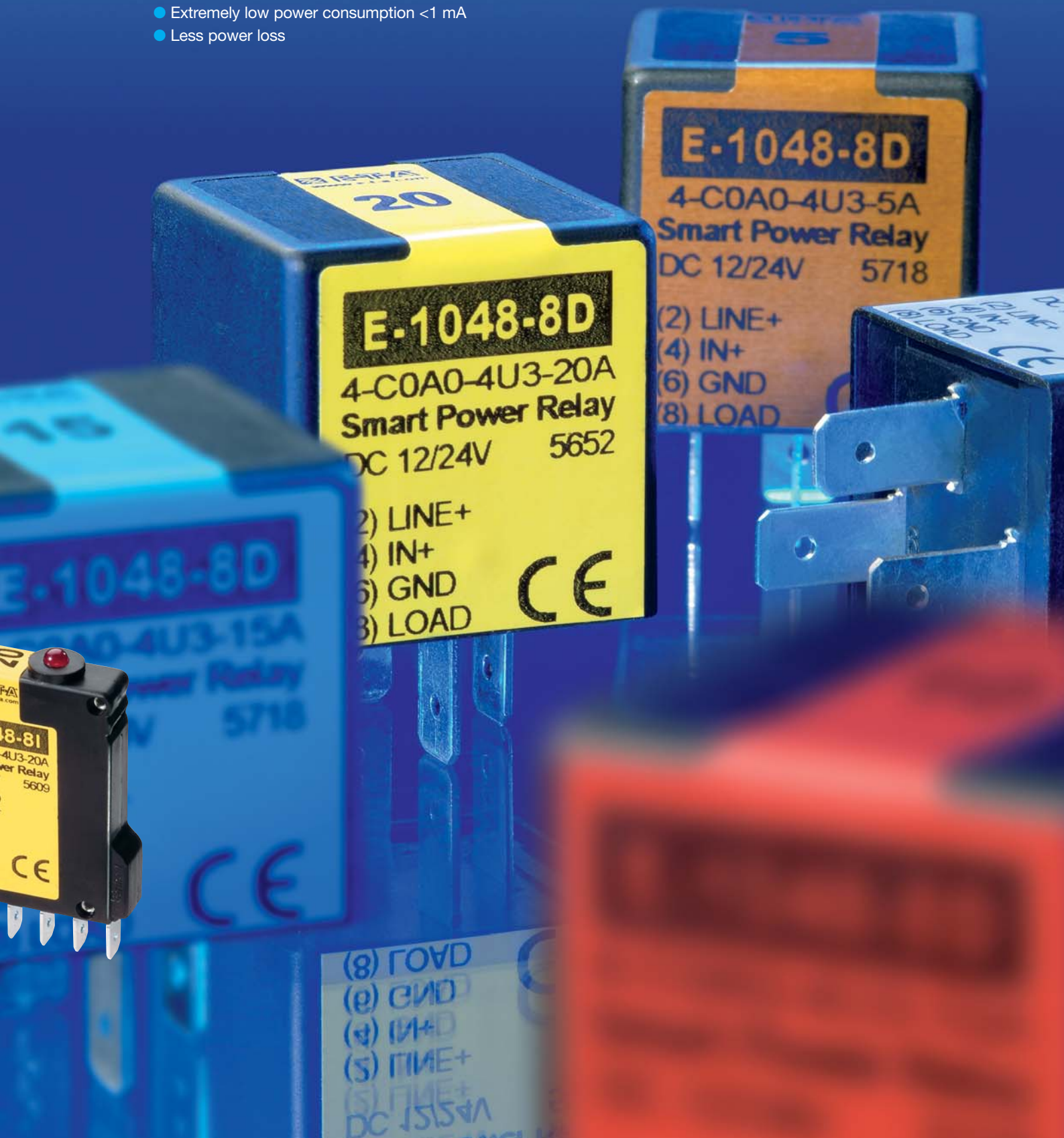


E-T-A Smart Power Relais E-1048-8... Cubic/Inline

At a glance:

The features and benefits of E-1048-8Dx (Dice)

- Electronic Relay plus Over Current Protection
- Voltage rating of load: DC 12 V / DC 24 V (9...32 V)
- Current rating of load: 1...25 A
- Extremely low power consumption <1 mA
- Less power loss



E-T-A Rides the Rails with Nordco.

Railroads are critical to the economic well being of the U.S., moving 42% of the nation's freight and countless passengers and commuters.

The first rail service began in South Carolina and by 1833 there was 380 miles of track in service. Today, there are over 120,000 miles of track with 474,839 freight cars in service, yet since 1980 railroads have reduced accident rates by 65%.

A big factor in reducing railway accidents has been the attention paid to construction and maintenance of the nation's rail tracks. Nordco, the oldest manufacturer of railroad track maintenance equipment in North America, designs, manufacturers and markets equipment used in the construction, maintenance and repair of railroad tracks.

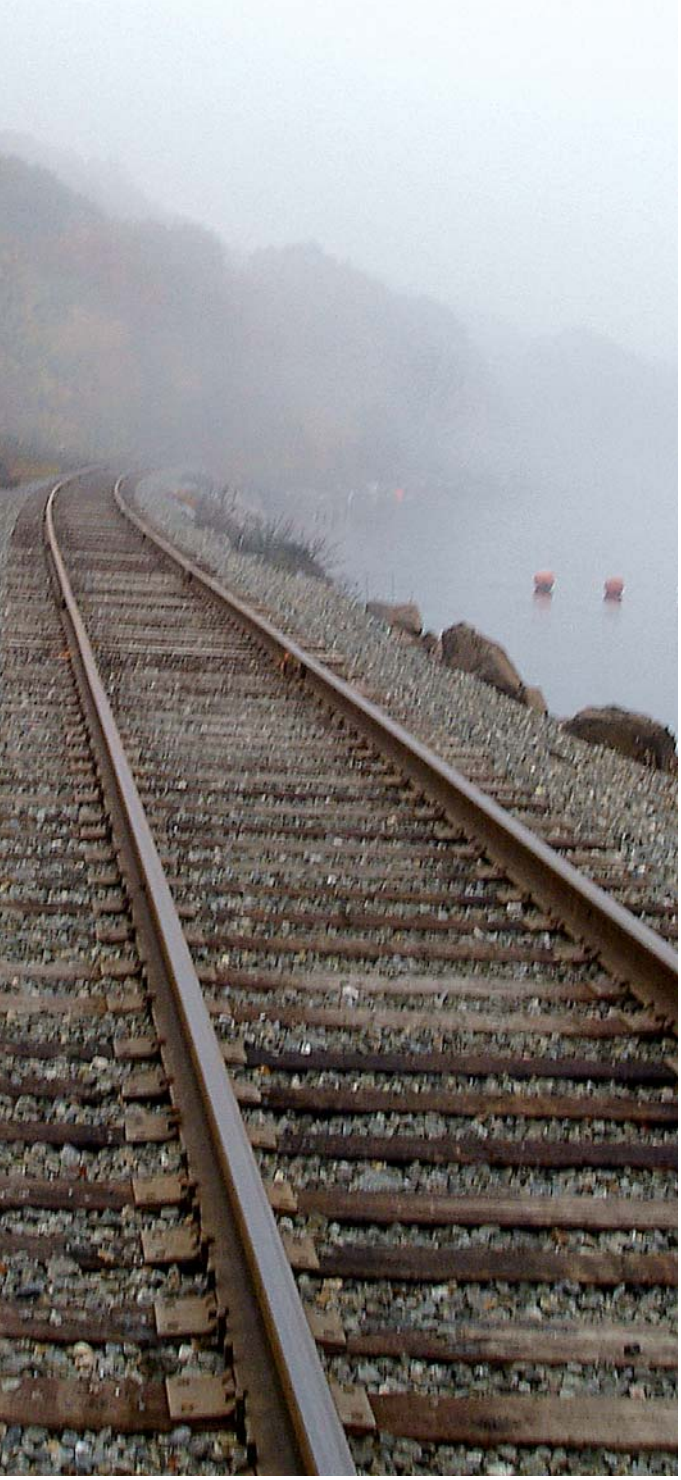
With manufacturing facilities in Oak Creek, WI, and Ontario, Canada, Nordco's equipment has played a major role in helping build better tracks and maintaining the huge number of track systems throughout the country.

The company's business strategy is focused on building quality equipment that can be counted on to perform in remote areas, such as track maintenance equipment that let small groups of workers maintain long stretches of railroad track.

Nordco continually improves their products by adopting modern technology. For example, hydraulic driven Spikers (see photo) now use PLCs (programmable logic controllers) or "PLC logic boxes", as they are referred to at Nordco, for system control. And rather than use fuses to protect PLC outputs, Nordco's engineering team realized the advantages of using advanced circuit breakers and was responsible for designing in the E-T-A E-1048 Solid-State Remote Power Controller.

Nordco Model CX Spiker

Nordco finds great value in the E-T-A E-1048 being a multi-functional device that not only provides a relay function for circuit protection but can also identify an electrical circuit's condition or failure. "This is ideal for an operator looking to quickly identify any potential



At a glance –
features and benefits of E-T-A E-1048
Solid-State Remote Power Controller.

- Three functions in a single device:
  - electronic relay
  - electronic overcurrent protection
  - indication and diagnostic functions
- CE marking according to EMC directive
- Colour coded label indicating current rating

problems associated with their electrical system and/or operation of their equipment," Bill Straub, VP of Engineering, comments. "The E-T-A E-1048 product has allowed Nordco to maximize available spacing by using the in-line version, which is fully compatible with an industry standard 35mm DIN rail."

Nordco also employs other E-T-A DIN rail mount components, such as the E-T-A 1170 Thermal Overcurrent Circuit Breaker used for protecting individual loads to PLCs, including horns and lights.

Nordco continues to expand its product line to serve the increasing need for the mechanization of railroad track repair and maintenance equipment. "We will continue to draw on E-T-A's expertise to help us enhance our product reliability as we focus on the details that make us stand out from our competitors," adds Straub.

ESS20 and ESX10: slim and powerful
providing greater safety

DC24V systems create new demands for circuit protection. E-T-A offers an overall comprehensive solution with electronic overcurrent protection – from electronic disconnection to physical isolation. Reliable power supply is ensured, even if the switch-mode power supply is overloaded.

Decentralized automation – well-protected!
Everywhere in industrial production and processes today there is a tendency towards decentralized automation. The DC24V supply voltage for control units, sensors and actuators, is increasingly supplied by switch-mode power supplies. They are lighter, smaller, more powerful and stable than transformer power supplies. Therefore, they are the first choice for all applications where reliability, availability and safety are at a premium. Switch mode power supplies demand a higher level of protection and in many cases standard circuit protection will not meet the application requirements. In order to prevent the SMPS from shutting down the voltage, due to an overload, the protection has to be quick and reliable. If not, a failure in only one load circuit may lead to a total shut down for all other circuits. The consequences: system stoppage, undefined status, and uncontrolled start-up of machinery.

Protection for each load condition
The electronic circuit breaker ESS20 and the electronic circuit protector ESX10 offer the best possible solution for every DC24V system. In equipment with long load lines or small cable cross sections, the ESS20 and ESX10 respond to a short circuit faster than the SMPS, limit the overcurrent and disconnect the faulty load avoiding dangerous operating conditions and protecting lines and loads.

Reliable disconnection to EN and UL
In compliance with the European standard EN60204-1, the ESS20 physically isolates the faulty load from the circuit. The combined features of electronic overcurrent protection, current limitation and physical isolation ensure compliance with the UL1077 - allowing use of the ESS20 in all systems and plants in the United States.

Electronic disconnection with ESX10
In machinery with integral safety requirements, the switch-mode power supply may connect via the ESX10. It will electronically disconnect the overload in the event of a failure, ensuring permanent selectivity.

Protection + diagnosis + distribution = E-T-A's comprehensive solution
ESS20 and ESX10 both feature control and reset inputs as well as signal and status outputs. Protection, diagnosis and remote control are combined with a compact, pre-assembled power distribution system providing a comprehensive and customized circuit protection solution.

Electronic circuit breaker type ESS20

Electronic circuit protector ESX10

At a glance –
features and benefits of electronic overcurrent protection with ESS20 / ESX10:

- operating voltage DC 24 V (DC 18 … 32 V)
- current ratings: 1 through 12 A
- ESS20 : current limitation plus electronic disconnection plus physical isolation
- ESX10: current limitation plus electronic disconnection
- extremely small width: 12.5 mm
- status indication by multicoloured LED (green, orange, red)
- manual ON/OFF button
- electronic signal output: individual and group indication of status
  electronic signal input: control signal or reset signal

Reduce costs at the push of a button

Using E-T-A's plug in thermal circuit breakers instead of blade fuses significantly reduces downtime of machinery or the entire plant. Instead of looking for a replacement fuse in the event of a failure, simply press the reset button.

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Modern machinery consists of a significant number of mechanical, electrical and electronic components coordinated by primary controls and monitoring devices. However, all sensors, actuators, controls and monitoring units have one thing in common: they are either electrically powered or, current pulses transfer the necessary information from one component to the other.

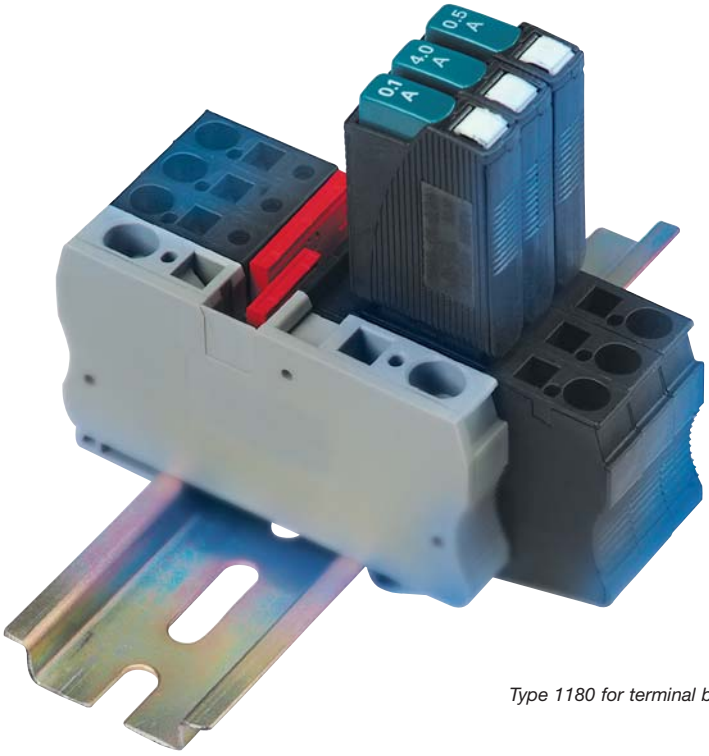
Standard blade or glass fuses are both popular forms of protection. While both types are cheap and can be plugged into terminal blocks that are snapped onto a DIN rail, a cheap solution has its drawbacks. If a fuse blows, it has to be replaced. Too often, replacements with an incorrect rating or a different trip behavior are used – making it possible for the replacement fuse not to blow at all in the event of another failure. Sometimes blown fuses are even shorted out, just to solve the problem quickly. Costs that arise from damage or stoppage during the search for a proper replacement fuse can be expensive.

E-T-A's 1180 circuit breakers are designed to fit standard DIN Rails and will help solve the problem. They can be used as simple replacements for blade fuses without any future re-work.

E-T-A 's 1180 features a push button for manual switch-off. So, unlike fuses, it can be used to physically isolate and disconnect the circuit during service and maintenance, without having to remove anything. Resetting the circuit breaker after tripping is achieved by a simple press of the push button.

The E-T-A 1180 is available in a wide range of current ratings from 0.1A to 10A for voltages up to 72 V DC (UL) and up to 250 V AC.

Resettable thermal circuit breakers are ideal for protection against overload with high inductive loads, or for the protection against short circuits. Ideal applications

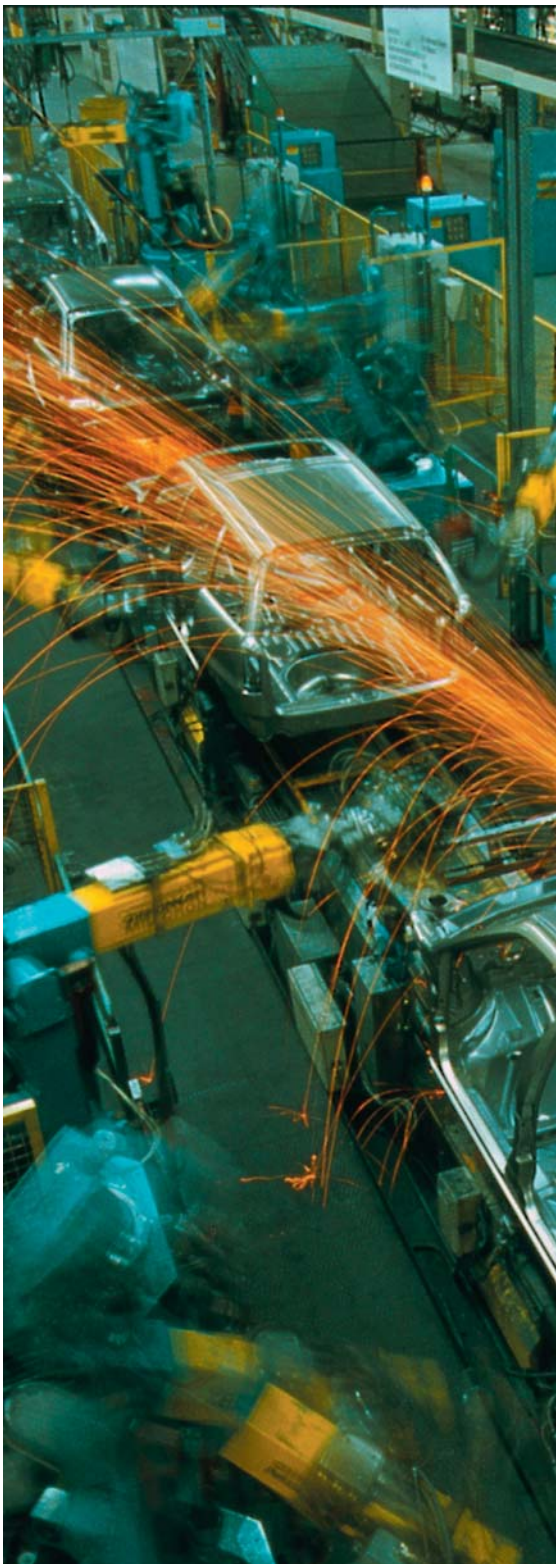


Type 1180 for terminal block mounting.

are those where immediate resettablilty is of high importance. For example, in applications where short circuits occur but where the current is restricted by the available power, or by the resistance of long cable runs.

E-T-A manufactures DIN rail mounted terminal blocks for the 1180 circuit breaker. The terminal blocks, with a width of just 8.2mm, may be mounted side by side. They are available with either screw terminals or spring-loaded terminals for cable connection. For power distribution, the terminal blocks are fitted with busbars to distribute the current to multiple output circuits, each individually protected by one 1180.

Terminal blocks can be supplied with a red LED (for 24V DC) that indicates when the circuit breaker has tripped making it easy to see the faulty circuit immediately, even in a dark control cabinet.



IBEX
Preview

The 2006 IBEX show will take place from November 1st to 3rd in Miami and is heralded as the only show that features the next generation of boatbuilding technologies from over 800 OEMs and suppliers.

If you're looking for the very latest in marine circuit protection technologies, the E-T-A booth should be you're first stop. E-T-A is featuring its new 3131 Thermal Circuit Breaker/ Switch – the newest addition to its thermal product line.

The 3131 stylishly combines a high performance switch and thermal circuit breaker in one unit which is certified to IP66 specifications – making it an excellent circuit protection solution for extreme nautical conditions. Equipped with a soft-touch rocker, the 3131 guarantees smooth and gentle operation with each use and is available in a wide range of configurations, including numerous actuator types, symbols and lighting options.

The combination circuit breaker/switch provides snap-in, panel mounted, single pole protection against both limited short circuits and low level, but potentially very harmful, overload circuits. The integral overload protection makes it unnecessary for fuse holders or additional circuit breakers – offering an advantage to boat users and simplifying the wiring circuits. The 3131 switch/ circuit breaker is available from 0.1 – 20A at up to 50V DC/ 240V AC. The three-way switch version offers additional switching required for applications like 2-way speed fans and wipers.

E-T-A Circuit Breakers tradeshow booth GLOBALCOMM 2006

Visit E-T-A at IBEX Booth # 3024 to see the new 3131 and the most comprehensive line of marine circuit protection devices.

E-T-A Circuit Breaker type 3131

F A Q

Frequently Asked Questions

Q. What is interrupting capacity and why are significantly different values sometimes shown for apparently similar products?

A. Interrupting capacity is the maximum fault current for which a circuit breaker is designed. The international IEC and European standards for Circuit Breakers for Equipment, IEC 60934/EN 60934, accommodate two different philosophies.

Category PC2 defines INC (Maximum Interrupting Capacity) as the value of rated conditional short circuit current for which the prescribed conditions require the circuit breaker to be fit for use upon completion of the tests. It must be fit for use following repeated switching operations under the prescribed test conditions (a minimum of three to meet IEC 60934/EN 60934 PC2).

Category PC1 is defined as the value of rated conditional short circuit current (interrupting capacity) for which the prescribed conditions do not include fitness of the circuit breaker for its further use. For a circuit breaker to meet the requirements of UL1077 (or IEC 60934/EN 60934 PC1), application of a short circuit current should not constitute a fire or a risk of injury: provided the circuit breaker fails safe with no ignition of test cotton wrapped around the actuator in a prescribed manner, an inability for it to reset would not represent a failure.

Specifiers should exercise caution, as current levels quoted in accordance with PC1 will almost certainly be significantly higher than figures quoted for PC2 compliance. Not all manufacturers make this distinction clear in their literature!

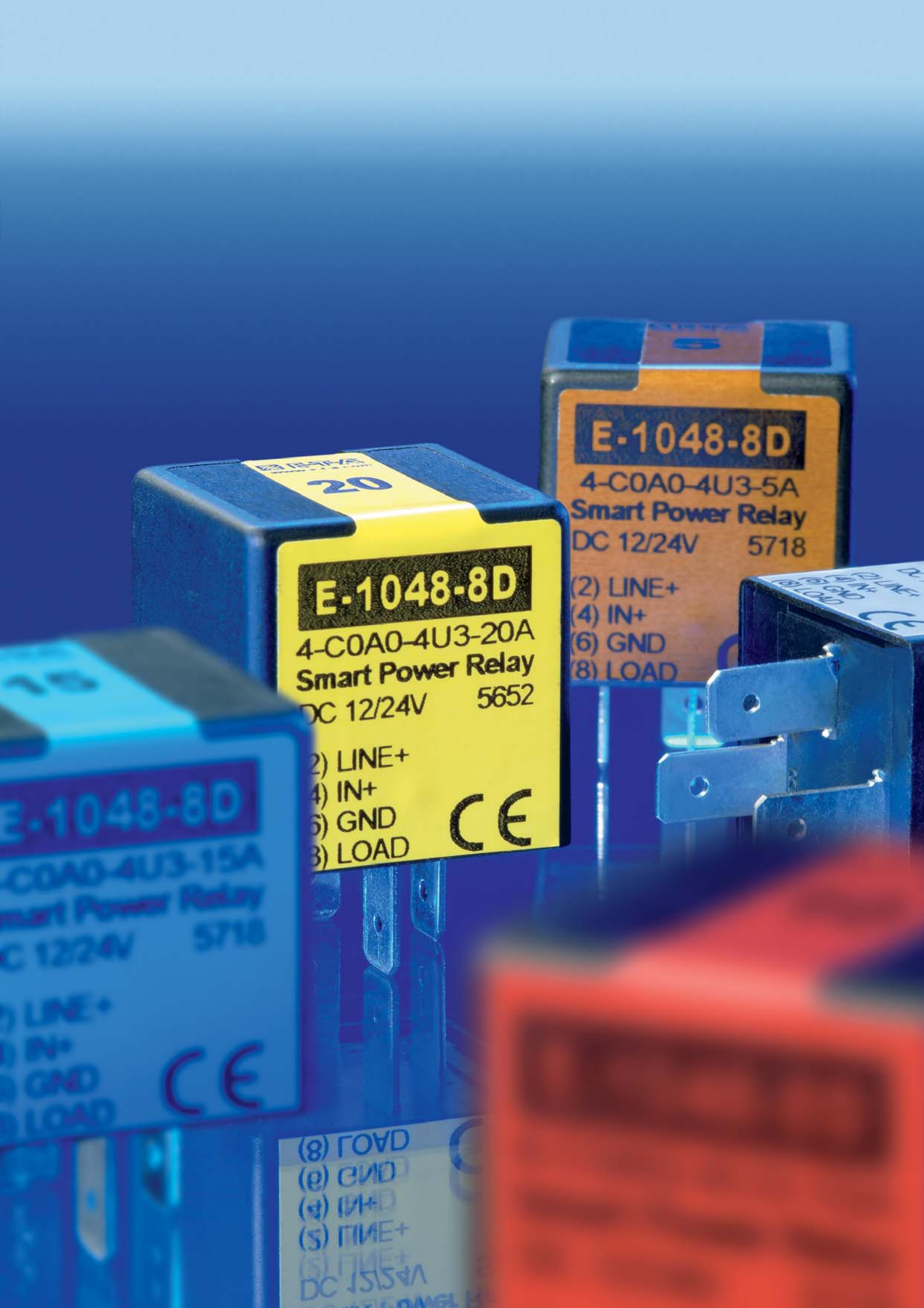
Q. What are 'M', 'R', 'S' and 'J' type Circuit Breakers for Equipment?

A. The descriptions 'M', 'R' and 'S' are used for circuit breakers which automatically disconnect on overload and are manually reset.
'R' type are designed to be manually reset only.
'M' type are provided with a means for occasional manual disconnection but are not intended for frequent use as a switch.
'S' type combine the functions of circuit breaker and on/off switch.
'J' type circuit breakers are those which will reset automatically following an overload operation. In selecting this type care should be taken to ensure that the automatic reconnection of power following a fault does not introduce a safety hazard.

Q. What is the meaning of relay trip?

A. This involves an additional actuator in the circuit breaker, usually a voltage rated solenoid, which is electrically separate from the main switching circuit. When this is energized, it will cause the mechanism of the circuit breaker to operate. This enables a circuit breaker to be remotely tripped by other sensors or controls.

For further information please request a copy of our Guide to Circuit Breakers for Equipment at: www.e-t-a.com/guidebook


E-1048-8D
4-C0A0-4U3-5A
Smart Power Relay
DC 12/24V 5718
(2) LINE+
(4) IN+
(6) GND
(8) LOAD
20
E-1048-8D
4-C0A0-4U3-20A
Smart Power Relay
DC 12/24V 5652
2) LINE+
4) IN+
6) GND
8) LOAD
CE