More possibilities: Moeller becomes Eaton

www.moeller.net/
moeller becomes-eaton

Industrial Automation Product Overview

All from a Single Source – Innovative Products for Electrical Engineering

SmartWire-Darwin

Motor-protective circuit-breaker PKE

Frequency Inverter M-Max

Safety Technology

EATON
Powering Business Worldwide

MOELLER
An Eaton Brand


THE QUALITIES THAT DISTINGUISH
MOELLER ARE EXPANDED –
BY EATON'S GLOBAL COMPETE NCIES.

Two companies with a rich history are forming one provider with global solution competence.

Moeller becomes Eaton – a winning fusion.

Moeller is now part of Eaton – a new player in electrical engineering is developing. Both brands have a great deal in common. With numerous benefits for you. After all, as an international key player we jointly endeavor to be your best supplier – and to offer you distinct and high-quality products, services and solutions anywhere in the world.

Connecting Elements
The venerable Moeller brand is now part of a group of companies that is also one of the innovation leaders in electrical engineering – and has been so since 1911. Eaton and its Moeller Business share not only the nature and purpose of what they do, but also their vision and character: we want to be the most valued company in our markets. To achieve this, we provide our customers with energy wherever it is needed – in a way that is flexible, efficient, and custom-made.

Performance excellence
We do our best to meet the highest demands of customers as well as suppliers and to increase the value of our company for the long term – in every respect: from customer orientation and availability to product performance, environmental compatibility and strength of our solutions. Furthermore, key technologies, market coverage, and the focus on specific industries complement one another – perfectly, in fact, in Eaton's Electrical Sector – as do the two brands' portfolios.

Continuous innovation
The power of innovation and product quality which have distinguished Moeller for many decades will be continued and further increased by Eaton. They will be complemented by the know-how and the presence, safety and power of innovation which only a leading technology corporation can offer. We seek to meet highest expectations in every field. Thus we work jointly every day on improving our products and services even more. Our staff members are proud to be part of Eaton.

Combined competencies
In short, it is a logical fusion, which is for the best of our joint business. With the integration of Moeller into Eaton and its incorporation into the Electrical Sector, a new era began in April 2008.

Discover what Eaton and Moeller have in common:

- Products of unique quality
- We want to be our customers' best supplier
- Joint values concerning ethically correct actions

Discover the synergies of Eaton and Moeller:

- Complementary key technologies for global standards: IEC, UL/CSA and CCC
- Complementary product portfolios in the fields of electric motors and power distribution
- Geographic presence for complete worldwide presence

More information: www.moeller.net/moeller-wird-eaton

EATON HAS A CLEAR VISION. AND IT IS NO COINCIDENCE THAT IT SHARES THE PURPOSE AND NATURE OF ITS BUSINESS WITH




Powering Business Worldwide – products and solutions for the energy of our world.

Discover Eaton – a leader in the power management field.

Eaton is one of the leading technology corporations of our day. Since the production of the first truck axle in 1911, we have helped our customers to manage electrical, hydraulic and mechanical power more effectively, efficiently and safely. Today we serve customers in electrical, hydraulics, aerospace, truck and automotive markets.

With all our energy
The statement Powering Business Worldwide defines our strength as a global enterprise and leading power management company. Eaton delivers and manages the power inside thousands of products – from manufacturing plants, hospitals, airport terminals, data centers and homes to aircraft, trucks, cars, oil rigs and even the Panama Canal locks. Our 70,000 employees (20,000 alone in Europe) are the power that drives Eaton forward.

Positioned internationally
Eaton's strengths are its global reach & resources as well as its local responsiveness and support. More than half of our sales are achieved outside the U.S. One-third of our employees live and work in Europe. We serve customers in more than 150 countries on earth with our global branches. Our identity is international through and through: we think globally and act locally. We are strongly integrated in our individual regions and available for our customers wherever they need us.

Electrical Sector
Energy management and power distribution solutions as well as power quality in buildings and industrial plants in all industry sectors ensure that electric energy can be used reliably, as needed, and in a way that is environmentally sound. Moeller fits seamlessly into Eaton's Electrical Sector. With its IEC products, it is becoming a fixed entity in the distribution of electric energy, supplying efficient solutions for industry automation. Everything from one source in the future – from Eaton.

Automotive Group
Innovations in the automotive market for more driving pleasure, better driving characteristics and less fuel consumption – such as the extra compact TVS compressors.

Truck Group
With our development of novel automatic transmissions we made the handling of large trucks safer and more economical – and now a completely new age of utility vehicles is starting with our revolutionary hybrid drives.

Hydraulics Group
Eaton holds a leading position in the development of trendsetting, efficient hybrid hydraulic systems for buses, utility vehicles and construction machines. Their market launch is imminent.

Aerospace Group
Elaborately constructed and therefore extremely lightweight – the 5,000-psi hydraulic system for the Airbus A380 saves weight, thus reducing fuel consumption and emission values.

Facts and figures:

- Founded in 1911 by J.R. Eaton
- Headquartered in Cleveland, Ohio, USA
- More than 70,000 employees worldwide, 20,000 of whom are in Europe
- Total revenues in 2009: US-$ 11.9 billion
- Turnover of the Electrical Sector in 2009: US-$ 5.9 billion


THE TWO GLOBAL STANDARDS IN ELECTRICAL
ENGINEERING HAVE FINALLY FOUND ONE ANOTHER.
UNDER THE ROOF OF A GLOBAL PLAYER.




Product lines which are tailored to needs and in line with the market for the markets of this world.

Complete coverage of the market – worldwide in all standards.

As in so many respects with Eaton and Moeller, the presence of one in the different regions of this world also complements that of the other. In markets that adhere to IEC standards, components from Moeller are established – and in the world of UL /CSA , Eaton is a key player. Now all customers are benefiting from first-rate engineering and the combined know-how in research and development. No matter which standards they use.

Standards for this world
In electrical engineering, it was less continents and regions but rather standards that drew boundaries. Historically grown in the U.S. market, Eaton focused on product series according to UL/CSA standards. Consequently, Eaton's Electrical Sector was always strongly geared towards the markets in North and South America, the Middle East, Benelux as well as the United Kingdom.

This is precisely where Moeller comes in. In markets adhering to IEC standards, innovative switchgears and control circuit devices, control, drive and operating systems as well as sophisticated visualization and communication from Moeller are customers' first choice.

New markets are waiting
Seen from this angle, Eaton is gaining ground thanks to Moeller's good market position in the traditional European markets as well as in Central and Eastern Europe. At the same time, access to important key markets, such as America and Asia, is considerably facilitated for the products of the German hightech brand of Moeller.

Global product lines
The development of complementary product lines according to global standards is one of the most tangible effects of the takeover of Moeller. As a dynamic brand in Eaton's Electrical Sector, Moeller will make a significant contribution to this. In the global development centers in Pittsburgh (USA), Raleigh (USA), Hengelo (NL), Bonn (D), Vienna(AT), Montbonnot (FR), Espoo (FI), Le Lieu (CH), St. Gallen (CH), Bognor Regis (GB) and Suzhou (CN) we work every day on jointly improving our products even more. Moeller customers can choose the best products from both worlds – from one source.

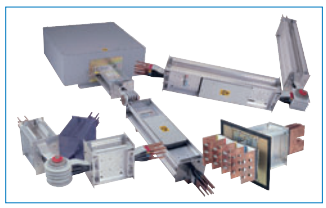
Utilizing synergies
More and more companies have positioned themselves internationally and have production sites throughout the world. Our customers benefit from Eaton, as a supplier in the fields of electrical engineering and automation, being in a position to offer the optimum product for any region, any application, and any standard.

Moeller becomes Eaton – generating tangible synergy effects, from the transfer of know-how to logistics; individual customer requirements regarding performance, availability, and quality can be perfectly satisfied.

Local market leader with global competence:

- Consistent product conformity with UL/CSA and IEC standards
- Product developments for global standards, such as IEC, ANSI, UL, GB, CCC
- Solutions for customers who operate globally – from one source
- Tapping new business segments through joint sales and distribution with a broad product portfolio
- 100% coverage of relevant market segments

WE HAVE REVISED AND CONSIDERABLY
EXPANDED MOELLER'S PRODUCT RANGE.

A consistent portfolio from medium voltage to sockets – from one source, available throughout the world.

Complementary product worlds – from medium voltage to sockets.

When two providers fuse, product ranges are merged and purged. This is different in the case of Eaton and Moeller. Here, the product portfolios complement one another and the product range doubles. Eaton can use Moeller's innovative product range – offering more options, from building to industry automation, from medium voltage to sockets.

Strong as a matter of heritage
Ever since the development of the first contactor and the first residual current circuitbreaker, the name of Moeller has symbolized extraordinary engineering and continuous innovation – with the goal of mastering electricity safely. We have steadily developed further all along and integrated customer requirements, market trends, and technological innovations into our products.
Eaton will maintain this good and important tradition – customers and partners can rely on that.

More products
Eaton offers a comprehensive product range from one source – from UPS systems, power distribution and management solutions all the way to medium-voltage components. Our uniform portfolio in all target markets makes as stronger and, more clearly than previously, the first choice for globally operating customers. Plus, thanks to the broad basis of our portfolio, our activities are more predictable and more immune to crises than they were before.

No overlapping
Moreover, a glance at the joint product range shows that the portfolios of Eaton and Moeller complement each other ideally.

Moeller's historically comprehensive range in the field of power distribution for lowvoltage products is complemented by Eaton's mediumvoltage systems, power distribution solutions, and busbar trunking systems for key accounts. In the field of industry automation, the components complement one another to form an even more comprehensive portfolio.

Here UL/CSA products are the strong suit of Eaton, and IEC products that of Moeller. UPS systems from Eaton and building automation from Moeller is yet another area which strengthens Eaton's overall product portfolio.

Markets and fields of application where the Moeller brand will remain present:
– Power distribution for functional and residential buildings
– Building automation
– Mechanical and plant engineering with the main focus on:
- Automotive
- Power plants
- Renewable energies
- Logistics
- Food & beverages
- Transportation
- Shipbuilding
- Packaging
- HVC




As a strong competence brand, Moeller is a driving force of innovation in Eaton's Electrical Sector.

Moeller products and solutions

Darwin Technology
The easy way to connect

xCommand

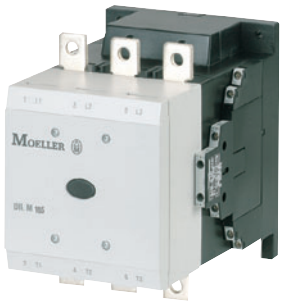
xControl

xStart

xEnergy

xBoard
xPole

Safety Technology



Content

↘ Raccourci

Results are just a click away.

1. All table pages are provided with a 6-digit Quicklink number.

2. Enter and acknowledge the relevant Quicklink number or a search term in the entry field on the top right at www.moeller.net.

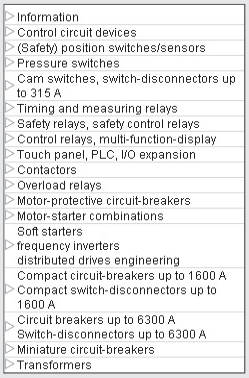
3. You now have access to comprehensive product information.

Online Catalogue

All product information just a click away!

The catalogue portal is the start page for the online catalogue. High performance search and graphic navigation features are the important elements. The clearly designed user interface makes the application particularly easy to use. The latest product data and innovations can be found here thanks to a continuous updating process.

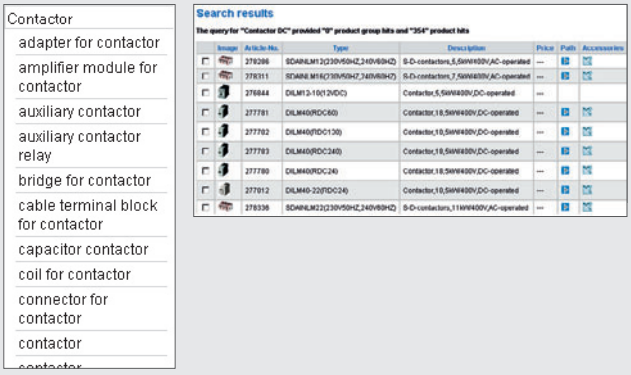
The Product Group Tree



The product group tree:
A clearly designed overview of Moeller products divided into product groups.

The one-dimensional product structure guarantees the user a clear way to find products with just a few clicks.

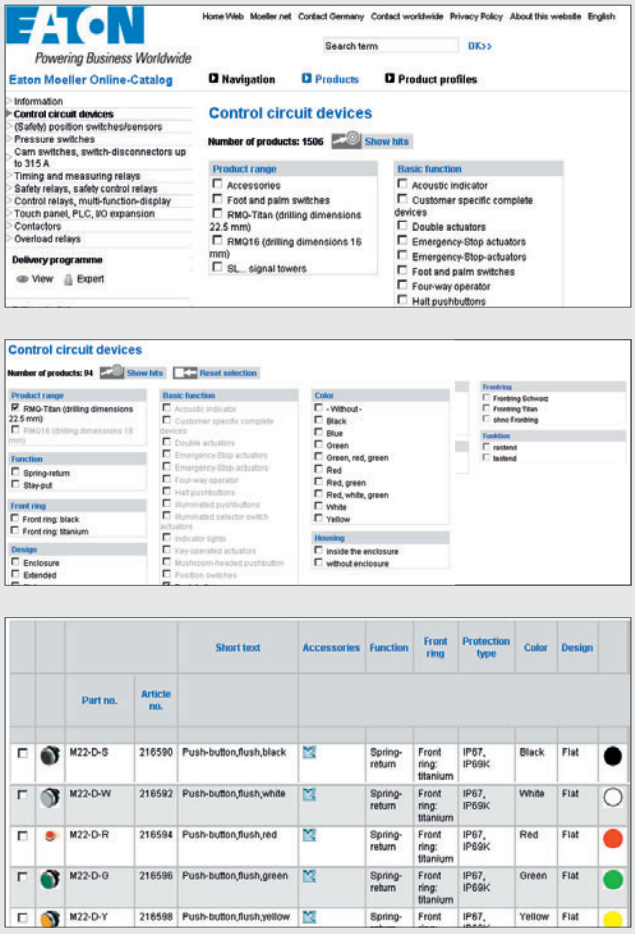
The Search



Search/hit list: High-performance search with a list of smart suggestions during "entry"

The smart suggestion list delivers better than average results, as nothing is more useless than a 0 hits result.

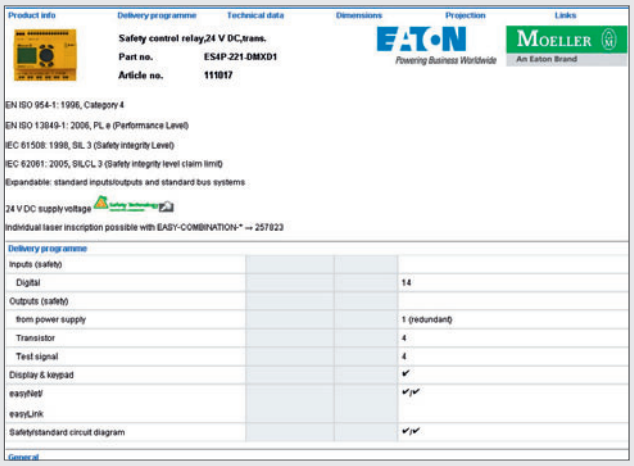
The Selection Guide



The selection guide:
The product with just "3" clicks

Selection-relevant properties help the user to select the right products. From the general field – to the special field – to the product in just 3 clicks!

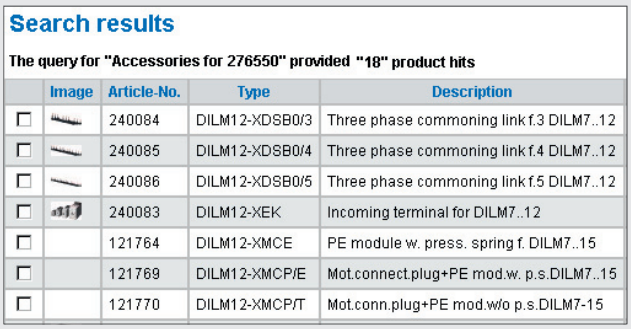
The Individual Data Sheet



The individual data sheet: Detailed product description

A photo, technical data, dimensions and all details at a glance. Also on offer are service data such as engineering support and documentation.

The Quick Configuration



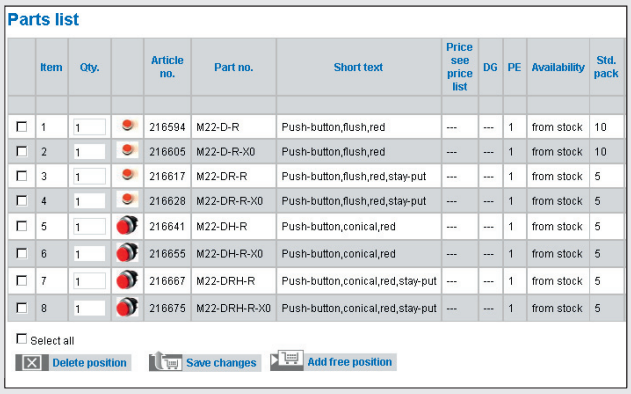
The quick configuration: Offering accessories for the base units

The available accessories are displayed or links to the accessory group are provided by a simple "click" on the base unit. "Virtual configuration" is possible by the selection of relevant characteristics.

Actuality:
Always the most up-to-date information

In future, the online catalogue will be updated continuously to ensure that the user always has the most up-to-date product data and innovations available.

The Bill of Materials



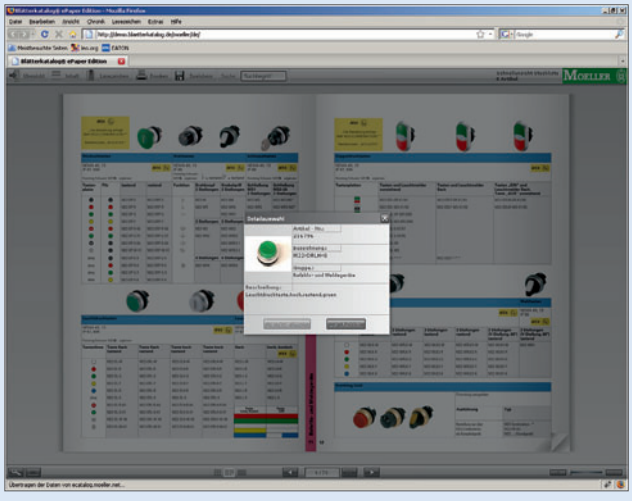
The bill of materials: Management of product lists

All products can be transferred to the bill of materials, in which a considerable amount of logistical data such as EAN number, weight or supplementary charges are included. The bill of materials can then be sent to the desired recipient.

Online browsing catalogue

Our "Industrial Automation Product Overview" is available as a comfortable to use online browsing catalogue.

All relevant information for the product of your choice is automatically compiled into a concise data sheet with images, technical data, dimensions and ordering information.



EATON

Powering Business Worldwide

There's a certain energy at Eaton. It's the power of uniting some of the world's most respected names to build a brand you can trust to meet every power management need. The energy created supports our commitment to powering business worldwide.

From power distribution to power quality and control, Eaton allows you to proactively manage your complete power system by providing electrical solutions that make your applications safer, more reliable, and highly efficient. Visit www.eaton.com/electrical.

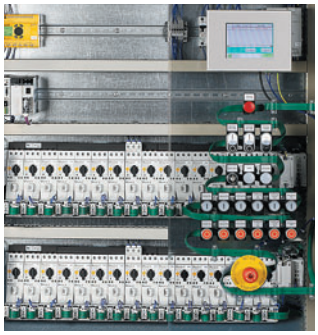
SmartWire-Darwin.
Connecting instead of wiring

Darwin Technology
The easy way to connect

Manufacturers of machines and systems strive to achieve a balance between the maximum level of functionality and cost optimization. SmartWire-Darwin is a communication system for industrial switchgear based on the concept of continued development in the control panel and in the peripherals: from control through to protection and switching, and extending to driving, operation and monitoring. A technology that benefits you, both now, and in the future.

SmartWire-Darwin to a very great degree reduces the wiring effort and expense and helps along the entire value-added chain – from the design to the construction, to the commissioning up to system expansion – in the reduction of costs. SmartWire-Darwin relies on the tried-and-tested Eaton Moeller industrial switchgear and grants intelligent communication features.

- Efficient planning and engineering
- Fault-free mounting and wiring
- Quick to commission
- Comfortable operation
- Maintenance with direct diagnostics
- Simple to expand



SmartWire-Darwin – System description

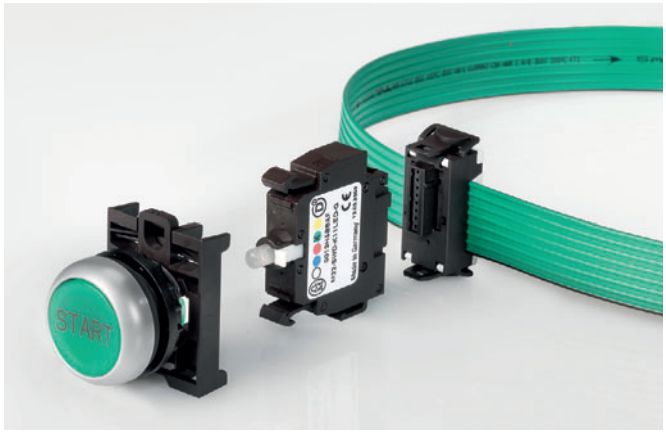
The communication system SmartWire-Darwin makes possible the connection of switching devices to a programmable logic controller without elaborate control wiring.

Connecting instead of wiring

The control wiring between the PLC and the switchgear is replaced by plug-in SmartWire-Darwin connection technology. The switchgear is quickly and reliably connected with SmartWire-Darwin.

The SmartWire-Darwin function elements are connected via gateways with a standard fieldbus to the programmable logic control. Central and distributed input/output cards are not required due to the direct connection of the switchgear to the PLC. The connection of the SmartWire-Darwin function elements is undertaken with device connectors and flat cable within the control panel.

A round cable is use for connections outside the control panel.



SmartWire-Darwin – simply ingenious – for control circuit devices.

Conventional wiring of control circuit devices involves a lot of effort and expense – every contact or indicator light is wired individually, and separately connected to the input/output modules of the control.

This requires a lot of time and has the potential for many wiring faults. SmartWire-Darwin is simply ingenious – the flat green cable connects control circuit devices, using a device connector, with just a click. This saves time and eliminates wiring faults. Standard RMQ-Titan control circuit devices form a unit in conjunction with SmartWire-Darwin function elements.

Connecting instead of wiring

SmartWire-Darwin is simply ingenious!

SmartWire-Darwin – simply clever – for motor starters or contactors

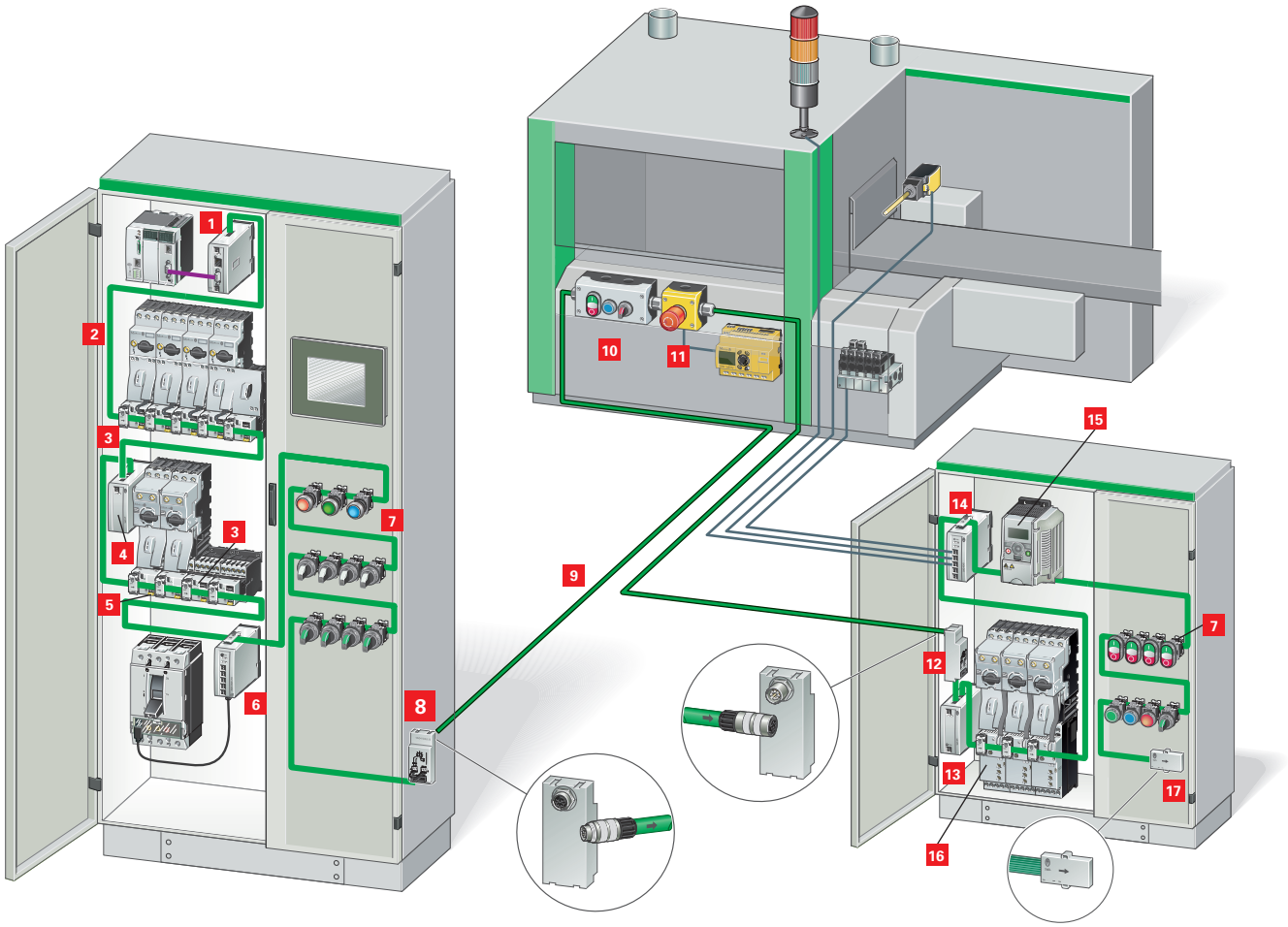
Even the conventional wiring of a control current circuit incorporating motor starters or contactors involves considerable time and effort. Every motor starter, every contactor is wired individually and separately connected to the input/output modules of the PLC. This requires a lot of time and has the potential for many wiring faults.

Standard contactor DILM, motor-protective circuit-breakers PKZ and PKE and motor starter MSC form a unit in conjunction with the SmartWire-Darwin function elements.

Connecting instead of wiring

SmartWire-Darwin is simply clever!

SmartWire-Darwin.
Evolution in the control panel.



1 Fieldbus gateway: Connection to the higher-level control
2 Flat cable
3 Function element for contactor DIL and motor starter MSC with PKZ
4 Powerfeed 1 (optional 24 V DC power supply)
5 Function element for motor starter MSC with PKE
6 Function element for circuitbreaker NZM
7 Function element front: control circuit devices RMQ Titan for front installation
8 Control panel feed-through socket
9 Round cable
10 M22-I… Surface mounting enclosure with circuit board, 3 installation positions
11 M22-PV… EMERGENCY-STOP surface mounting enclosure with circuit board, 1 installation position
12 Control panel feed-through plug
13 Powerfeed 2 (optional 15 V DC and 24 V DC power supply)
14 I/O module: connection of digital actuators / sensors
15 Frequency inverter M-Max
16 Soft starter DS 7
17 Bus terminator

SmartWire-Darwin gateway
- Connection of SmartWire-Darwin to field bus.
- Supports the field Buses PROFIBUS-DP and CANopen.
- Supply voltage feeder for the SmartWire-Darwin slaves.
- Supply control voltage for the motor starter or contactor.
- Configuration button for automatic addressing of the SmartWire-Darwin slaves.
- Support of up to 99 SmartWire-Darwin slaves.
- Connection of the SmartWire-Darwin flat band conductor via blade terminal.

Switch cabinet bushing
- Transition between the SmartWire-Darwin connection cables round and flat.
- Connection of the flat band conductor via blade terminal.
- Additional feeder facility for 24 V DC control voltage for motor starter and contactors.
- Formation of emergency stop groups.
- Protection class IP67.
- Round cable connection via socket/plug.

SmartWire-Darwin inputs/outputs module
- Connection to SmartWire-Darwin flat band conductor via external device plug.
- Integration of other switching devices without integrated SmartWire-Darwin technology.
- Variant with 8 digital inputs or 4 digital inputs and 4 potential-tied transistor outputs or 4 digital inputs and 2 relay outputs 250 V AC.
- SmartWire-Darwin diagnostics LED for signalling of the communication status of the module.

Power feeder module
- Connection to SmartWire-Darwin flat band conductor via blade terminal.
- Supply voltage feeder for the SmartWire-Darwin slaves.
- Control voltage feeder for the motor starter and contactors.
- Formation of emergency stop groups.

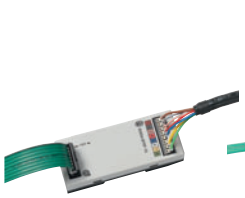
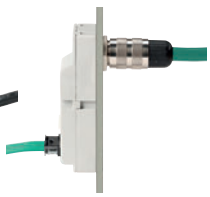
Planning and ordering help (SWD-Assist)
- Free download at: http://downloadcenter.moeller.net.
- Easy generation of SmartWire-Darwin networks.
- Function for the generation of ordering lists.
- Integrated validity check.



Gateways		Input/output modules		Powerfeed module	
	Part no.		Part no.		Part no.
Profibus DP (Slave)	**EU5E-SWD-DP**	8 digital inputs 24 V DC	**EU5E-SWD-8DX**	Control voltage feeder for the motor starter and contactor. Emergency Stop groups	**EU5C-SWD-PF1-1**
CANopen (Slave)	**EU5E-SWD-CAN**	4 digital inputs 24 V DC 4 transistor outputs 0,5 A	**EU5E-SWD-4D4D**	Supply of other SWD slaves. Control voltage feeder for the motor starter and contactor. Emergency Stop groups	**EU5C-SWD-PF2-1**
		4 digital inputs 24 V DC 2 relay outputs 250 V AC	**EU5E-SWD-4D2R**		



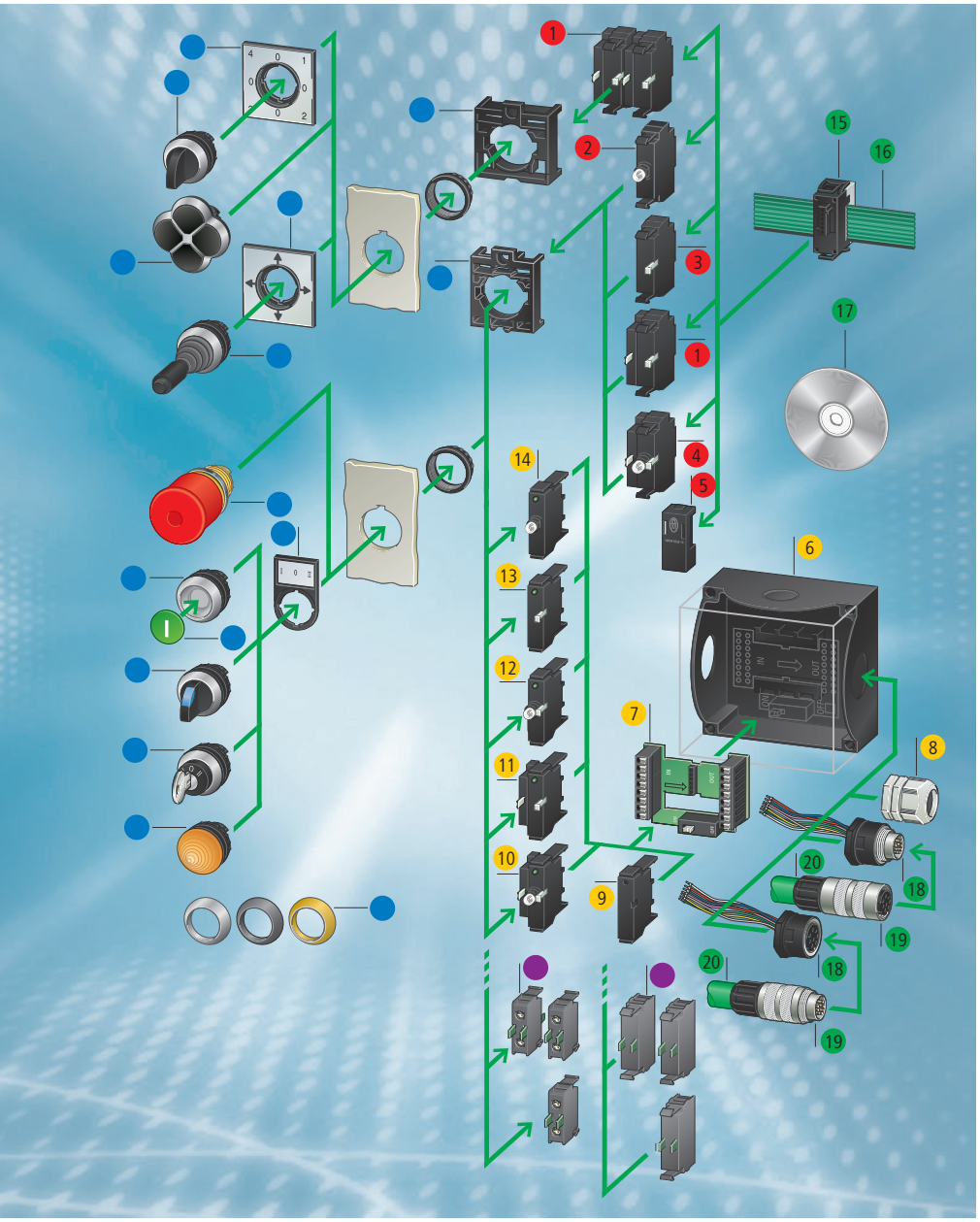

Flat and round cables		Plug, coupling and network terminator		Mounting tools for device connectors	
	Part no.		Part no.		Part no.
Flat cable		External device plug for SWD slaves	**SWD4-8SF2-5**	Pliers for external device plugs	**SWD4-CRP-1**
Length 100 m	**SWD4-100LF8-24**	8-pin blade terminal	**SWD4-8MF2**	Pliers for blade terminal	**SWD4-CRP-2**
Length 3 m	**SWD4-3LF8-24-2S**	Coupling for 8-pin blade terminal	**SWD4-8SFF2-5**	Insert for toggle lever press of external device plugs	**SWD4-CRPAD-1**
Length 5 m	**SWD4-5LF8-24-2S**	Network terminator for 8-pole flat band conductor	**SWD4-RC8-10**	Insert for toggle lever press of blade terminal	**SWD4-CRPAD-2**
Length 10 m	**SWD4-10LF8-24-2S**				
Round cable outside					
Length 50 m	**SWD4-50LR8-24**				




Flat cable and round cable adapters		Bridging of open mounting locations		Connectors for SWD round cables	
	Part no.		Part no.		Part no.
For top-hat rail mounting	**SWD4-8FRF-10**	for device plug SWD4-8SF2-5 (front fixing)	**SWD4-SEL8-10**	8-pole socket, flat	**SWD4-SF8-67**
		for unused mounting locations of M22-SWD-I...LP (base fixing)	**M22-SWD-SEL8-10**	8-pole plug, flat	**SWD4-SM8-67**
Flat and round cable control panel feed-through				8-pole socket, 90° angled	**SWD4-SF8-67W**
Socket	**SWD4-SFL8-20**			8-pole plug, 90° angled	**SWD4-SM8-67W**
Plug	**SWD4-SML8-20**			Enclosure bushing for installation in surface mounting enclosure M22-I...	
				8-pole socket, M20	**SWD4-SF8-20**
				8-pole plug, M20	**SWD4-SM8-20**

Command and signalling devices RQM-Titan



Front elements

Function elements for front fixing

1 Function element with 3 positions
2 LED element
3 Function element with 2 positions
4 Function element with 3 positions and LED
5 Link for device plug

Function elements for base fixing

6 M22 surface mounting enclosure
7 PCB for built-in enclosure
8 Enclosure bushing for round cable
9 Link for base slots
10 Function element with 3 positions and LED
11 Function element with 3 positions
12 Function element with 2 positions and LED
13 Function element with 2 positions
14 LED element

SmartWire-Darwin accessories

15 SmartWire-Darwin external device plug
16 SmartWire-Darwin flat band conductor
17 Planning and ordering help, SWD-Assist
18 Enclosure bushing plug/socket
19 Connectors for SmartWire-Darwin round cables
20 SmartWire-Darwin round cable

Standard contact elements




Control circuit devices

	Function elements front fixing			Function elements base fixing		
LED		**2 positions**	**3 positions**		**2 positions**	**3 positions**
without		**M22-SWD-K11**	**M22-SWD-K22**		**M22-SWD-KC11**	**M22-SWD-KC22**
○	**M22-SWD-LED-W**	**M22-SWD-K11LED-W**	**M22-SWD-K22LED-W**	**M22-SWD-LEDC-W**	**M22-SWD-K11LEDC-W**	**M22-SWD-K22LEDC-W**
●	**M22-SWD-LED-B**	**M22-SWD-K11LED-B**	**M22-SWD-K22LED-B**	**M22-SWD-LEDC-B**	**M22-SWD-K11LEDC-B**	**M22-SWD-K22LEDC-B**
●	**M22-SWD-LED-G**	**M22-SWD-K11LED-G**	**M22-SWD-K22LED-G**	**M22-SWD-LEDC-G**	**M22-SWD-K11LEDC-G**	**M22-SWD-K22LEDC-G**
●	**M22-SWD-LED-R**	**M22-SWD-K11LED-R**	**M22-SWD-K22LED-R**	**M22-SWD-LEDC-R**	**M22-SWD-K11LEDC-R**	**M22-SWD-K22LEDC-R**

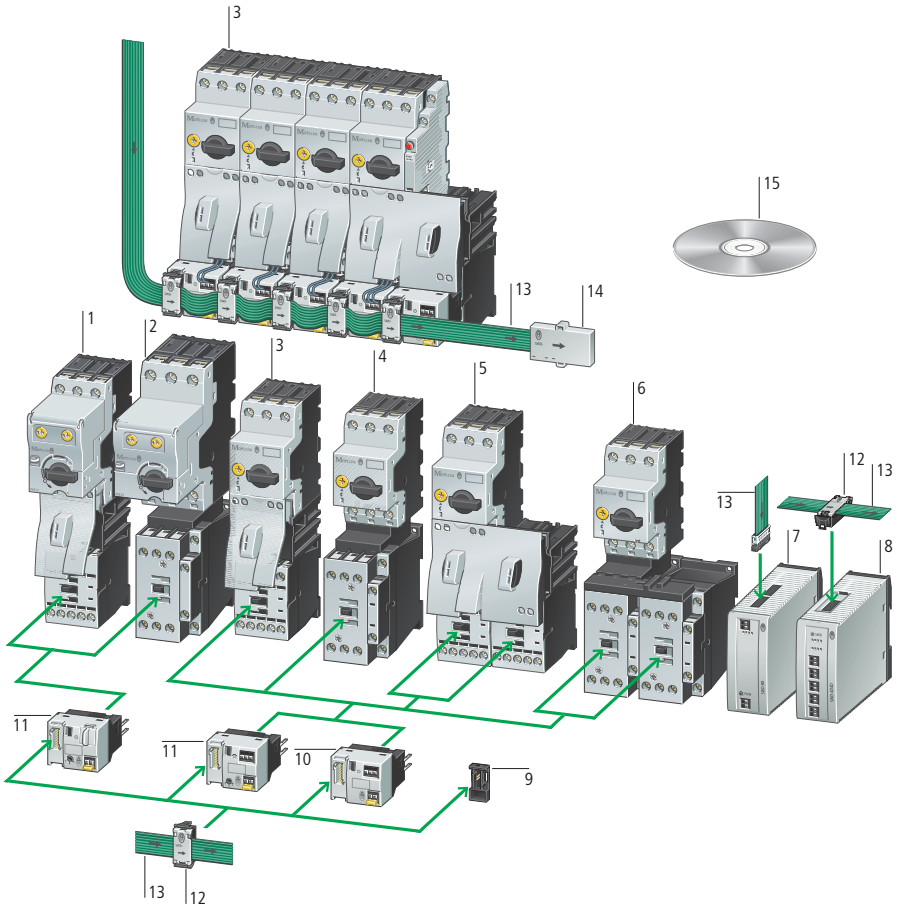
Accessories surface mounted enclosure M22-I..

		1 installation position	2 installation positions	3 installation positions	4 installation positions	6 installation positions
	PCB for enclosure	**M22-SWD-I1-LP01**	**M22-SWD-I2-LP01**	**M22-SWD-I3-LP01**	**M22-SWD-I4-LP01**	**M22-SWD-I6-LP01**

Motor starter xStart

Online catalogue Quick-link to www.moeller.net

OC1EN



1 DOL starter MSC-DE (with PKE12) up to 12 A
2 DOL starter MSC-DE (with PKE32) up to 32 A
3 DOL starter MSC-D (with PKZM0) up to 15,5 A
4 DOL starter MSC-D (with PKZM0) up to 32 A
5 Reversing starter MSC-R up to 12 A
6 Reversing starter MSC-R up to 32 A
7 Powerfeed module
8 SmartWire-Darwin input/output module
9 Link for device plug
10 SmartWire-Darwin protective module
11 SmartWire-Darwin protective module with hand/auto functionality
12 SmartWire-Darwin external device plug
13 SmartWire-Darwin flat band conductor
14 Network terminator
15 Planning and ordering help, SWD-Assist

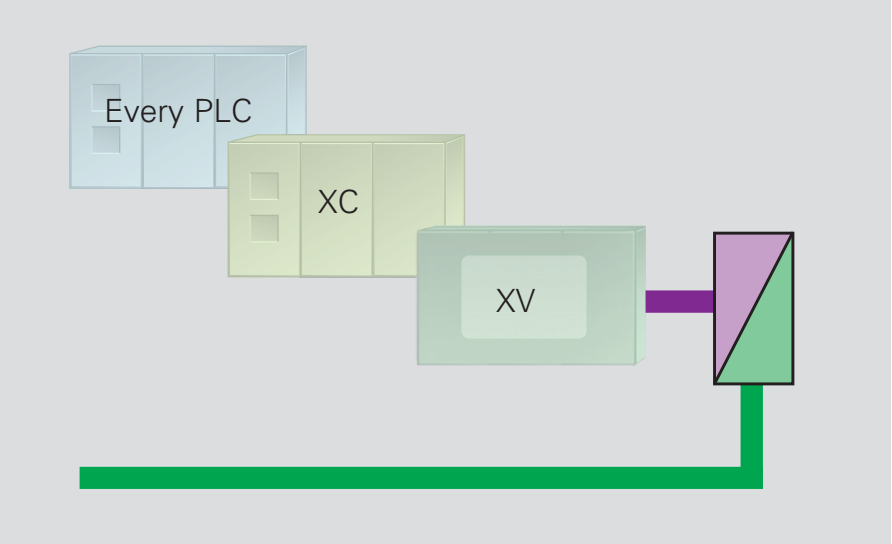
Contactor modules		
Function element, DIL/MSC **DIL-SWD-32-001**	Function element, DIL/MSC, manual/auto **DIL-SWD-32-002**	Function element, PKE12/32 **PKE-SWD-32**

Motor-protective circuit-breaker PKE 12 / PKE 32, coordination type “1” and “2”				
Motor rating	380 V, 400 V, 415 V	**Overload release setting tange**	**Base unit**	**Control unit Extended**
kW	A		**Part no.**	**Part no.**
0.12	0.41	0.1 ... 1.2 A	**PKE12**	**PKE-XTUA-1,2**
0.18	0.6			
0.25	0.8			
0.37	1.1			
0.37	1.1	1 ... 4 A	**PKE12**	**PKE-XTUA-4**
0.55	1.5			
0.75	1.9			
1.1	2.6			
1.5	3.6			
1.5	3.6	3 ... 12 A	**PKE12**	**PKE-XTUA-12**
2.2	5			
3	6.6			
4	8.5			
4	8.5	8 ... 32 A	**PKE32**	**PKE-XTUA-32**
5.5	11.3			
7.5	15.2			
11	21.7			
15	29.3			

SmartWire-Darwin.
Protects your know-how.

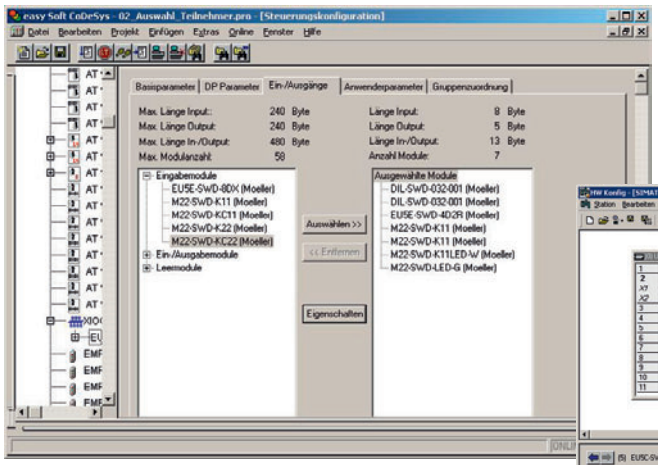
SmartWire-Darwin to a very great degree reduces the wiring effort and expense and helps along the entire value-added chain, from the design to the construction, the programming, to the commissioning and up to system expansion – in the reduction of costs.

SmartWire-Darwin based on the known and proven – that is on Eaton Moeller industrial switchgear – SmartWire-Darwin transforms Eaton Moeller industrial switchgear to communication-enabled devices.



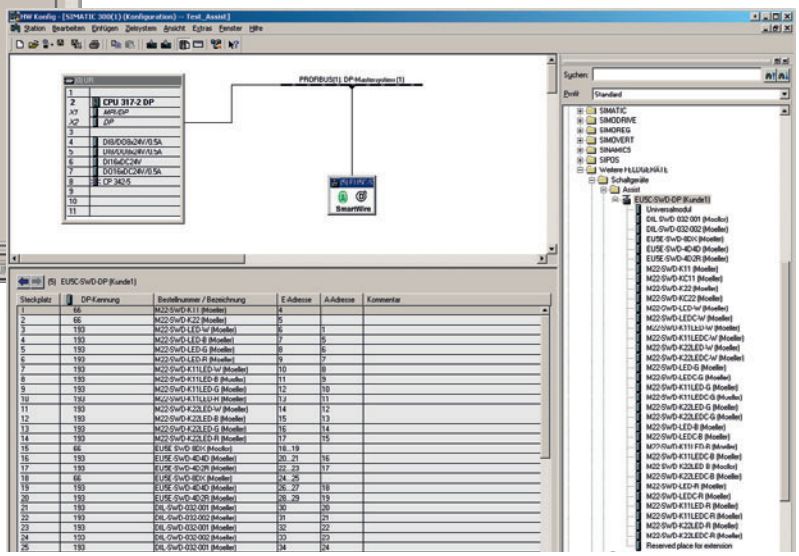
Your application program is retained

Integration of the SmartWire-Darwin gateways into the PLC program is problem-free. It simply acts as the control configuration not as the application program. Thus the conversion to SmartWire-Darwin is also made simple and easy in the area of PLC programming. You continue to protect and retain your software know-how!



SmartWire-Darwin in the easySoft-CoDeSys configuration

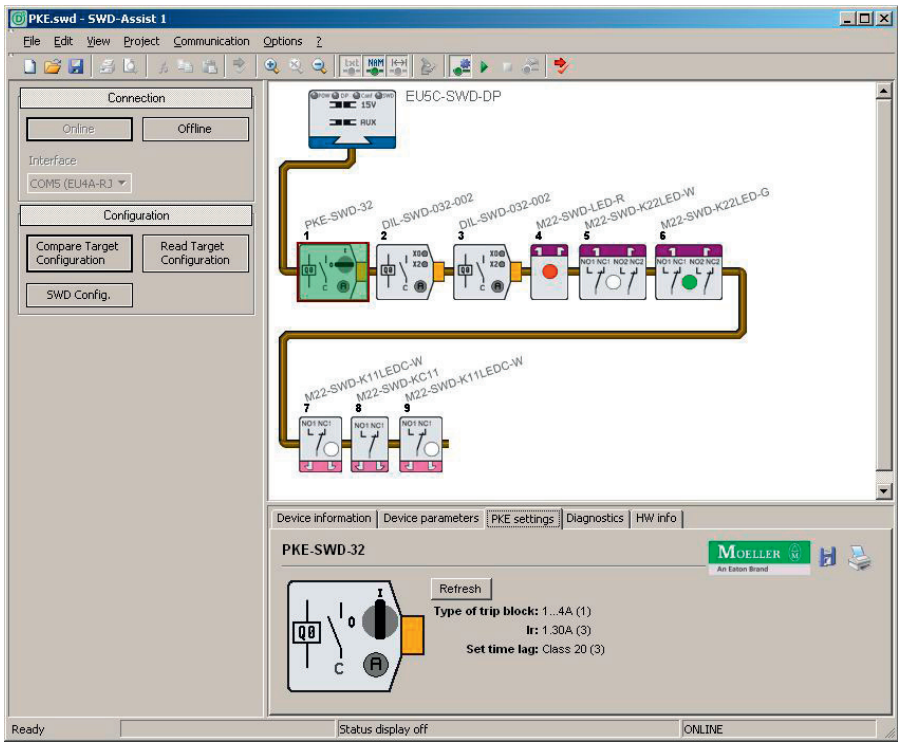
SmartWire-Darwin in the Step7 PLC configuration



Easily achieve you target with SWD-Assist

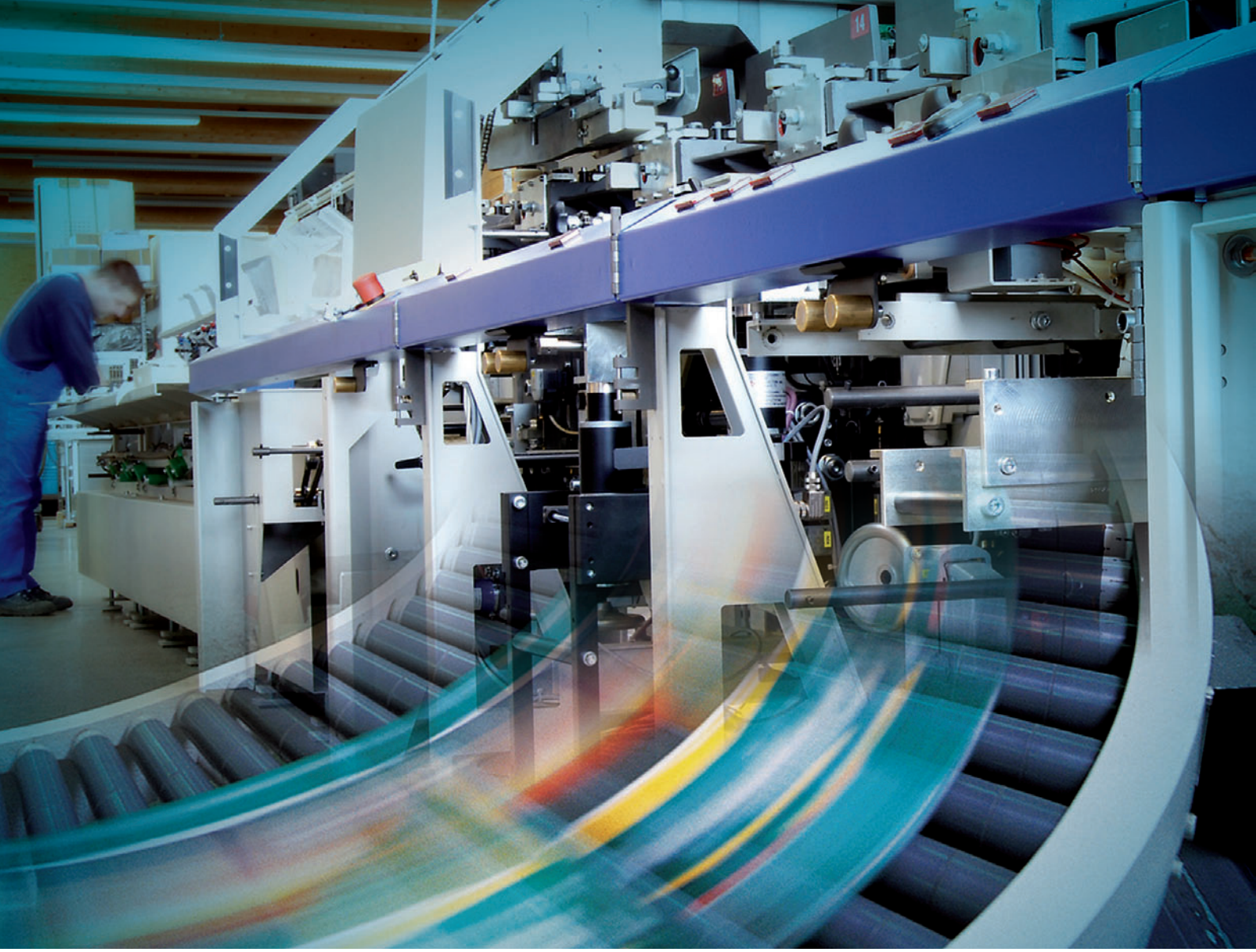
The SWD-Assist software supports you in the planning, engineering and commissioning of a SmartWire-Darwin network. You simply select the required SWD function elements from the device catalogue and place them at the intended location. The configuration can be saved and reused for other projects. For PROFIBUS, the generation of a project-specific gsd-file is also possible. This can be integrated into the programming environment in the usual manner. Entry into the SWD-configuration in the control configuration is no longer necessary.

The SWD-Assist can be downloaded free-of-charge from our website: www.moeller.net/swdassist



Fast and comfortable: SWD online diagnostics

You can also directly access the SmartWire-Darwin devices over the configuration interface of the gateway. The entire SWD network can be checked without a connected PLC. Reading and editing of the current configuration is possible just as is the display of states, parameter data and diagnostic messages. Differences between the existing configuration and the configuration defined in the control configurator are also displayed. Device faults are detected immediately and can be quickly remedied.



Functional safety for persons, machines and the environment

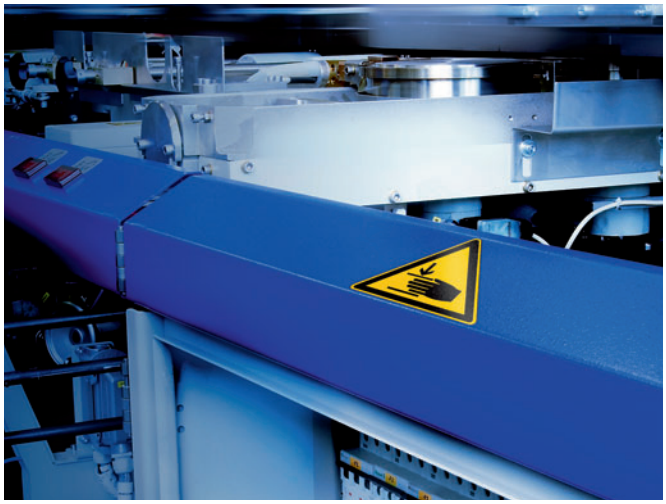
Safety Technology
Control the unexpected

The EC machinery directive demands that there is no danger posed by machines. As one hundred percent safety is impossible to technically implement, the challenge is to reduce the risk to a tolerable level of remaining risk. In doing so the entire lifecycle of the machine – from manufacture to disassembly – must be examined to determine the dangers for people, machines and the environment, i.e. suitable risk reduction measures must be introduced during the construction phase of the machine.

The overall safety of a machine defines the state which is deemed to be free of unwarranted risks for persons or which is deemed to be danger free. The functional safety describes the fraction of the overall safety of a system that is dependent on the correct function of the safety-related systems and external devices in order to reduce the risks.

Avoiding dangers

Protecting against dangers



Indicating remaining sources of danger

Assuring machine safety by reduction of the risk

The international standard EN ISO 12100-1 "Safety of machinery – Basic concepts, general principles for design" provides the constructor with detailed assistance in the identification of dangers and the risks to be examined, and contains design guidelines and methods for safe construction and reduction of risks.

The first steps deal with the area of risk analysis and risk assessment for achieving the required level of machine safety. For this purpose the EN ISO 14121-1 "Safety of machinery – Risk assessment – Principles" provides detailed requirements, which are to be implemented methodically in an iterative process and which are to be comprehensibly documented. The technical measures for reduction of the danger are defined as the result.

All protective measures which are used to eliminate the dangers or reduce the risks as a result of these protective measures are to be undertaken in a predefined sequence in compliance with the EN ISO 12100-1:

1st step → *Avoidance of dangers:* risk elimination and reduction through constructive measures during the planning and development phase of the machine

2nd step → *Protect against dangers:* reduction of the risks by the introduction of necessary protective measures

3rd step → *Indicate remaining sources of danger:* risk reduction through information/warnings concerning the residual risks

If the dangers cannot be avoided or sufficiently limited by the use of construction design measures, the protective devices are to be provided in the second step – safety-related parts of control systems (SRP/CS). These must be constructed and selected in such a way that the probability of functional faults is sufficiently minimal. If this is not possible, the faults which have occurred may not cause a loss of the safety function.

As a supplement to the protective measures selected by the machine constructor, further protective measures for reduction of the residual risk may be necessary for the machine operator or machine users (e.g. personal protective equipment, training, etc.).

Eaton Moeller offers you suitable components for reduction of the inherent risk through SRP/CS (step 2) with Safety Technology conforming to the highest demands of the international safety standards! Suitable safety functions are used depending on the area of application and required level of protection against danger.

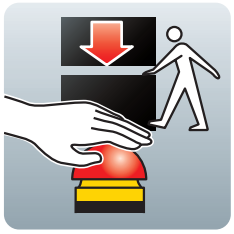
Safety-related parts of control systems (SRP/CS)

The components of machine controls that are responsible for safety tasks are referred to in international standards as "safety-related parts of control systems." These SRP/CS can consist of hardware or software and be separate or integral elements of the machine control. Safety-related control parts involve the entire functional chain of a safety function, consisting of the input level (sensors), the logic (safe signal processing) and the output level (actuator).

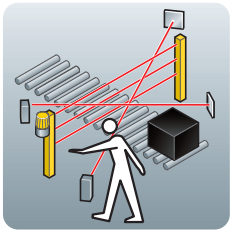
A wide range of circuit examples for functional safety with electrical, electronic and electric, programmable components and systems in safety-relevant applications are shown in the new Eaton Moeller Safety Manual.

You are given an overview of the most important relationships between directives, standards and regulations that require consideration when employed in the safety equipment and devices used on machines.

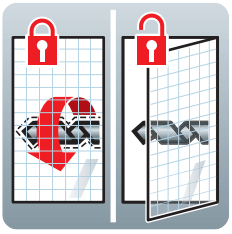
The Eaton Moeller Safety Manual offers machine and panel builders, trainers and trainees as well as all who are interested in the issue of safety, a simple introduction to the extensive subject matter.



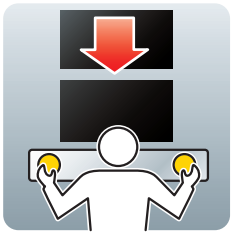
Circuits for stopping in an emergency



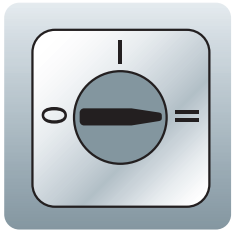
Light curtain Optional with muting function



Guard door monitoring with and without interlocking/ guard locking

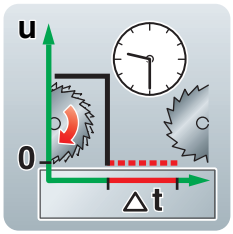


Safe operation with two-hand-control

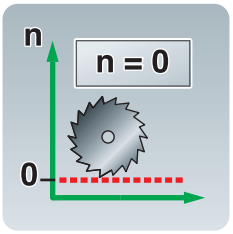


Mode switch

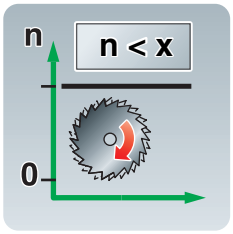
Enabling switch



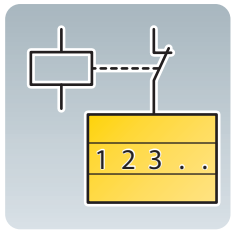
Safety-related timing relay



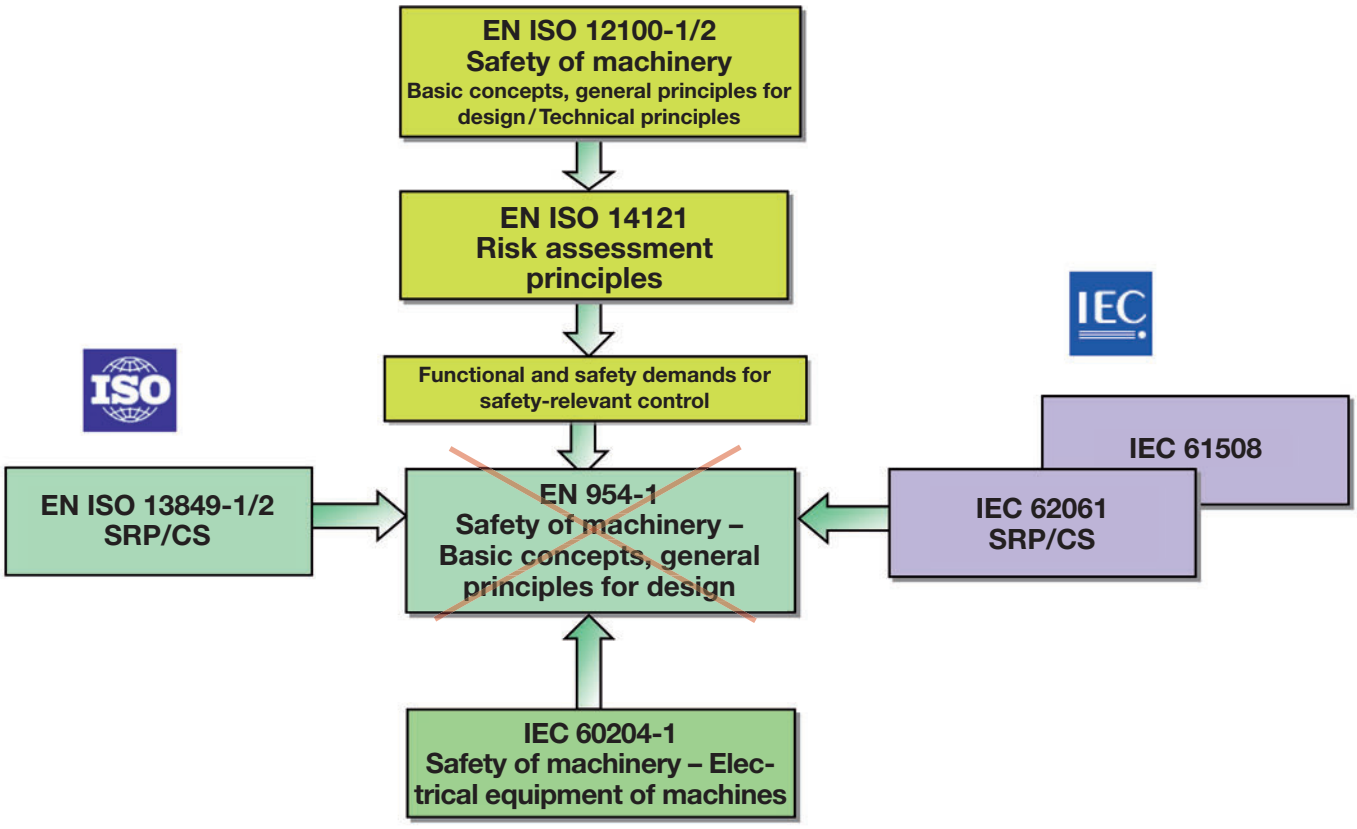
Zero monitoring



Overspeed monitoring



Feedback loop monitoring (EDM)



Definition of safety demands on the SRP/CS and their implementation

The following represented standards use different classification systems and definitions for the safety stages and are applied depending on the technology, risk categorisation and architecture.

Previous EN 954-1 "Safety of machinery – Safety-related parts of control systems"

The European standard EN 954-1 has established itself in the area of machinery safety as the leading international state-of-the-art standard. The EN 954-1 defines control categories for allocation of different technical performance safety – *categories B, 1, 2, 3, 4.*
Validity of EN 954-1: transitional period until 28.12.2009, thereafter it will be superseded by the EN ISO 13849-1.

New EN ISO 13849-1 "Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design"

At the end of 2006 the EN ISO 13849-1 was officially declared as the successor standard of the EN 954-1 and is already listed in the Official Journal of the European Community. With the EN ISO 13849-1 a quantitative observation of the safety functions beyond the qualitative approach of the EN 954-1 is applied. For the classification of different technical safety effectiveness, Performance Levels (PL) are defined in the EN ISO 13849-1. The five PL's *(a, b, c, d, e)* represent the average probability of a dangerous malfunction per hour.

Alternative IEC 62061 "Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems"

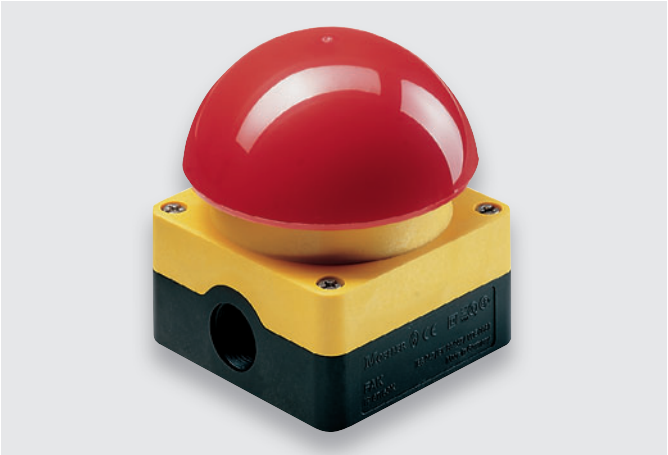
IEC 62061 serves in the overall scope of the EN ISO 12100-1 as an alternative standard to the EN ISO 13849-1. The Safety Integrity Level SIL describes the technical safety performance in three stages (1, 2, 3).

Quicklink ID:
enter SAF1en at www.moeller.net

Quickly detect danger with Emergency-Stop actuators

Emergency-Stop actuator from the 16 mm control circuit device range **RMQ16**. With our without lighting is decided by the application.

Larger and optimally suited for operator actuation are the Emergency-Stop buttons from the 22 mm control circuit and signalling device **RMQ-Titan®**.



Eaton Moeller offers the foot and palm switch **FAK** (e.g.: for operation wearing gloves) for use in rugged and harsh environments.

The machine or system must be immediately stopped to protect persons, machines or systems in dangerous situations. An effective and conventional method allows the operator or persons located in the vicinity to decide if a dangerous situation exists.

Emergency-Stop switches are used to trigger the standstill of the system or machine. Eaton Moeller is a specialist for control circuit devices with Emergency-Stop functions – the Emergency-Stop button. Eaton Moeller Emergency-Stop buttons are suitable for most applications. Example: DIN EN 60204 "Safety of machinery – Electrical equipment of machines" (Emergency-Stop button). The devices must latch and stay-put independently, the contacts must be positively opening (see IEC 60947-5-1) and Eaton Moeller Emergency-Stop buttons are constructed compliant to the IEC 60547-5-1 standard!

For applications in explosive dust atmospheres (ATEX Zone 22) Eaton Moeller offers both the 22 mm RMQ-Titan control circuit device as well as the foot and palm switch FAK.

Common properties of all Emergency-Stop actuators

- Developed, tested and constructed compliant to IEC, EN or even UL / CSA safety standards
- Tamper-proof compliant to **DIN EN ISO 13850**
- TÜV and / or BG (BG – Institute for Occupational Safety and Health / Germany)
- World-wide approvals (countries or shipping classifications)
- Indication if actuated or not actuated
- High degree of protection against dirt or water
- Larger operating temperature range
- Resistant to extremely high shock and vibration loading

The key-operated buttons can be integrated into a master key system.

Illuminated Emergency-Stop buttons are flexible in use.

The ATEX approval enables use in explosion-hazardous areas.

Tamper-proofing

An important factor for Emergency-Stop buttons is tamper-proofing and the positive opening of the contacts. If the Emergency-Stop button is actuated and if the N/C contacts open, the Eaton Moeller Emergency-Stop button automatically jumps to the stay-put position and remains in this position (N/C contacts in Emergency-Stop circuit remain opened) until the Emergency-Stop button is manually reset. This reset can be initiated by pulling (PULL), rotation (TWISTED) or with a key switch (KEY RESET).

There are two further specialities with the RMQ-Titan range:

- Key switches for resetting can be integrated in a master key system
- The Emergency-Stop button can be protected by a sealable shroud (reset by pulling or twisting) to prevent resetting after actuation. This is very useful if the Emergency-Stop button is to be protected against tampering. It is only possible to reset the Emergency-Stop button by breaking the seal.

Illumination of the Emergency-Stop button

Versions with illumination are available in order to make Emergency-Stop buttons in a system or machine even more distinguishable. The integrated indicator lights can be used in different ways:

- Continuous light, dependent on the switch position of the Emergency-Stop button (high visibility)
- Continuous light until actuation of the Emergency-Stop button, subsequently with the signal light "OFF"
- Continuous light (highly visible until actuated, subsequently unlit, recognisable as actuated)
- No lighting when un-actuated, lit on actuation, (A quick method of detecting actuated Emergency-Stop buttons (is seldom used)).

ATEX approval Zone 22 dust environments

In mills, shredders, silos etc., it is possible that explosive dust-atmospheres can evolve in a brief period in the operating areas of the system or machine. For these environments, Eaton Moeller offers both the 22 mm RMQ-Titan control circuit device as well as the foot and palm switch FAK with an ATEX approval for Zone 22.

Quicklink ID:
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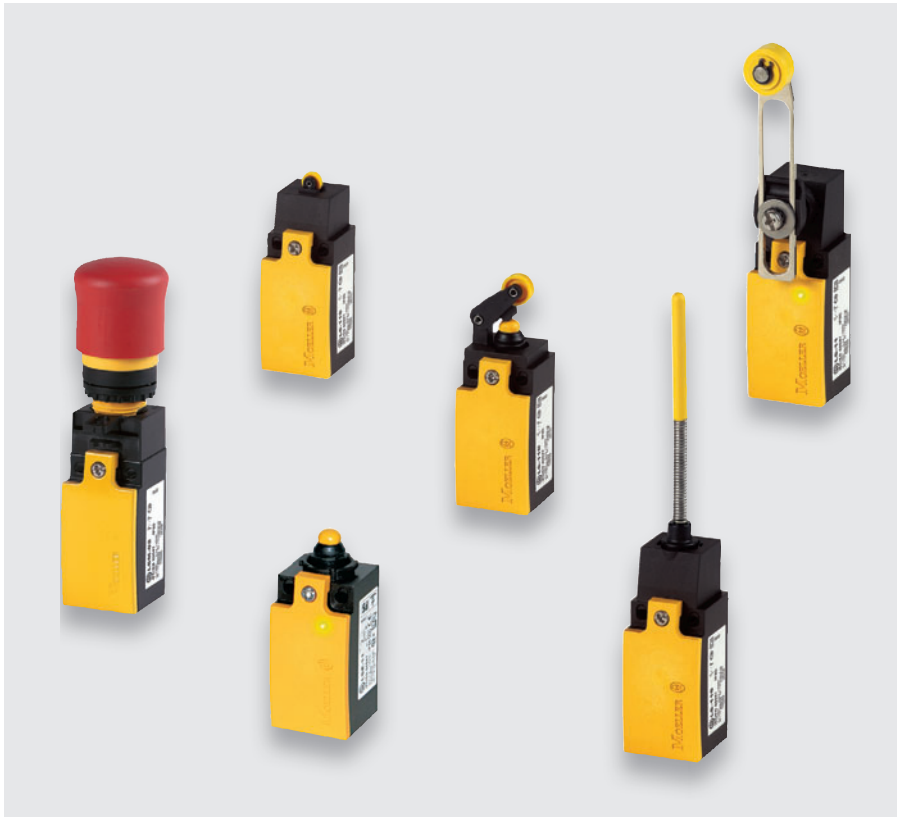
Movements safely under control with position switch LS-Titan®



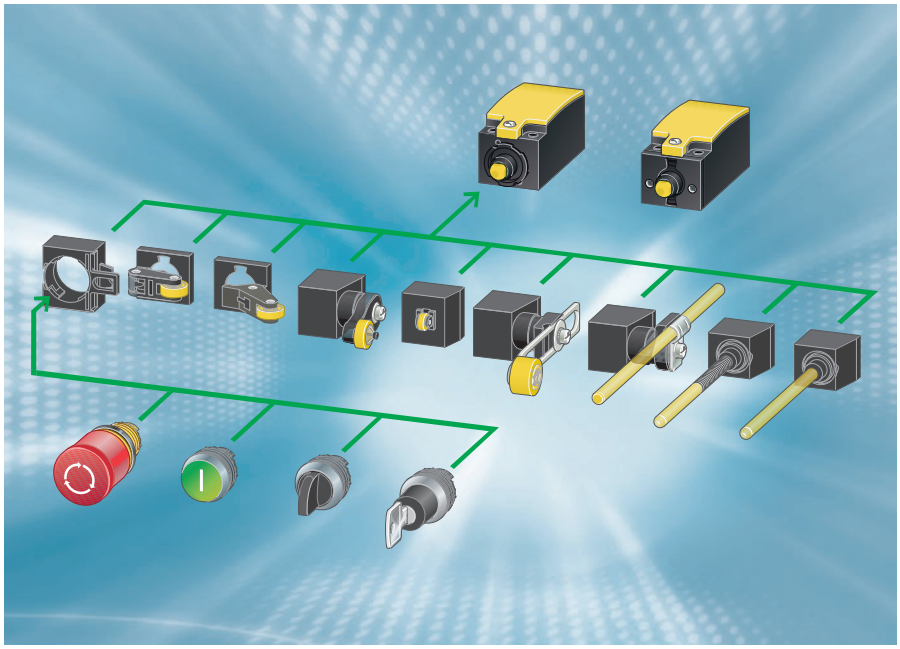
Safety position switches LS-Titan®

Safety of persons in manufacturing plants has the highest priority. By the installation of mobile protective mechanisms such as safety position switches, dangerous process will cease when a safety door or protective flap is opened.

Whether its in the area of wood processing or with printing machines, in the packaging industry or in car washes: the LS-Titan position switches are used wherever exact positioning is required. They mechanically detect the positions of moving parts and guarantee a safe indication of their positions. They are safe because they comply to the DIN EN 60947-5-1 standard and thus feature positively opening N/C contacts. This means that the actuation of the position switch will safely break the circuit and for example, that the machine will be switched off.

Positively opening position switches are marked with the following symbol:

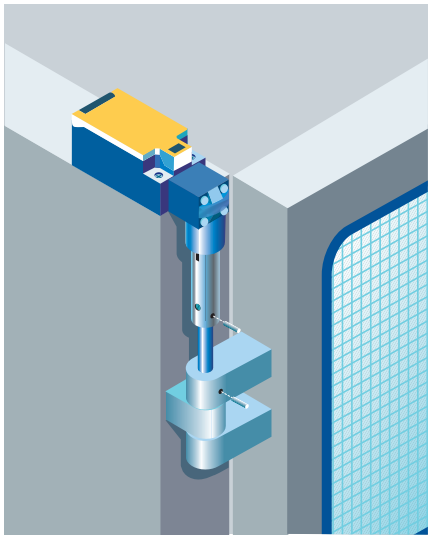
LS-Titan position switches are available either in robust metal or light plastic enclosure designs. Exchangeable operating heads enable flexible use for all applications.
Equipped with double-break contacts, they are also suitable for use in the configuration of redundant safety circuits. The switches featuring double break contacts are suitable for use with electronic devices in accordance with IEC/EN 61 131-2, enabling the safe exchange of information with any controller.



RMQ-Titan® and LS-Titan®: new combinations for your solutions

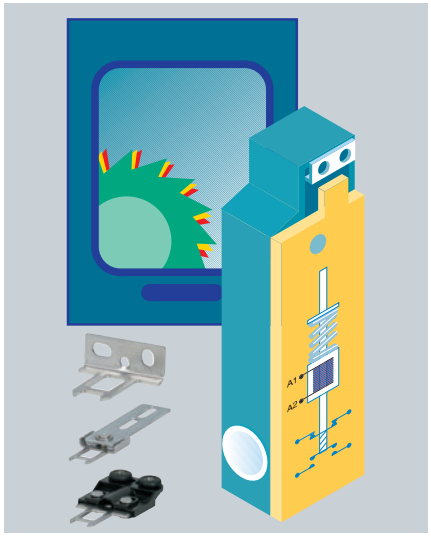
Quicklink ID:
enter SAF3en at www.moeller.net

Control the unexpected



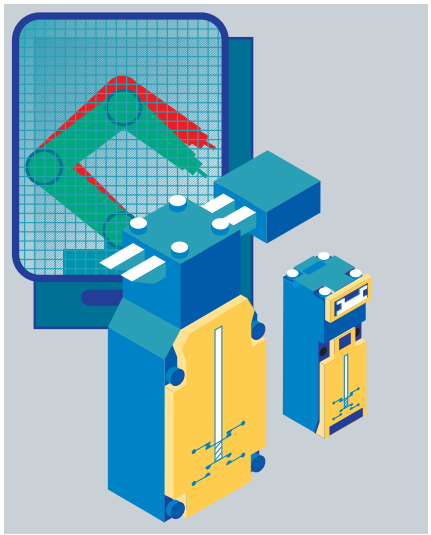
Safety for persons and processes, → door safety switch LSR-...TS and hasp-operated switch LSR-...TKG

The safety of all personnel working in production halls must be ensured at all times. Protective doors and hinged flaps keep people out of hazardous areas. Where an attempt is made to open a protected door or flap during operation, the LSR/TS hinge-operated switches and the LSR/TK hasp-operated switches immediately disconnect the power supply to the machine or installation. Opening is registered at an angle of only 5 degrees, and so tampering is not possible. Wherever tampering must be absolutely prevented and protruding actuating levers would be unacceptable, door switches offer protection on tooling and packaging machines or in areas where robots operate. If the LSR hasp-operated switches are fitted inside a cover, tampering is completely eliminated.



Safe locking → safety position switch LS...-ZBZ with mechanical securing action

By reliable securing and interlocking of protective doors, the LS...-ZBZ increases the safety standards for the protection of personnel and processes. The separately coded actuator is electromechanically interlocked in the operating head.
The LS...-ZBZ operates according to one of two principles: on the basis of magnet-powered or spring-powered interlocking.
The spring-powered interlock is optimally suited for enhanced personnel protection. The door or protective guard remains safely locked even in the event of power failure. In an emergency, the protective guard can be opened using an auxiliary release mechanism.
Magnet-powered interlock is used in personnel and process protection.
The protective cover is interlocked when operational voltage is applied, and can therefore be opened directly in the event of power failure.
If necessary, the safety door anti-tamper features will only disable after a waiting time. This ensures for example that saws must come to a standstill or process stages must be completed before the system or plant can be approached.



Switching off danger → safety position switch LS... ZB with separate actuator

Safety position switches LS...-ZB and LS4-ZB are used on centrifuges, motor and gearbox covers, presses, etc. If the safety cover is opened, the actuator retracted from the operating head and the positively opening contacts switch off the voltage and the danger. Tampering with simple tools is ruled out through the use of separately coded actuators. LS...ZB and LS4...ZB comply with EN 1088 "Safety of machinery – Interlocking devices associated with guards". The selection of the necessary protective device is thus simplified.

Certified safety position switches

The safety position switch LS-Titan is certified by the German employers liability insurance association (BG).

Quicklink ID:
enter SAF4en at www.moeller.net

T rotary switches for safe switching, disconnection, control and operation

The high-performance, robust and compact T rotary switches and P switch-disconnectors are used in industry, trade and building engineering applications. The IP65 degree of protection with the top mounting switches and the switch front enable use in harsh environments. Ten basic switch types and four different construction types, in a whole range of standard switches and across a wide performance range are available. Customised circuits can also be implemented in addition to the standard configurations. The possibilities are almost unlimited. A comprehensive accessory range complements the switch range and rounds off the range of applications. The rotary switch T and the switch-disconnector P are approved conform to the ATEX directive 94/9 EC for EX-zone 22. The approval enables use in dust explosion hazardous areas.

Maintenance, manual override and safety switches perform important tasks as main switches. They prevent danger to persons, machines and manufactured goods. With maintenance and manual override switches, they isolate an electrical system from the mains.

Main switch with Emergency-Stop function

Process and processing machines require a power disconnecting device in compliance with EN 60204-1. Furthermore, standstill in an emergency must also be assured.

Standstill in an emergency requires:

- The priority function and operation in all modes of operation
- The power supply, which is connected to the machine states which produce the danger, must switch off as fast as possible.

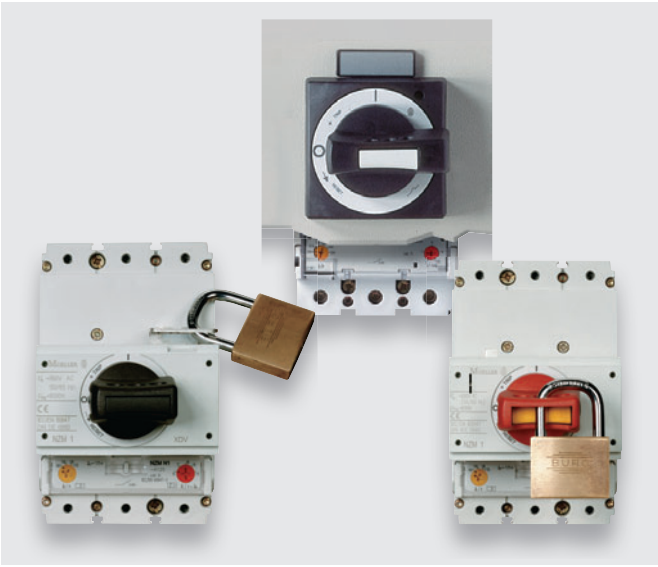
Maintenance and manual override switches

Whole ranges of electric motors are required to operate the conveyor belts in conveyor systems. In conditioning plants, warehouses, airports etc., the individual conveyor belts are combined to a unit. The safety and availability of these systems demands that each individual drive can be isolated from the power supply. The isolation is performed using T and P manual override switches. The switch can be secured against reapplication of power using three padlocks in the off state. Maintenance and repair work can be completed in safety.

Power disconnecting devices and switchgear with Emergency-Stop function

Switch-disconnector P with Emergency-Stop function

Rotary switch T



Circuit-breakers NZM

Switch-disconnector P

The switch-disconnectors P up to 315 A is compact and robust. The manual operator acts directly on the contacts. The contacts are positively opened on de-energization. In addition to their use as switch disconnectors with and without the Emergency-Stop function, P switch-disconnectors can be used as On-Off switches as well as maintenance, manual override or safety switches.

Rotary switch T

The rotary switch T represents a very flexible, compact and robust modular system. The rotary switch T has a widely varied range of application uses. Customised version are available. The different rating sizes are available in up to four different construction types.

Eaton Moeller now offers the following in conformity with the manufacturers guidelines: ATEX directive 94/9 EC cam switch T and switch-disconnector P up to 315 A.

The switches are approved for device group II, with area of application "all except mining" as well as for category 3. The rotary switches and switch-disconnectors in surface mounting enclosures with the ATEX approval are used in dust hazard areas, for example in mills, metal grinding plants, wood processing and wood processes areas, cement factories, the aluminium industry, the foodstuffs industry, grain storage and processing facilities, agriculture, pharmaceutical industry, etc.

Application related locking

- The rotary handle can be locked with padlocks and the door coupling rotary handle automatically locks the doors in the locked state.
- The second handle variant allows an additional locking arrangement directly on the switch. It is possible for example, to directly lock the individual switches on an extensive service distribution board.
- The handles are also available in a red-yellow contrasting colour design for the Emergency-Stop function.
- Automatic handle latching in switch positions enables the comfortable closing of control panel doors even when using several switches with differing switch positions.
- The positively opening switch contacts and the red-yellow colour design are compliant to the IEC safety requirements.

Simple processing of logic with ESR and easySafety

Secure processing of different sensor signals for example, such as those of position switches, light barriers, two-hand controls, Emergency-Stop buttons, contact mats, etc. are monitored in the logic unit of the SRP/CS and evaluated in accordance with the application requirement. Whether ESR electronic safety relays or the new safety-oriented control relay easySafety – the safe logic units from Eaton Moeller enable the realisation of applications in accordance with the international standards for compliance with the highest safety demands of category 4 to EN 954-1, PL e to EN ISO 13849-1, SIL CL 3 to IEC 62061 as well as SIL 3 to IEC 61508.

Safety guaranteed with ESR safety relays

Economic monitoring with ESR safety relays

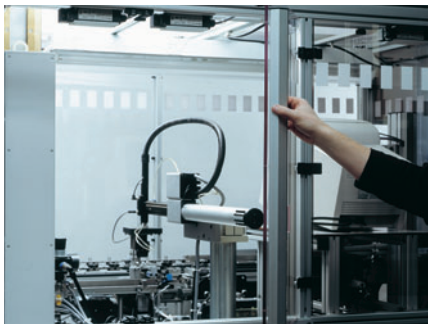
Safety relays are designed to constantly reliably monitor the signals from the safety devices and to processes them quickly. We provide one and two-channel variants for the implementation of safety-oriented applications with up to 5 enable and 2 signal current paths. The internal logic of the safety relays monitors the safety circuits (Emergency-Stop, safety door, etc.) and activates the enable paths. The enable paths are switched off after actuation of the safety devices, or in the event of a fault, in accordance with the Stop category. Faults which occur in the control circuit such as an earth fault, cross-short and open circuits are quickly and reliably detected.

The ESR product range incorporates safety relays for:

- Circuits for stopping in an emergency
- Monitoring of safety doors and light barriers
- Monitoring of two-hand controls
- Off-delayed circuits
- Delayed and non-delayed contact extensions

Safely monitored Emergency-Stop circuits

The ESR electronic safety relay from Eaton Moeller switch several enable current paths for direct or time-delayed disconnection of the energy supply when the Emergency-Stop actuator is triggered. Depending on their configuration, they can detect faults such as cross short-circuits, earth faults or a short-circuit in the Emergency-Stop actuator circuit.
These either lead to immediate disconnection or prevent restart as long as the fault is not remedied. The relays feature the option of monitored re-energization. In this case the enabling of the relay only occurs after the reset button is released.



Monitoring mobile protective mechanisms

The monitoring of protective screens on machines and processing centres is another important function of the ESR electronic safety relay. Depending on the safety level, one or two position switches signal that the protective door is in the closed position. Instead of restart-monitoring, you can also implement an automatic start with the safety relays. Thus, you reduce the cycle times in production without dispensing with safety.

Quicklink ID:
enter SAF5en at www.moeller.net

Safety-oriented control relay easySafety

All in one – safety and control relay combined in a single device

The safety-oriented control relay easySafety integrates not only safety, but also standard functions in just a single device – its all in one. The safety control relay easySafety certified by TÜV-Rheinland features a standard circuit diagram in addition to a safety circuit-diagram which incorporates the safety configuration. This circuit diagram can be used for standard tasks such as the processing of diagnostics messages or general control tasks of a machine. The simplicity of the easy-circuit diagram philosophy has been continued so that every one of today's easy users will immediately be at home. With its high number of safety function blocks, it opens a wide range of application possibilities to the users on just a single device. Users remain flexible and can immediately respond to current and future changing application demands. This saves financial resources and offers investment protection in the future, and also reduces the stockkeeping costs for special safety relays. Whether its in a simple or complex system, the necessary personnel and process protection are guaranteed by the compact easySafety.

A wide range of safety functions

All conventional safety functions are selected from a list of safety function blocks and the sequence is defined by simple assignment of the safe inputs and outputs.

The easySafety incorporates ready-made and tested safety function blocks

- Circuits for stopping in an emergency
- Light barrier monitoring, optional with muting
- Protective door monitoring with and without monitoring
- Monitoring of two-hand controls
- Hand or foot actuated permission switch
- Standstill monitoring
- Highest speed monitoring
- Safe timing relay
- Operating mode selector switch
- Starting elements
- Feedback circuit monitoring (EDM)

Comfortable operation

The comfortable configuration environment is offered by the PC software easySoft-Safety. This is used to create and simulate the safety configuration into the classic easy wiring diagram language and to transfer it onto the device. Modifications or complete configurations can be undertaken directly on the device via the integrated display and keypad. The created configuration can be transferred using a memory card to the easySafety device.

A strict separation between safety and standard tasks is assured by the use of separate circuit diagrams. On the one hand it avoids unauthorised actions or manipulation of safety sequences using separate passwords. On the other hand the operator still has the freedom to adapt the uncritical standard functions as well as machine diagnostics to applications. As the only small safety control with an integrated or separate display, the easySafety enables simple operation and direct diagnostics on devices of safety relevant and standard machine states.

Flexible expansion

Using the integrated interfaces the expansion of the easySafety with standard functions becomes child's play. Whether with further base units from the easy family; central or distributed standard input/output expansion; communication modules, such as Profibus-DP, CANopen, DeviceNet or AS-i; the comprehensive easy accessories range leaves no application unsolved. This is the way to easily and cost-effectively exchange standard information.

Quicklink ID:
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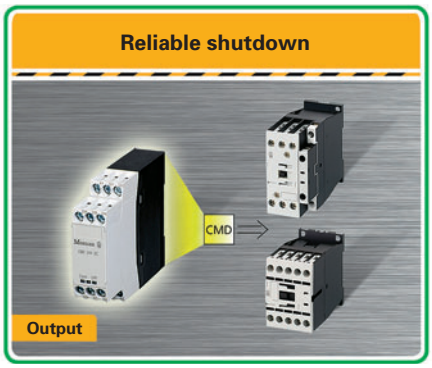
Reliable switch off with contactors DIL M



Continuous operation requires a high level of operating reliability of the components used. This is why the Eaton Moeller contactors DIL M have not just the best service life values in standard AC 3 operation, but is also excellently suited for heavy duty AC 4 inching operation. As a result, the safety is also enhanced during the set-up and retooling phases of machines and systems. Naturally, these devices also have properties which serve the needs of active safety, such as positively-driven contacts, safe isolation or protection against direct contact.

Reliable monitoring with mirror contacts

Operational switching of motors, heating etc. is the typical task of the contactor DIL M. In hazardous situations the contactor DIL M is used to switch off the motor which drives the hazardous motion. The state of the contactor contacts are monitored here via mirror contacts.
If any main contact of a contactor is closed, no mirror contact (auxiliary NC contact) compliant to IEC EN 60947-4-1 may be closed. After the hazard has been eliminated it is possible to switch the system back on without danger based on the feedback from the mirror contacts.

Positively driven auxiliary contacts for safety-relevant controls

Small control tasks – which require the duplication of contacts and the connection of large contactors to electronic outputs – are the typical tasks for contactor relay.
As soon as safety-relevant circuits are affected the NO and NC auxiliary contacts may not be closed simultaneously. Contactor relays DIL A features positively drives contacts conform to IEC EN 60947-5-1. They can be used to implement control functions in safety-relevant system sections without danger.

Practical with safety

The auxiliary contact is also on board up to 38 A and a suppressor circuit is always included with DC operated contactors. On applications over 15 A the DC contactor features an electronic drive, which for example makes the use of coupling relays unnecessary. Contactors DIL M up to 170 A feature box terminals with two terminal chambers. Accordingly, differing conductor cross-sections can be securely wired, even on machines subject to a high level of vibration. The costs are also reduced considerably as so much is integrated into the contactor. The contactor DIL M and overload relay feature approvals for world markets. All devices comply with the demands compliant to IEC/EN 60947 and DIN VDE 0660 as well as to UL/CSA.

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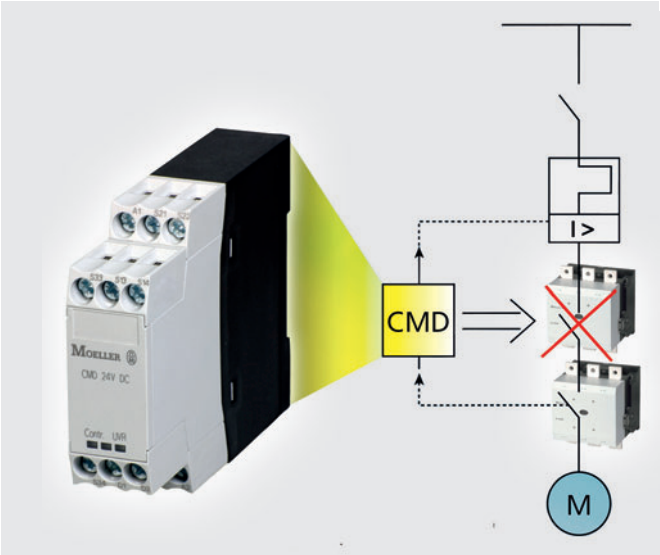
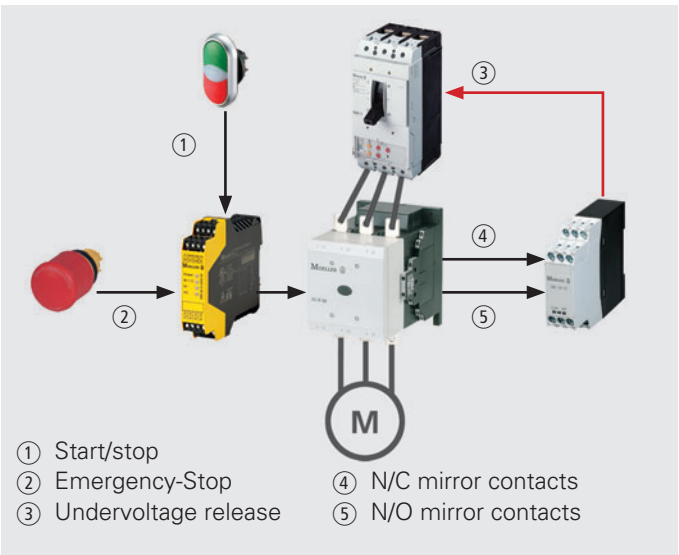
Reliable switch off with contactor monitoring relay CMD



Redundant design of contactor circuits is unnecessary

In almost all of today's applications system sections feature a safety-related design.
Safety-related control components are used in dangerous situations – for example when a protective screen is opened or the Emergency-Stop is actuated – for shutdown. A redundant shutdown system is often provided in order to avoid a failure of these system sections. A contactor is typically used as the shutdown device during danger. However, the contactors have a tendency to weld at the end of their lifespan, and for this reason two contactors are usually switched in series. A particularly costly method – especially with large contactors. The EN ISO 13849-1 compliant contactor monitoring relay CMD from Eaton Moeller makes this redundant design unnecessary.



① Start/stop
② Emergency-Stop
③ Undervoltage release
④ N/C mirror contacts
⑤ N/O mirror contacts

Applications

These types of combinations are used in Germany and Europe with safety-related applications. Up to now a series connection of two contactors was recommended for circuits of safety category 3 and 4 for compliance to the EN 954-1. Now you just need one contactor and the Eaton Moeller CMD. The contactor monitoring relay CMD serves Emergency-Stop applications compliant to EN 60204-1. It can also be used in the American car manufacturing industry, where solutions are also required which reliably detect the welding of the motor starter and which safely switch off the motor load. In its function as a safety component the CMD also receives the employers liability insurance association approval in addition to the CE mark. As a device for world markets it also receives the UL and CSA approval for the North American market.
The CMD (Contactor Monitoring Device) monitors the main contacts on a contactor for welding. To implement this, the CMD compares the control voltage of the contactor with the state of the main contacts, which are reliably signalled with a mirror contact (IEC EN 60947-4-1 Annex. F). If the contactor coil is de-energized and the contactor does drops-out, after a short delay, the CMD will trip the upstream circuit-breaker / motor-protective circuit-breaker or switch-disconnector using an undervoltage release. In addition the CMD monitors the functional operation of the internal relay, an additional auxiliary switch of the monitored contactor serves this purpose. For this the auxiliary N/C contact and N/O contacts are positively driven, where the latter is a mirror contact.

Approved switchgear and controlgear assemblies

In order to guarantee the functional safety of the entire unit – consisting of a contactor, circuit-breaker and CMD – the CMD is only approved for defined Eaton Moeller contactors as well as Eaton Moeller motor-protective circuit-breakers/circuit-breakers/ or switch-disconnectors.
All DILM7 to DILH2000 contactors from the Eaton Moeller range can be monitored for welding using the CMD. All auxiliary N/C contacts of these contactors are mirror contacts and can be used for monitoring purposes. The motor-protective circuit-breaker PKZ2 can be used as an upstream motor-protective circuit-breaker/circuit-breaker or switch-disconnector, when equipped with an undervoltage release U-PKZ2 (18VDC). The same applies for the circuit-breaker NZM1 to NZM4 or switch-disconnector N1 to N4 – equipped with an undervoltage release NZM..-XUV.

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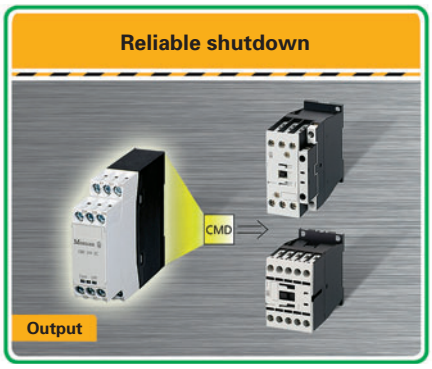

Avoid damage, guarantee operational continuity

ARCON® – the lightning fast airbag for your switchgear system

The effects of an arc can be compared those of an explosion. They range from injury of persons to massive damage to the switchgear systems, and can result in standstills which can last for weeks and may even necessitate a complete replacement of the switchgear system. In the worst case it may even lead to insolvency because the customers are forced to find another supplier. The factor of availability is highly relevant in today's competitive environment and a whole range of suitable protective measures must be undertaken to ensure it. Computer centres, tunnel services and energy supplies for continuous manufacturing processes in the chemical industry belong up to now to the main applications in which the Eaton Moeller arc-fault protection system ARCON® has been used.

Personnel protection

All renowned manufacturers of low-voltage switchgear systems today offer an arc-fault protected version of their switchgear systems. This personnel protection feature is tested however under conditions not found in practice on the enclosed switchgear system. The statistics of the BGETE have shown that 2 out of 3 accidents occur on open switchgear systems. This fact needs to be considered and technical solutions offered, which provide effective protection that is also effective on open switchgear systems. For this reason Eaton Moeller engaged in fundamental research in conjunction with the Technical University Ilmenau and came to the conclusion that only extremely fast protection systems have a "real" chance or implementing personnel protection. ARCON® has achieved an unbeatable level of personnel protection with arc-quenching times of just 2 ms.

System protection

Low-voltage switchgear assemblies can be out of operation for weeks due to the effects of an arc fault. If no redundant energy supply is provided, an unwanted loss of production occurs. The only remedy here is an effective protection of systems which limits the effects of the arc fault to a minimum and which enables an immediate re-commissioning of the system. If ARCON® is used, the effects of the arc are limited to its base points. After elimination of the cause and exchange of the quenching device, the system can be put back into operation and the required availability can be re-established.

Control the unexpected

Safety at a glance

A complete safety chain also involves that the impending danger or the danger that has arisen is explicitly and very visibly indicated. The signal tower SL from the control circuit devices range RMQ-Titan from Eaton Moeller, indicates the respective state of the machine both acoustically and/or optically in five colours with continuous, flashing or strobe light. The faster that the annunciation is perceived, even from a distance, the faster you can react safely and quickly to the unforeseeable states.

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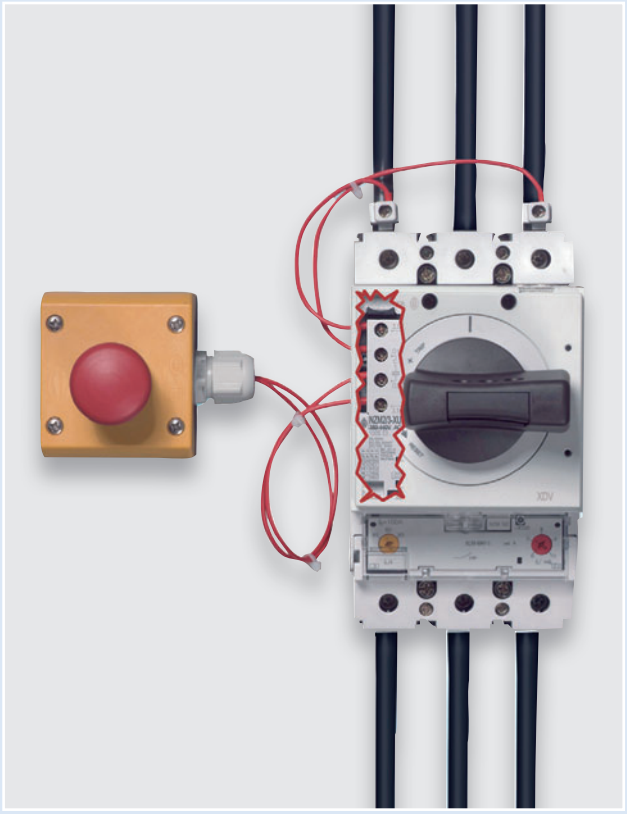
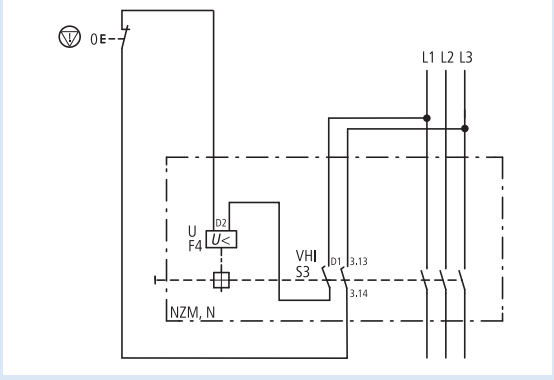


Main switch application

The main switch application with an emergency-stop function up to 1600 A conform to IEC 60204-1, VDE 0113 Part 1 can be easily and cost-effectively implemented with the new Eaton Moeller products.

The voltage is switched off on all current conducting circuits are when the switch is switched off using the undervoltage release with two integrated early-make auxiliary contacts. Safety is guaranteed at all times in this manner when the switch is in the Off position.

The early-make auxiliary contacts can always be installed – even if the circuit-breaker is equipped with a toggle-lever or rotary drive.



The New Control Circuit Devices RMQ-Titan® are in Great Shape

New for ATEX use
See pages 56/57

Modern styling has been combined with an optimum range of functions, – ideal for use at machines and on panels. The ergonomically shaped button elements are matched to the shape of a fingertip for even more comfortable operation.

Control circuit devices RMQ-Titan emit light non-stop for over 100 000 hours. Special lenses and coloured LEDs offer enduring reliability at a very attractive price. Emergency-Stop actuators are now illuminated as well. This safety component is thus clearly visible even in dark rooms and a separate indicator light is not required.

Customised laser inscription

Whether at the control desk, in suspended operator panels or in the control cabinet, RMQ-Titan is number one when it comes to control circuit devices for machine and panel building. As well as the attractive and ergonomic design, the flexibility and versatility of the range always make it the ideal solution. All button plates, indicator lights and legend plates can be provided with abrasion resistant laser inscriptions of texts and symbols as required.

Optimum degree of protection for safety

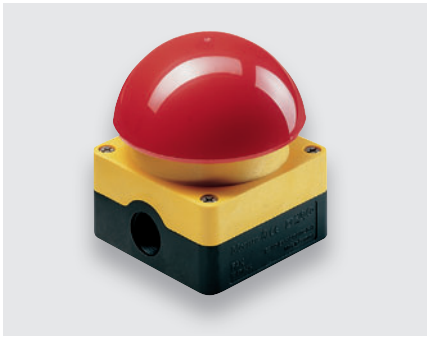
Apart from the acoustic indicator, all RMQ-Titan front elements come with protection to at least IP67, thus already providing virtually unlimited scope for applications. Pushbutton actuators and indicator lights even offers protection to IP 69K! They can therefore be cleaned safely with high-pressure and steam cleaners – a key benefit in applications where cleanliness and hygiene are important requirements.

Adapted to the location

Mushroom actuators with a large actuation area offer more safety thanks to their conspicuous design and their ability to even be actuated with gloved hands. Illuminated Emergency-Stop buttons and buzzers ensure reliable signal indication even in dark rooms. Special diaphragms are also available for protecting buttons against dust, flour or cement.

Complete devices

For standard applications the RMQ-Titan pushbuttons, EMERGENCY-STOP buttons, selector switches and key switches are available for order as complete components for installation and mounting. You as the user save time with engineering design, ordering and mounting. The stock requirement is reduced.



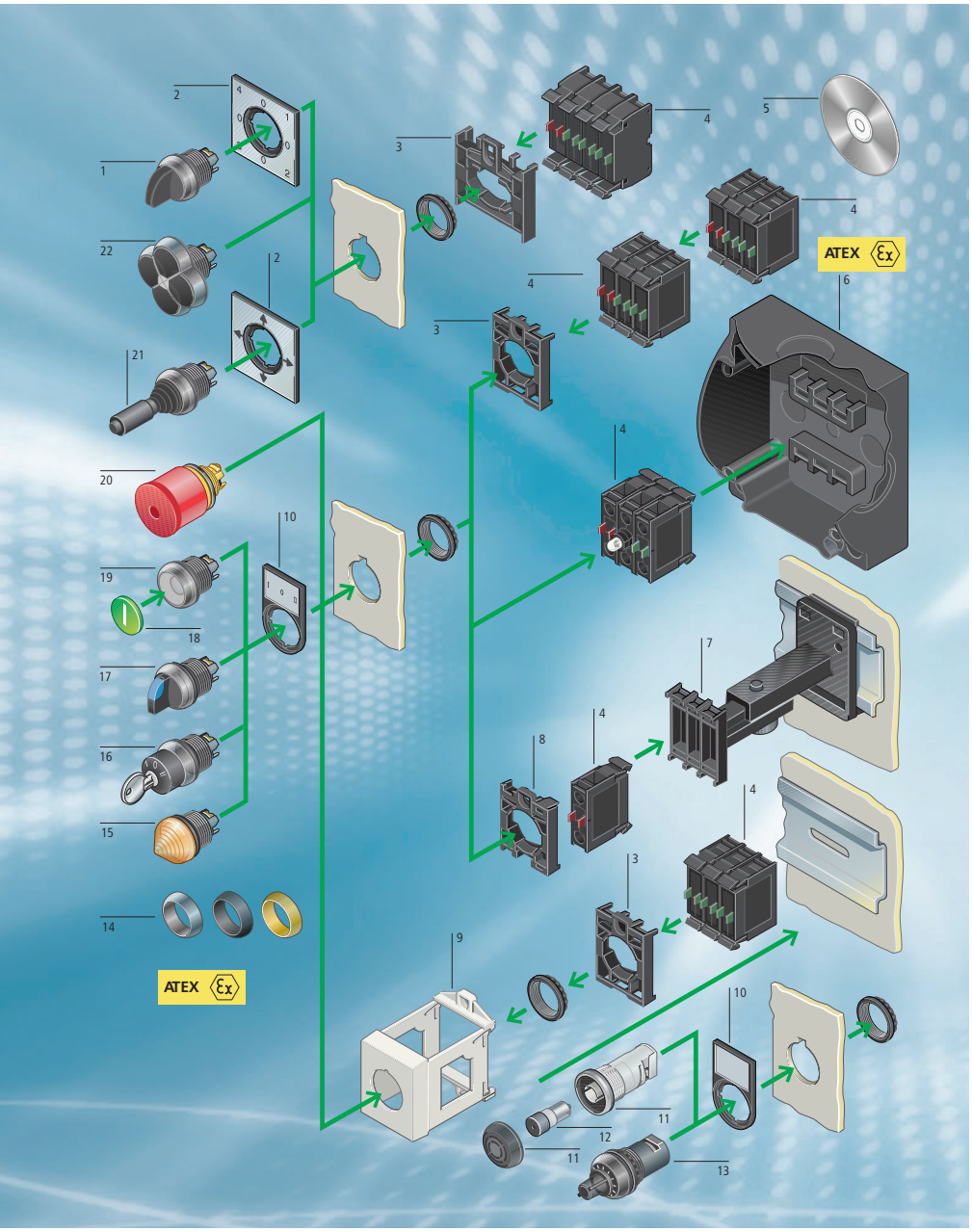
Foot and palm switches

The foot and palm switches FAK are ideal for intuitive and safe operation because of their design with a particularly large actuator surface. This is especially true for use as an EMERGENCY-STOP switch. The high degree of protection IP 69K makes it ideal for use in harsh environments. The FAK is available as a complete device or as individual components.

Always well enclosed

The surface mounting enclosure for eight control circuit devices RMQ16 with protection to IP65 is specially designed for industrial applications. The surface mounting enclosure in the RMQ-Titan range even provides protection to IP66 with up to 6 mounting locations.

System Overview
RMQ-Titan®



1 **4 position selector switch actuators**
2 **Front label for 4-way selector switch/joystick**
3 **Fixing adapter**
4 **Contact element**
5 **Inscription software**
6 **Enclosure**
7 **Telescopic clip**
8 **Centring adapter**
9 **Distribution board rail adapter**
10 **Label plate**
11 **Acoustic indicator**
12 **Buzzer**
13 **Potentiometer**
14 **Frontring** Titanium M22
Black M22**S**
(add S to types if necessary)
Gold: see page 44
15 **Indicator light**
16 **Key switch**
17 **Selector switch**
18 **Button plate/button lens**
19 **Push-button**
20 **Emergency-stop button**
21 **Joystick**
22 **4 position button**

Push-button actuators, flush

NEMA 4X, 13
IP 67, 69K

ATEX

Front ring black: M22**S**...

Button plate	Actuator spring-return	Actuator stay-put
●	M22-D-S	M22-DR-S
○	M22-D-W	M22-DR-W
●	M22-D-R	M22-DR-R
●	M22-D-G	M22-DR-G
●	M22-D-Y	M22-DR-Y
●	M22-D-B	M22-DR-B
◎	M22-D-R-X0	M22-DR-R-X0
◎	M22-D-G-X1	M22-DR-G-X1
◎	M22-D-S-X0	M22-DR-S-X0
◎	M22-D-W-X1	M22-DR-W-X1
Without	M22-D-X	M22-DR-X
Without button plate With guard ring	M22-DG-X	

Push-button extended

NEMA 4X, 13
IP 67, 69K

ATEX

Front ring black: M22**S**...

Button plate	Actuator spring-return	Actuator stay-put
●	M22-DH-S	M22-DHR-S
○	M22-DH-W	M22-DHR-W
●	M22-DH-R	M22-DHR-R
●	M22-DH-G	M22-DHR-G
●	M22-DH-Y	M22-DHR-Y
●	M22-DH-B	M22-DHR-B
◎	M22-DH-R-X0	M22-DHR-R-X0
◎	M22-DH-G-X1	M22-DHR-G-X1
◎	M22-DH-S-X0	M22-DHR-S-X0
◎	M22-DH-W-X1	M22-DHR-W-X1
Without	M22-DH-X	M22-DHR-X

Online catalogue Quicklink
to www.moeller.net

OC2EN

ATEX

„The order is handled via M22-COMBINATION-*“

Additional order specification „M22-ATEX“




Mushroom actuators

NEMA 4X, 13
IP 67, 69K

ATEX

Front ring black: M22**S**...

Selector switch actuators

NEMA 4X, 13
IP 66

ATEX

Front ring black: M22**S**...

= stay-put = spring-return

Key-operated actuators

NEMA 4X, 13
IP 66

ATEX

Front ring black: M22**S**...

Button plate	Mush-room	spring-return	stay-put	Function	Rotary button 2 positions	Thumb-grip 2 positions	MS1 lock mechanism, 2 positions	MS2-20 lock mechanism, 2 positions
●	●	M22-DP-S	M22-DRP-S		M22-W	M22-WK	M22-WS	M22-WS-MS*
●	●	M22-DP-R	M22-DRP-R		M22-WR	M22-WRK	M22-WRS	M22-WRS-MS*
●	●	M22-DP-G	M22-DRP-G			M22-WKV		
●	●	M22-DP-Y	M22-DRP-Y		**3 positions**	**3 positions**	**3 positions**	**3 positions**
◉	●	M22-DP-R-X0	M22-DRP-R-X0		M22-W3	M22-WK3	M22-WS3	M22-WS3-MS*
◉	●	M22-DP-G-X1	M22-DRP-G-X1		M22-WR3	M22-WRK3	M22-WRS3	M22-WRS3-MS*
◉	●	M22-DP-S-X0	M22-DRP-S-X0			M22-WRK3-1	Also available with lock mechanism suitable for master key systems	
◉	●	M22-DP-W-X1	M22-DRP-W-X1			M22-WRK3-2		
Without	●	M22-DP-S-X	M22-DRP-S-X		**4 positions**	**4 positions**		
Without	●	M22-DP-R-X	M22-DRP-R-X		M22-WR4	M22-WRK4		
Without	●	M22-DP-G-X	M22-DRP-G-X				Protective diaphragm for use with	
Without	●	M22-DP-Y-X	M22-DRP-Y-X				M22-WS ...	M22-XWS




Illuminated push-button actuators

NEMA 4X, 13
IP 67, 69K

ATEX

Front ring black: M22**S**...

Indicator light lens assemblies

NEMA 4X, 13
IP 67, 69K

Button lens	Actuators flush, spring-return	Actuators flush, stay-put	Actuators extended, spring-return	Actuators extended, spring-return	Flush	Extended, conical ATEX
○	M22-DL-W	M22-DRL-W	M22-DLH-W	M22-DRLH-W	M22-L-W	M22-LH-W
●	M22-DL-R	M22-DRL-R	M22-DLH-R	M22-DRLH-R	M22-L-R	M22-LH-R
●	M22-DL-G	M22-DRL-G	M22-DLH-G	M22-DRLH-G	M22-L-G	M22-LH-G
●	M22-DL-Y	M22-DRL-Y	M22-DLH-Y	M22-DRLH-Y	M22-L-Y	M22-LH-Y
●	M22-DL-B	M22-DRL-B	M22-DLH-B	M22-DRLH-B	M22-L-B	M22-LH-B
Without	M22-DL-X	M22-DRL-X	M22-DL-X	M22-DRL-X	M22-L-X	M22-L-X
◉	M22-DL-R-X0	M22-DRL-R-X0	M22-DLH-R-X0	M22-DRLH-R-X0		
◉	M22-DL-G-X1	M22-DRL-G-X1	M22-DLH-G-X1	M22-DRLH-G-X1	**Colour Lens, thumb-grip**	**Colour LED**
◉	M22-DL-W-X0	M22-DRL-W-X0	M22-DLH-W-X0	M22-DRLH-W-X0		
◉	M22-DL-W-X1	M22-DRL-W-X1	M22-DLH-W-X1	M22-DRLH-W-X1		

ATEX

„The order is handled via M22-COMBINATION-*“

Additional order specification „M22-ATEX“

Double actuator

NEMA 4X, 13
IP 67, 69K

ATEX

Front ring black: M22**S**...

Button plates	Actuator and indicator light extended	Actuator and indicator light flush	ON buttons and indicator light flush, OFF button extended
I / O	M22-DDL-GR-X1/X0	M22-DDLF-GR-X1/X0	M22-DDLM-GR-X1/X0
I / O	M22-DDL-WS-X1/X0	M22-DDLF-WS-X1/X0	M22-DDLM-WS-X1/X0
START / STOP	M22-DDL-GR-GB1/GB0		
START / STOP	M22-DDL-WS-GB1/GB0		
▲ / ▼	M22-DDL-S-X7/X7		
+ / −	M22-DDL-S-X4/X5		
	M22-DDL-GR		
	M22-DDL-WS		
Colours and symbols customised	M22-DDL-*-*-*	M22-DDLF-*-*-*	

Illuminated selector switch actuators

NEMA 4X, 13
IP 66

ATEX

Front ring black: M22**S**...

Selector switch actuators

NEMA 4X, 13
IP 66

ATEX

Thump-Grip	2 positions spring-return	2 positions stay-put	3 positions spring-return	3 positions stay-put	2 positions (V position, 60°) spring-return	2 positions (V position, 60°) stay-put
○	M22-WLK-W	M22-WRLK-W	M22-WLK3-W	M22-WRLK3-W	M22-WLKV-W	M22-WKV
●	M22-WLK-R	M22-WRLK-R	M22-WLK3-R	M22-WRLK3-R	M22-WLKV-R	
●	M22-WLK-G	M22-WRLK-G	M22-WLK3-G	M22-WRLK3-G	M22-WLKV-G	
●	M22-WLK-Y	M22-WRLK-Y	M22-WLK3-Y	M22-WRLK3-Y	M22-WLKV-Y	
●	M22-WLK-B	M22-WRLK-B	M22-WLK3-B	M22-WRLK3-B	M22-WLKV-B	

Front ring gold

Front ring gold-plated

Version	Part no.
Order only via M22 combination as complete unit	M22 combination - * M22-FR-AU M22..... (basic unit)



Joystick

2 and 4 positions
IP 66
ATEX

Front ring black: M22**S**...

Function One position per direction	Part no. Front ring titanium Front ring black	
	Spring-return	Stay-put
in 2 positions horizontal	M22-WJ2H	M22-WRJ2H
in 2 positions vertical	M22-WJ2V	M22-WRJ2V
in 4 positions	M22-WJ4	M22-WRJ4

Function Two positions per direction.[1]	Part no. Front ring titanium Front ring black	
	Spring-return	Stay-put
in 2 positions horizontal	M22-WJ2H-2P	–
in 2 positions vertical	M22-WJ2V-2P	–
in 4 positions	M22-WJ4-2P	–

[1] The joystick is combined with two positions per actuation direction with "normally closing" M22-K10 and "early closing" M22-K10P.

Selector switch actuators

NEMA 4X, 13
IP 66
ATEX

Front ring black: M22**S**...

Function	Rotary button, 4 positions	Thumbgrip 4 positions
4 0 1 0 3 0 2	M22-WR4	M22-WRK4

4 position push-button

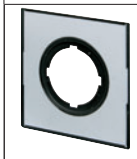
IP 66
ATEX

Front ring black: M22**S**...

Function	Inscription	Colour	Part no.
Buttons not mechanically interlocked			
All buttons spring-return	Directional arrows	Black	M22-D4-S-X7
All buttons spring-return	None	Black	M22-D4-S
All buttons spring-return	Individual	Individual	M22-D4-*-*
Opposing buttons mechanically interlocked			
All buttons spring-return	Directional arrows	Black	M22-DI4-S-X7
All buttons spring-return	Individual	Individual	M22-DI4-*-*

Labels

for joystick
for 4-way selctor switch

Version	Part no.
 Blank	M22-XCK
 Arrows	M22-XCK-1 for joystick 4 positions
 Arrows	M22-XCK-3 for joystick 2 positions
 0-1-0-2-0-3-0-4	M22-XCK-2 for 4-way selector switch
 with individual inscription	M22-XCK-*

Built-in sockets

Design	Part No.
	M22-USB-SA for USB 2.0 A/A with connection cable IP65 with closed cover IP20 with plug connected
	M22-RJ45-SA Front mounting 8/8 IP65 with closed cover IP20 with plug connected

ATEX

„The order is handled via M22-COMBINATION-*“

Additional order specification „M22-ATEX“

Emergency-Stop actuators

NEMA 4X, 13
IP 66, 69K

ATEX

Function		Tamper proof
Non-illuminated	●	M22-PV[1] M22-PVT[2]
Non-illuminated	●	M22S-PV[1]
illuminated	●	M22-PVL[1] M22-PVLT[2]
illuminated	●	M22S-PVL[1]
With key-telease MS1 individual lock mechanism	●	M22-PVS[1]
With key-telease MS2-20 individual lock mechanism	●	M22-PVS-MS*[1]

Sealable shroud	Protective collar for Emergency-Stop push-buttons	Emergency-Stop labels
M22-PL-PV	M22-XG-PV	see current Industrial Switchgear main catalogue

Contact elements

IP 20

⊖ = Positive opening safety function to IEC / EN 60 947-5-1

Function		Screw terminal	Cage Clamp[3]
Front fixing		M22-K10	M22-CK10
		M22-K01	M22-CK01
		M22-K10P	–
	⊖	M22-K01D	M22-CK01D
	⊖	–	M22-CK11
	⊖	–	M22-CK02
		–	M22-CK20
Base fixing	⊖	M22-KC10	M22-CKC10
		M22-KC01	M22-CKC01

Adapters

	Screw terminal Cage Clamp[3]	Note
Front fixing	M22-A M22-A4	max. 3 contact elements max. 4 contact elements (only for 4-way switch and Joystick)
Base fixing	Built into the enclosure	max. 3 contact elements

Acoustic indicators

IP 40

Compact without buzzer

M22-AMC

Buzzer 24 V AC/DC +10% / -15%

Continuous tone M22-XAM

Pulsed tone M22-XAMP

LED elements

IP 20

		Screw terminal 12-30 V AC/DC	Screw terminal 85-264 V AC	Cage Clamp[3] 12-30 V AC/DC	Cage Clamp[3] 85-264 V AC
Front fixing	○	M22-LED-W	M22-LED230-W	M22-CLED-W	M22-CLED230-W
	●	M22-LED-R	M22-LED230-R	M22-CLED-R	M22-CLED230-R
	●	M22-LED-G	M22-LED230-G	M22-CLED-G	M22-CLED230-G
	●	M22-LED-B	M22-LED230-B	M22-CLED-B	M22-CLED230-B
Base fixing	○	M22-LEDC-W	M22-LEDC230-W	M22-CLEDC-W	M22-CLEDC230-W
	●	M22-LEDC-R	M22-LEDC230-R	M22-CLEDC-R	M22-CLEDC230-R
	●	M22-LEDC-G	M22-LEDC230-G	M22-CLEDC-G	M22-CLEDC230-G
	●	M22-LEDC-B	M22-LEDC230-B	M22-CLEDC-B	M22-CLEDC230-B

Housing

NEMA 4X, 13
IP 67

ATEX

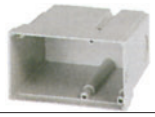
M22 enclosure ATEX also available as individual unit

Locations	Surface mounting enclosures
1 ●	M22-IY1, M22-IY1-ATEX
1 ○	M22-I1, M22-I1-ATEX
2 ○	M22-I2, M22-I2-ATEX
3 ○	M22-I3, M22-I3-ATEX
4 ○	M22-I4, M22-I4-ATEX
6 ○	M22-I6, M22-I6-ATEX
12 ○	M22-I12
Connecting screw for M22-I...	M22-XI

NEMA 4X, 13
IP 54

Locations	Flush mounting panels
1 ●	M22-EY1
1 ○	M22-E1
2 ○	M22-E2
3 ○	M22-E3
4 ○	M22-E4
5 ○	M22-E5
6 ○	M22-E6

NEMA 4X, 13
IP 55, 40*



Locations	Shrouds
1 ○	M22-H1
2 ○	M22-H2
3 ○	M22-H3
4 ○	M22-H4*
5 ○	M22-H5*
6 ○	M22-H6*

Dust protection cover

with fixing adapter
IP 53 (IP 4X)

for one M22... device
5 x M20 knock-outs

Contacts/ LEDs	Dust protection cover
max. 3	M22-ADC
max. 4	M22-ADC4
Attachment plate	M22-XADC

[1] Pull to release, [2] Turn to release IP 67, [3] Cage clamp is a registered trademark of Wago Kontakttechnik GmbH, Minden

ATEX Ex

„The order for FAK-ATEX is handled via FAK-COMBINATION-* with the specification FAK-ATEX“

Foot and palm switches

NEMA 4X, 13
IP 67, 69K
ATEX Ex

Mush-room head	Function	Spring-return
■	⇳ ⊖	FAK-S/KC11/I
■	⇳ ⊖	FAK-R/KC11/I

Emergency-Stop button

NEMA 4X, 13
IP 67, 69K
tamper proof
ATEX Ex

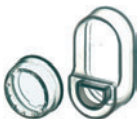
Mush-room head	Function	Spring-return
■	⇳ ⊖	FAK-R/V/KC01/IY
■	⇳ ⊖	FAK-R/V/KC11/IY
■	⇳ ⊖	FAK-R/V/KC02/IY

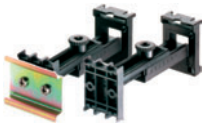
Indicator lights

conical,
BA9s

Lens	for filament lamps, neon lamps and LEDs
●	L-R
○	L-W
●	L-G
●	L-Y

⊖ = Positive opening safety function to IEC / EN 60 947-5-1





Accessories

For use with	IVS top-hat rail adapter	For use with	Actuators diaphragms	For use with	Telescopic clips		Legend plates
Top-hat rail EN 50 022	M22-IVS	Push-button actuators indicator lights, flush Double actuators	M22-T-D M22-T-DD	Mounting depth compensation 115–155 mm With top-hat rail	M22-TC M22-TA	With various languages and symbols	M22S-ST-…

LED series elements
for front and base fixing

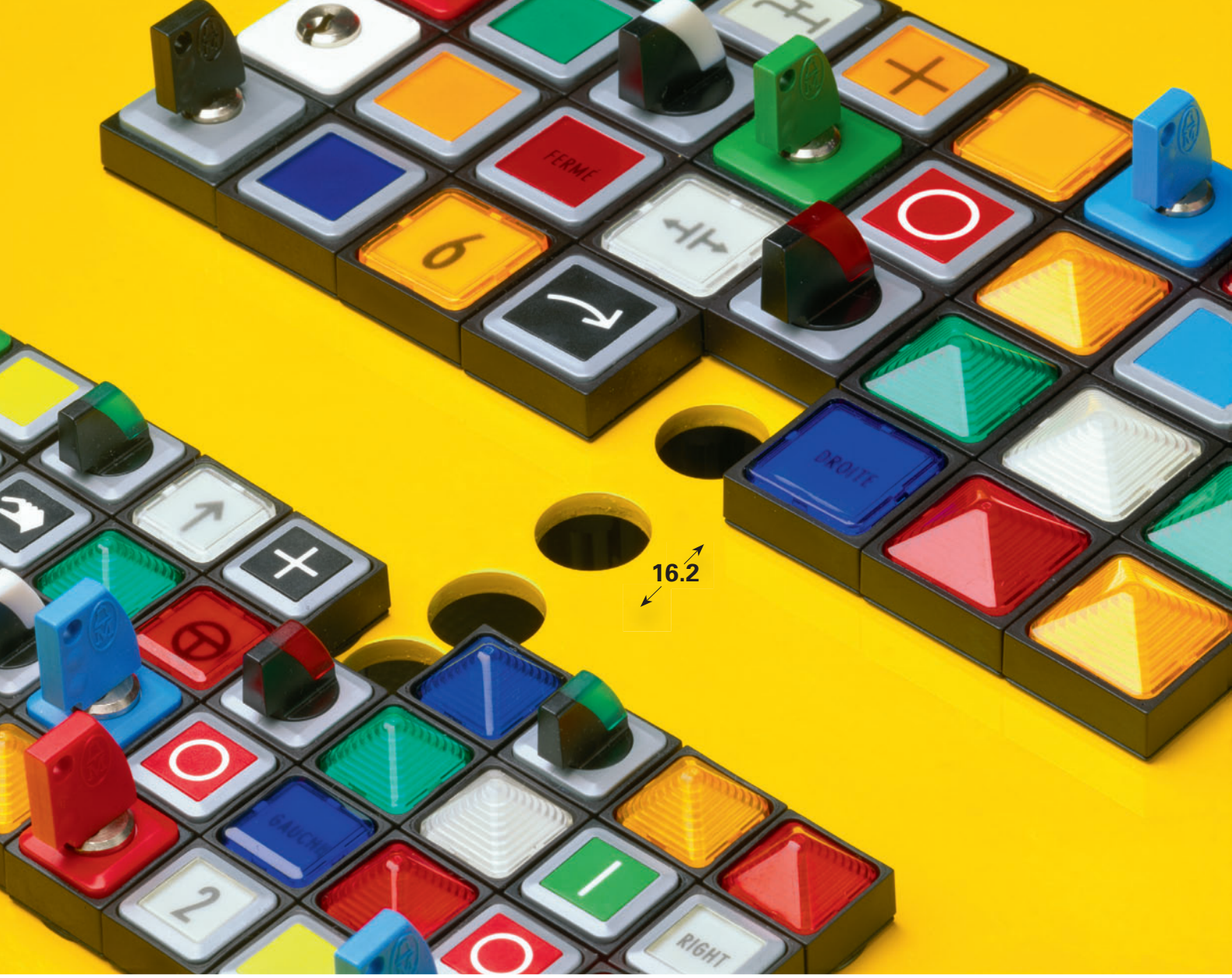
Function	Part no.
LED resistor element for connection of 12-30 V LED's to 42-60 V AC/DC	M22-XLED60
LED resistor element for connection of 12-30 V LED's to 220 V DC	M22-XLED220
LED test element for decoupled function test (lamp test) on 12-30 V AC/DC	M22-XLED-T
LED test element for decoupled function test (lamp test) on 85-264 V AC	M22-XLED230-T

AS-Interface for RMQ Titan

For use with	Part no.
AS-Interface connection	
Flush mounting panel	M22-ASI
Base fixing	M22-ASI-C
Surface mounting enclosure	RMQ-M1C-ASI
Emergency-Stop connections for safety monitor	
Front fixing	M22-ASI-S
Base fixing	M22-ASI-CS

Potentiometer, IP 66

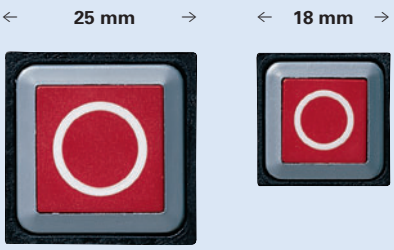
ATEX Ex Resistance KΩ	Part no. Front ring black: M22**S**...
1	M22-R1K
4.7	M22-R4K7
10	M22-R10K
47	M22-R47K
100	M22-R100K
470	M22-R470K



High Information Density Thanks to Compact Mounting: RMQ 16

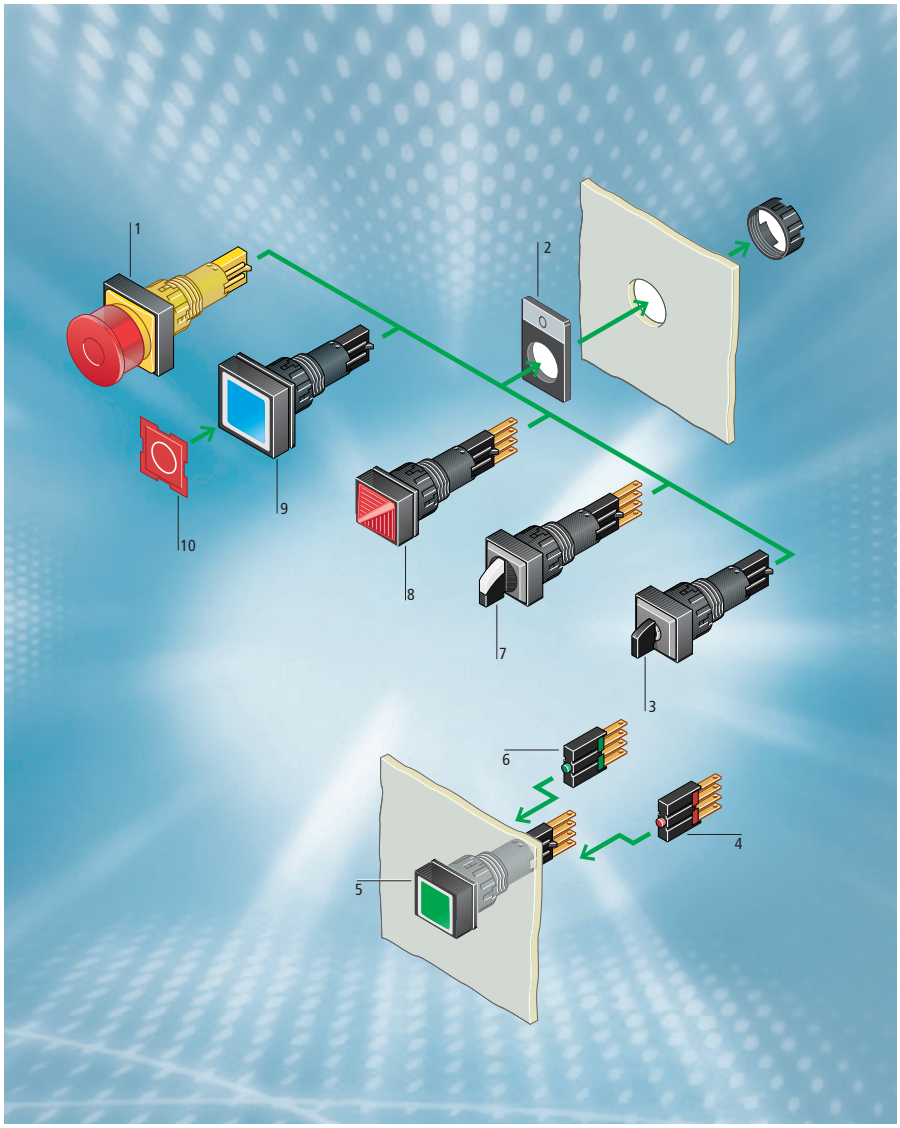
The control panels of modern machines and plants must be able to convey increasingly complex information, even though the available space is limited.

The RMQ16 range of compact control circuit devices provides the solution. The various front elements can be mounted flush on all four sides, without any gaps. Compared with conventional 22 mm ranges, using RMQ16 devices with their 18 x 18 mm front dimension, achieves three times the information density.



Two sizes of front element: 25 x 25 mm and 18 x 18 mm. Both sizes use the same, standard mounting aperture of 16.2 mm.

System Overview RMQ16

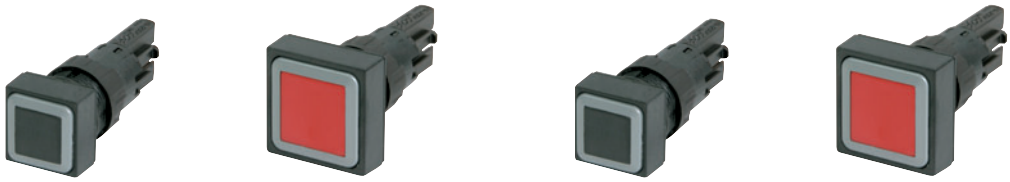


1 **Emergency-stop button**
2 **Base plate**
3 **Key switch**
4 **Contact element break (red)**
5 **Illuminated push button**
6 **Contact element make (green)**
7 **Selector switch**
8 **Indicator light**
9 **Push-button**
10 **Button plate/insert label**

Label mounts with insert plates offer additional labelling options. Secured via the front elements, both elements are simply bolted on from the rear of the flush mounting plate using a lock nut.

The RMQ 16 control circuit devices range can also be inscribed. The button plates as well as the lenses for the illuminated push buttons and the flat lenses for indicator lights are inscribed by laser (see page 282 for Label Editor information) Thus, even after years of use, the information they provide is still clear and unambiguous. These control circuit devices can be fitted with LEDs instead of filament bulbs. This means no more changing of bulbs, because LED service life equals machine life. The high degree of protection, IP 65, of the front elements ensures safe operation even in harsh environments. This makes RMQ16 ideally suitable for industrial applications.

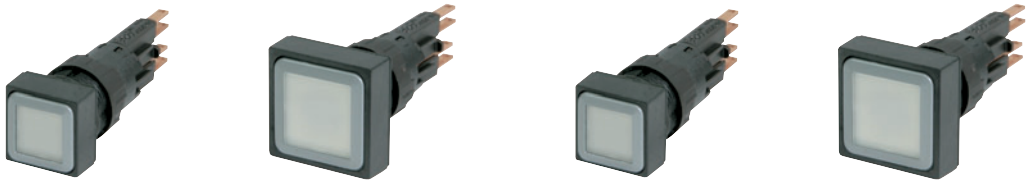
"Side by side mounting enables well ordered control panels on the smallest possible space."



Push-button actuators

IP 65, NEMA 13

Button plates	18 x 18 mm Spring-return	25 x 25 mm Spring-return	18 x 18 mm Spring-return	25 x 25 mm Spring-return
	Q18D-11	Q25D-11		
	Q18D-10	Q25D-10		
	Q18D-20	Q25D-20		
	Q18D-19	Q25D-19		
	Q18D-SW	Q25D-SW	Q18DR-SW	Q25DR-SW
	Q18D-WS	Q25D-WS	Q18DR-WS	Q25DR-WS
	Q18D-GN	Q25D-GN	Q18DR-GN	Q25DR-GN
	Q18D-RT	Q25D-RT	Q18DR-RT	Q25DR-RT
	Q18D-GE	Q25D-GE	Q18DR-GE	Q25DR-GE
	Q18D-BL	Q25D-BL	Q18DR-BL	Q25DR-BL
Without	Q18D-X	Q25D-X	Q18DR-X	Q25DR-X



Illuminated push-button actuators

IP 65, NEMA 13
with 24 V filament lamp

Button lens	18 x 18 mm Spring-return	25 x 25 mm Spring-return	18 x 18 mm Spring-return	25 x 25 mm Spring-return
	Q18LT-WS/WB	Q25LT-WS/WB	Q18LTR-WS/WB	Q25LTR-WS/WB
	Q18LT-GN/WB	Q25LT-GN/WB	Q18LTR-GN/WB	Q25LTR-GN/WB
	Q18LT-RT/WB	Q25LT-RT/WB	Q18LTR-RT/WB	Q25LTR-RT/WB
	Q18LT-GE/WB	Q25LT-GE/WB	Q18LTR-GE/WB	Q25LTR-GE/WB
	Q18LT-BL/WB	Q25LT-BL/WB	Q18LTR-BL/WB	Q25LTR-BL/WB






Key-operated actuators

IP 65, NEMA 13

18 x 18 mm 2 positions		25 x 25 mm 2 positions		18 x 18 mm 3 positions		25 x 25 mm 3 positions	
0	Q18S1	0	Q25S1	0	Q18S3	0	Q25S3
0,I	Q18S1R	0,I	Q25S1R	I,0,II	Q18S3R	I,0,II	Q25S3R
0	Q18S1R-A1	0	Q25S1R-A1	0	Q18S3R-A1	0	Q25S3R-A1
				I,0	Q18S3R-A2	I,0	Q25S3R-A2
				0,II	Q18S3R-A3	0,II	Q25S3R-A3
				I,0	Q18S3R-A4	I,0	Q25S3R-A4
				0	Q18S3R-A5	0	Q25S3R-A5
				0,II	Q18S3R-A6	0,II	Q25S3R-A6
				0	Q18S3R-A7	0	Q25S3R-A7

= Stay-put 45° = Spring-return 45°

For further individuel locking arragements please enquire

I,0,II = Key can be withdrawn in the positions indicated

Selector switch actuators

IP 65, NEMA 13

18 x 18 mm 2 positions		25 x 25 mm 2 positions	
	Q18WK1		Q25WK1
	Q18WK1R		Q25WK1R
3 positions		**3 positions**	
	Q18WK3		Q25WK3
	Q18WK3R		Q25WK3R
	Q18WK3R1		Q25WK3R1
	Q18WK3R2		Q25WK3R2

= Stay-put 45° = Spring-return 45°




Indicator lights

IP 65, NEMA 13
with 24 V filament lamp

Lens	18 x 18 mm Flush	25 x 25 mm Flush	18 x 18 mm Extended	25 x 25 mm Extended
	Q18LF-WS/WB	Q25LF-WS/WB	Q18LH-WS/WB	Q25LH-WS/WB
	Q18LF-GN/WB	Q25LF-GN/WB	Q18LH-GN/WB	Q25LH-GN/WB
	Q18LF-RT/WB	Q25LF-RT/WB	Q18LH-RT/WB	Q25LH-RT/WB
	Q18LF-GE/WB	Q25LF-GE/WB	Q18LH-GE/WB	Q25LH-GE/WB
	Q18LF-BL/WB	Q25LF-BL/WB	Q18LH-BL/WB	Q25LH-BL/WB

Emergency-Stop actuators

IP 65,
NEMA 13
Tamper proof
25 x 25 mm

Non-illuminated	illuminated by means of 24 V multiple LED
Q25PV	Q25LPV
Q25PV-S	Q25LPV-S

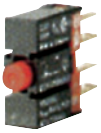
Emergency-Stop labels

in four languages SQT11	in four languages SRT11
Blank	Blank
SQ-GE	SR-GE

Housing

IP 65

Locations	Surface mounting enclosures	Flush mounting panels
8 □	I 8	E 8
8 ■		E 8-SW



Contact elements

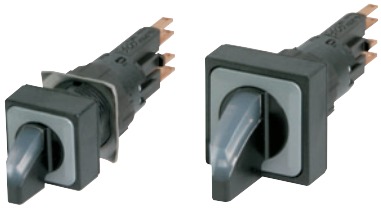
⊖ = Positive opening safety function to IEC / EN 60 947-5-1

N/O (.3 / .4)	N/C (.1 / .2 ⊖)
E10	E01

Screw adapter

1 x 1.5 mm²
2 x 0.75 mm²

For N/O	For N/C	For lamp sockets
SRA10	SRA01	SRAL

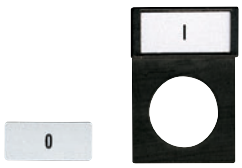


Illuminated selector switches

IP 65,
NEMA 13
with 24 V filament lamp

= Stay-put 45° = Spring-return 45°

	18 x 18 mm 2 positions	25 x 25 mm 2 positions	18 x 18 mm 2 positions	25 x 25 mm 2 positions	18 x 18 mm 2 positions	25 x 25 mm 2 positions
	Q18LWK1-WS/WB	Q25LWK1-WS/WB	Q18LWK1-GN/WB	Q25LWK1-GN/WB	Q18LWK1-RT/WB	Q25LWK1-RT/WB
	Q18LWK1R-WS/WB	Q25LWK1R-WS/WB	Q18LWK1R-GN/WB	Q25LWK1R-GN/WB	Q18LWK1R-RT/WB	Q25LWK1R-RT/WB
	3 positions	**3 positions**	**3 positions**	**3 positions**	**3 positions**	**3 positions**
	Q18LWK3-WS/WB	Q25LWK3-WS/WB	Q18LWK3-GN/WB	Q25LWK3-GN/WB	Q18LWK3-RT/WB	Q25LWK3-RT/WB
	Q18LWK3R-WS/WB	Q25LWK3R-WS/WB	Q18LWK3R-GN/WB	Q25LWK3R-GN/WB	Q18LWK3R-RT/WB	Q25LWK3R-RT/WB
	Q18LWK3R1-WS/WB	Q25LWK3R1-WS/WB	Q18LWK3R1-GN/WB	Q25LWK3R1-GN/WB	Q18LWK3R1-RT/WB	Q25LWK3R1-RT/WB
	Q18LWK3R2-WS/WB	Q25LWK3R2-WS/WB	Q18LWK3R2-GN/WB	Q25LWK3R2-GN/WB	Q18LWK3R2-RT/WB	Q25LWK3R2-RT/WB



Additional labelling

	Insert plates	Label mounts, complete
	10 x 22 mm	**25 x 38 mm**
	01SQ25	Q25TS-01
	02SQ25	Q25TS-02
	05SQ25	Q25TGE-05
START	111SQ25	Q25TS-111
STOP	110SQ25	Q25TS-110
	10SQ25	Q25TS-10
	11SQ25	Q25TS-11
	without	Q25TS-X
Additional texts and symbols	See Industrial Switchgear Main Catalogue	

Cover plate

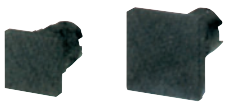
IP 65

For surface mounting enclosures and flush mounting panels	**25 x 38 mm**
	Q25AS
	Q25AGR
	Q25AGE

Laser inscription

Labelling plates

See Industrial Switchgear Main Catalogue



Blanking plug, IP 65

	18 x 18 mm	**25 x 38 mm**
	Q18BS	Q25BS

Lights

Socket Wedge Base W2x4,6d
Positive pole connected to X1

Filament lamps	**6 V / 1 W**	**12 V / 1 W**	**24-28 V / 1 W**
	WBGL6	WBGL12	WBGL24
LEDs (AC / DC)	**6 V / 45 mA**	**12 V / 24 mA**	**18-30 V / 7-12.5 mA**
	–	–	LEDWB-W
	WBLED-GN6	WBLED-GN12	LEDWB-G
	WBLED-RT6	WBLED-RT12	LEDWB-R
	WBLED-GE6	WBLED-GE12	LEDWB-Y
	–	–	LEDWB-B

Clear Signals – Quick Reactions

A clear picture at a glance

Signal towers SL provide visual and audible signals of machine states, easily identifiable even at a distance. Signals are distinguishable as continuous light, flashing light, strobe light or acoustic indication, enabling their level of importance to be correctly evaluated without delay.
The individual modules can be combined as required, and simply assembled by plugging the bayonet fitting into place and turning slightly.
The individual modules are freely programmable by merely relocating a wire link (jumper) on each module board. This, for example, enables a dangerous machine state to be indicated by a red flashing light backed up at the same time by an audible alarm signal. To achieve this, put the jumpers of both modules in the same position on the module board, irrespective of the module position in the column.

1 **Base module**

2 **Light modules**

3 **Fixing base**

Signal towers SL indicate the machine operating state clearly and unmistakeably.

Base module	
IP 54 Black with cover	
Description	**Part no.**
With screw terminals	SL-B
With Cage Clamp	SL-CB
With connection AS-Interface	SL-B-ASI

Acoustic module		
IP 20		
Operational voltage	**Part no. Continuous tone**	**Part no. Pulsed tone**
24 V AC/DC	SL-A24	SL-AP24
110-230 V AC/DC	SL-A110-230	SL-AP110-230

Fixing base		
With spacer		
Height mm	**Part no. Plastic**	**Part no. Metal**
100	SL-F100	SL-F100M
250	SL-F250	SL-F250M
400		SL-F400
800		SL-F800

Signal columns
Individual programming via jumpers
Max. 5 modules and base module

	Continuous light module	Flashing light module	Operating voltages	Multiple LED	Filament lamp	Strobe light module
	Without bulb, BA15d socket	Without bulb, approx. 1 Hz, BA15d socket		BA15d socket	BA15d socket	With flash tube, 1 Hz, 1 Ws
	Part no.	**Part no.**		**Part no.**	**Part no.**	**Part no.**
	SL-L-W	SL-BL24-W SL-BL130-W SL-BL230-W	**24 V AC/DC** **110-130 VAC** **230 VAC**	SL-LED-W SL-LED230-W SL-LED230-W	SL-L24 SL-L130 SL-L230	SL-FL24-W SL-FL130-W SL-FL230-W
	SL-L-R	SL-BL24-R SL-BL130-R SL-BL230-R	**24 V AC/DC** **110-130 VAC** **230 VAC**	SL-LED-R SL-LED230-R SL-LED230-R	SL-L24 SL-L130 SL-L230	SL-FL24-R SL-FL130-R SL-FL230-R
	SL-L-G	SL-BL24-G SL-BL130-G SL-BL230-G	**24 V AC/DC** **110-130 VAC** **230 VAC**	SL-LED-G SL-LED230-G SL-LED230-G	SL-L24 SL-L130 SL-L230	
	SL-L-Y	SL-BL24-Y SL-BL130-Y SL-BL230-Y	**24 V AC/DC** **110-130 VAC** **230 VAC**	SL-LED-Y SL-LED230-Y SL-LED230-Y	SL-L24 SL-L130 SL-L230	SL-FL24-Y SL-FL130-Y SL-FL230-Y
	SL-L-B	SL-BL24-B SL-BL130-B SL-BL230-B	**24 V AC/DC** **110-130 VAC** **230 VAC**	SL-LED-B SL-LED230-B SL-LED230-B	SL-L24 SL-L130 SL-L230	

RMQ Titan with ATEX Approval

The devices in our main catalogue and the basic types mentioned can be ordered with the approval to ATEX guideline 94/9 EC.

ATEX Ex

See individual products for ordering details

ATEX = **At**mospheres **Ex**plosibles = explosive atmospheres

Eaton Moeller now offers the following in conformity with the manufacturers guidelines: ATEX guideline 94/9 EC (mandatory from 06/2003) devices from the RMQ Tiatn range and the FAK range. The switches are approved for device group II, with area of application "all except mining" as well as for category 3. The approval has the test number BVS 06 ATEX E023U, BVS 06 ATEX E024X. The enclosures, push buttons, indicator lights etc. as well as the foot and palm switches are marked with equipment designation

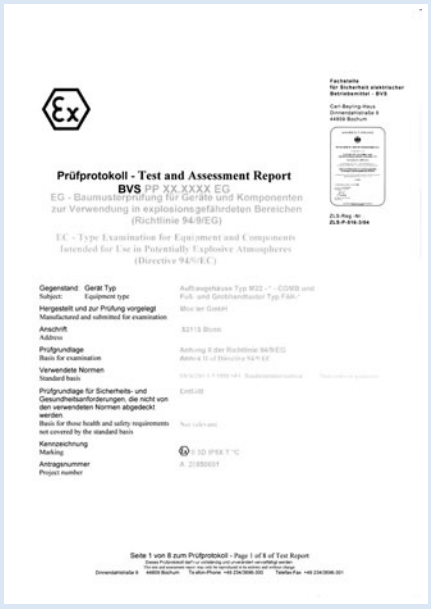
Ex II3D IP5X T85°C. According to the guideline for operators: Ex guideline 1999/92/EC (mandatory from 06/2006) all the devices with test number BVS 06 ATEX E023U, BVS 06 ATEX E024 can be used in dust areas, zone 22, category 3.

The devices in surface mounting enclosures with the ATEX approval are used in dust hazard areas, for example in mills, metal grinding plants, wood processing and wood process areas, cement factories, the aluminium industry, the foodstuffs industry, grain storage and processing facilities, agriculture, pharmaceutical industry, etc.

ATEX approved devices enhance the operational security in industrial manufacturing areas, production plants, during the storage of grains and their preparation and processing as well as in agriculture. Grain storage silos are also subject to dust in outdoor areas, which requires the use of devices with ATEX approval.

Important general mounting and application note:

- only category 3D suitable cable glands can be used!
- only heat-resistant cables can be used (>90 °C)!
- the surface temperature is a maximum of 90 °C!
- only permissible with an ambient temperature from -20 °C to +40 °C!
- the technical data of the devices used must be observed!
- never open the device in the dust explosion hazardous area!
- the demands of the EN 50281-1-2 must be observed!
- the device must be checked for dust before assembly!
- Impact energy max. 2 joules according to EN 50014

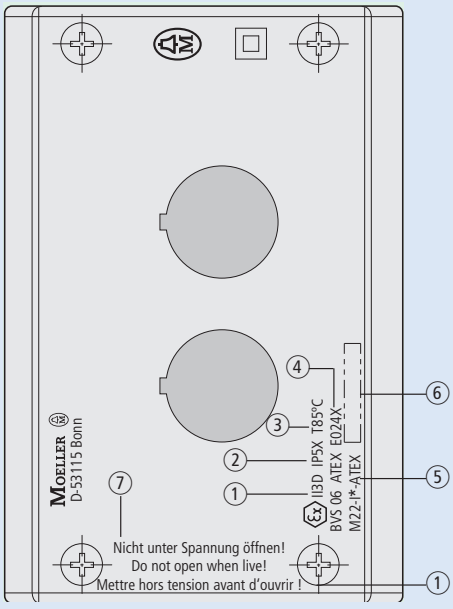

Prüfprotokoll - Test and Assessment Report

BVS PP XX.XXXX EG

EG - Baumusterprüfung für Geräte und Komponenten zur Verwendung in explosionsgefährdeten Bereichen (Richtlinie 94/9/EG)

EC - Type Examination for Equipment and Components Intended for Use in Potentially Explosive Atmospheres (Directive 94/9/EC)

Approval certificate for use of the Eaton Moeller RMQ range in surface mounting enclosure conform to ATEX guideline 94/9 EC.



The marking of the housing is conform to the ATEX guideline 94/9 EC.

1. **categories**
2. **degree of protection**
3. **temperature class**
4. **test numbers**
5. **type**
6. **production code**
7. **warning text**

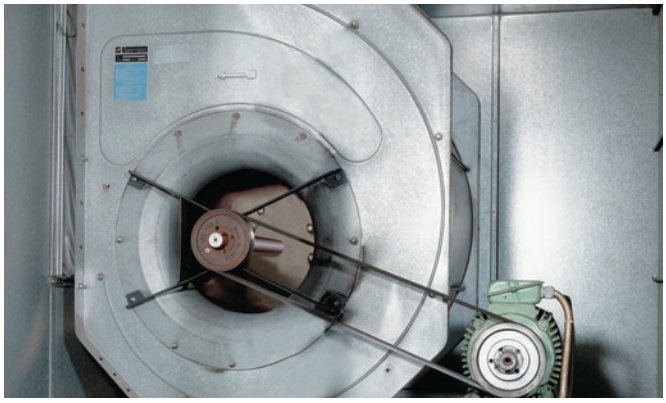
www.moeller.net/atex

Movements safely under control – Safety/ position switches and proximity switches

From material handling systems to plastic injection moulding; from car washes to doors on trams: the safety/position switches LS-Titan are used wherever there is exact positioning requirement.

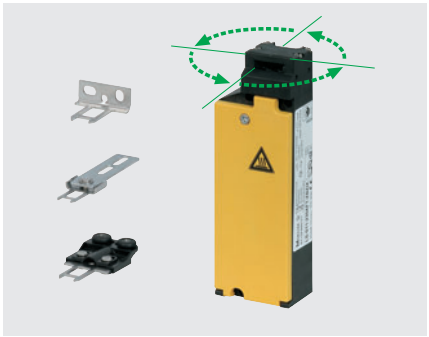
With the electronic safety/position switch LSE even exact adjustment of the set position is no longer required. The operating point can be "learned". Simply at the "touch of a button".

The analog position switch with a voltage or current output also enables a range of new applications for the LS-Titan, where mechanical position detection could only provide insufficient information up to now – for example, detecting the position with opened flaps for flue gasses.



The new electronic safety/position switches LSE-Titan are the ideal connection directly to the world of automation. This new innovation enables exact and continuous detection of the position of a flue gas flap or a servo drive. The position is converted to an analog voltage (0..10V) or current (4..20mA) and can be continuously signalled to the automation world. Even objects of differing thickness and size, such as brake blocks, can be detected and the signal can be processed. Simple, speed-dependent controls of ventilator motors or smoke removal systems indicate how wide the air ventilation flap is opened (e.g. 25, 50 or 75 percent) and thus save energy and protect and conserve the material.

For applications such as final inspections with packaging systems, non-intrusive detection is necessary in order to guarantee a smooth interruption-free process and extremely low levels of rejects. Capacitive proximity switches feature the ideal properties for this task. The advantage: they can detect both metallic and non-metallic objects non-intrusively and free of wear. Non-metals can be detected – even through other mediums. Thus, empty packages are detected, sorted out and can be refilled in order to guarantee a consistent high-level of quality. Further typical examples are for example, detection of wooden palettes, plastic containers or even liquids in glass containers.



Safety/position switches LS-Titan

LS-Titan switches are used wherever positions must be reliably detected and signalled. They are available either in robust metal or plastic enclosure designs. Exchangeable operating heads enable flexible use for all applications. The range is rounded off by electronic safety position switches LSE….

Safety/position switches LS...-ZBZ

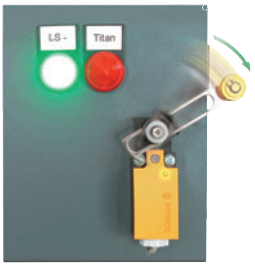
The LS…-ZBZ enhances the safety standard for personnel and process protection through reliable protection and interlocking of safety doors, grilles or flaps. The separate, coded actuator is electromechanically interlocked in the operating head. Switches are available with spring force or magnetic force interlocking. In conjunction with the safety relay, anti-tamper access to hazardous areas is only enabled after a delay. This ensures that movements must come to a standstill or process stages must be completed beforehand.

Proximity switches LSI, LSC, LSO

Automation engineering is practically unimaginable without the use of non-contact and non-invasive sensors. The speeds with which the processes are detected make the wear-free and robust sensors indispensable. Even under harsh conditions such as use in heavily contaminated environments. Inductive, capacitive or optical: the right proximity switch for every situation enables optimum.

Functional Safety
Type Approved
TÜVRheinland FS

30°



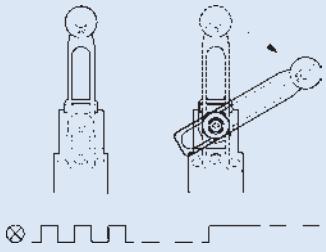
60°

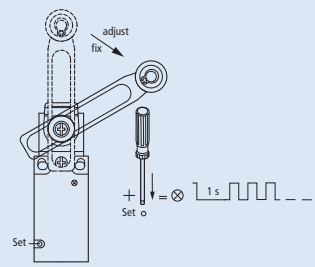
Electronic safety/position switch LSE-Titan®

Setting a variable operating point

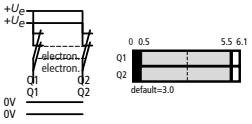
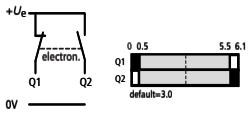
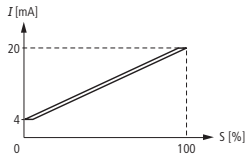
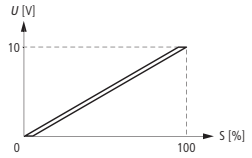
The electronic safety/position switch LSE has an operating point that can be set variably. Two fast and bounce-free PNP switch outputs enable high switching frequencies. They are protected against short-circuit and overload and are equipped with an abrupt switching behaviour. This guarantees a defined and reproducible operating point.
The actual operation point is in a range between 0.5 mm to 5.5 mm (supplied ex-works = 3 mm).

The setting to the "new" operating point is performed as follows: The plunger must be moved from the "old" to the "new" operating position. Now the set button should be pressed for a duration of 1 sec. The LED now flashes with a higher pulse frequency and the new operation point is set retentively.





Limit switch electronic -LSE-
Individual adjustment of switching point

Safety/position switch LSE-Titan®		
Version	**Contact sequence diagram for plunger**	**Part no.**
Plastic version 		**LSE-02**
		**LSE-11**
Plastic version 		**LSE-AI 4 – 20 mA**
		**LSE-AU 0 – 10 V**

Simply snap on the command device RMQ-Titan®

A further unique feature is the ability to combine a control circuit device from the RMQ-Titan range with the LS-Titan safety/position switches. Pushbutton actuators, selector switches or emergency-stop buttons can be simply snapped on directly as the operating heads on each safety/position switch. The combined unit maintains the degree of protection IP66 on both the front and rear.

Analog electronic position switch LSE-Titan

The analog position switches LSE-AI (4-20mA) and LSE-AU (0-10V) are a further electronic position switch innovation. It is possible for the first time, to continuously monitor the actual position of a flue gas flap or an actuator. Hereby, the position is detected on an analog basis with voltage (0-10V) or current (4-20mA) and continuously signaled to the automation world. Even objects with differing thicknesses, such as brake blocks can be detected and the signal can be processed.

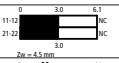
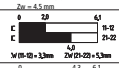
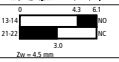
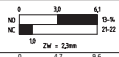
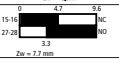
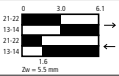
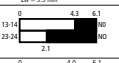
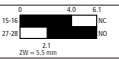
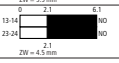
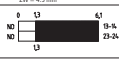
Simple speed-dependent controls for fan motors or smoke extraction fans signal the opening width of the air flap (e.g. 25, 50 or 75 percent) and thus save energy and material. The analog position switch also features a diagnostics output for further signal processing. It enables monitoring and evaluation of the safe state at any time. The position switch also features a self-test function: Outputs Q1 and Q2 are continuously tested for overload, short-circuit to 0 V and short-circuit to $+U_e$.

Simple to mount

The operating heads can be attached in all 4 directions (4 x 90°) and can be quickly and safely snap mounted using the bayonet fitting. Modern, reliable and fast mounting is assured in conjunction with the vibration-proof and maintenance-free cage-clamp terminals.
Furthermore, devices with conventional screw terminals are available as further variants.

LS-Titan® operating heads, accessories

Operating heads									
	Roller lever short	Roller lever long	Roller lever large	Angled roller lever	Roller plunger	Rotary lever	Adjustable roller lever d=18mm	Adjustable roller lever d=30mm	
									
Plastic	**LS-XLS**	**LS-XL**	**LS-XLB**	**LS-XLA**	**LS-XP**	**LS-XRL**	**LS-XRLA**	**LS-XRLA30**	
									
Metal		**LSM-XL**		**LSM-XLA**	**LSM-XP**	**LSM-XRL**	**LSM-XRLA**		

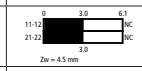
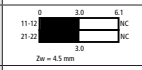
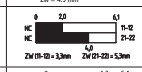
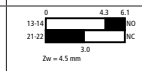
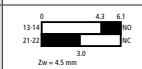
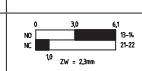
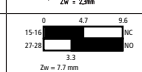
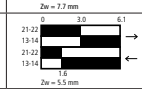
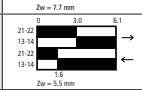
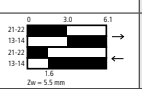
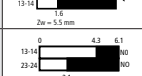
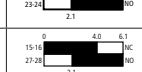
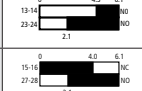
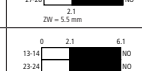
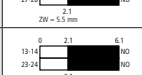
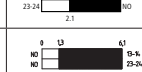
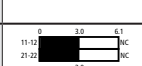
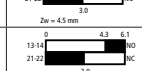
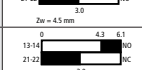
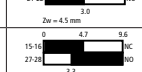
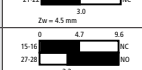
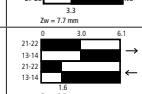
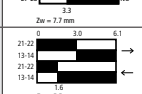
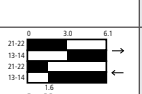
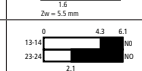
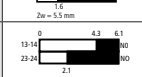
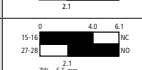
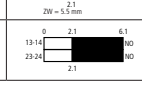
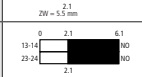
LS-Titan® safety/position switch				plastic version		metal version
LS..., LSM.... Cage Clamp connection (Cage Clamp is a registered trademark of Wago Kontakttechnik, 32423 Minden) LS-S... screw terminal connection	NEMA 4X, 13 IP 66		Contact sequence diagram for plunger	Plunger DIN EN 50 047	Plunger, Black DIN EN 50 047	Plunger DIN EN 50 047
				Part no.	Part no.	Part no.
	-	2N/C ⊖		LS-02 LS-S02	LS-02-SW LS-S02-SW	LSM-02
	-	2N/C ⊖		LS-02A LS-S02A		
	1N/O	1N/C ⊖		LS-11 LS-S11	LS-11-SW LS-S11-SW	LSM-11
	1N/O	1N/C ⊖		LS-11A LS-S11A		
	1N/O	1N/C ⊖		LS-11D LS-S11D	LS-11D-SW LS-S11D-SW	LSM-11D
	1N/O	1N/C ⊖		LS-11S[1] LS-S11S[1]	LS-11S-SW[1] LS-S11S-SW[1]	LSM-11S[1]
	2N/O	-		LS-20 LS-S20	LS-20-SW LS-S20-SW	LSM-20
	1N/O	1N/C ⊖		LS-11DA LS-S11DA		LSM-11DA
	2N/O	-		LS-20A LS-S20A		LSM-20A
	2N/O	-		LS-20B LS-S20B		

⊖ = positive opening safety function to IEC/EN 60947-5-1 [1] LS/LSM-..S = Snap-Action contact

	Adjustable roller lever d=40mm	Adjustable roller lever d=40mm (Rubber)	Plastic actuating rod	Metal actuating rod	Spring rod actuator	Actuating rod	Plunger Central fixing	Roller Plunger Central fixing	RMQ-Titan fixing adapter
									
	LS-XRLA40	LS-XRLA40R	LS-XRR	LS-XRRM	LS-XS	LS-XOR	LS-XZS	LS-XZRS	M22-LS
						Additional fixing for side approach Adapter plate 2.5 mm thick 	Guide disc 	Cage-Clamp connector 	
			LSM-XRR	LSM-XRRM	LSM-XS	LS-XAP	FS-AT	LS-XTW	

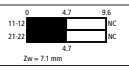
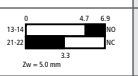
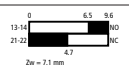
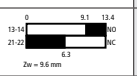
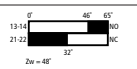
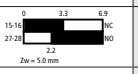
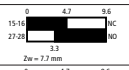
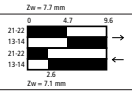
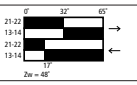
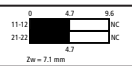
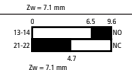
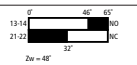
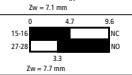
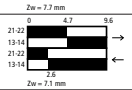
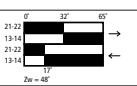
Safety/position switch LS-Titan®

LS..., LSM.... Cage Clamp connection
(Cage Clamp is a registered trademark of Wago Kontakttechnik, 32423 Minden)
LS-S... screw terminal connection

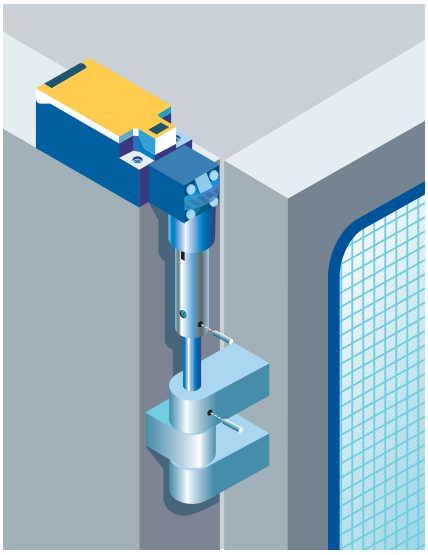
NEMA 4X, 13 IP 66		Contact sequence diagram for plunger	Plunger **DIN EN 50 047**	Plunger **DIN EN 50 047**	Roller Plunger **DIN EN 50 047**	Contact sequence diagram for front fixing	Front fixing[1] **DIN EN 50 047**	Contact sequence diagram for spring rod	Spring-Rod
Version	**Contacts**		**Part no.**	**Part no.**	**Part no.**		**Part no.**		**Part no.**
plastic version	- 2N/C ⊖		**LS-02** **LS-S02**	**LS-02-SW** **LS-S02-SW**			**LS-02/F** **LS-S02/F**		
	- 2N/C ⊖		**LS-02A** **LS-S02A**						
	1N/O 1N/C ⊖		**LS-11** **LS-S11**	**LS-11-SW** **LS-S11-SW**	**LS-11/P** **LS-S11/P**		**LS-11/F** **LS-S11/F**		
	1N/O 1N/C ⊖		**LS-11A** **LS-S11A**						
	1N/O 1N/C ⊖		**LS-11D** **LS-S11D**	**LS-11D-SW** **LS-S11D-SW**			**LS-11D/F** **LS-S11D/F**		
	1N/O 1N/C ⊖		**LS-11S**[1] **LS-S11S**[1]	**LS-11S-SW**[1] **LS-S11S-SW**[1]	**LS-11S/P**[1] **LS-S11S/P**[1]		**LS-11S/F**[1] **LS-S11S/F**[2]		**LS-11S/S**[1] **LS-S11S/S**[1]
	2N/O -		**LS-20** **LS-S20**	**LS-20-SW** **LS-S20-SW**			**LS-20/F** **LS-S20/F**		
	1N/O 1N/C ⊖		**LS-11DA** **LS-S11DA**				**LS-11DA/F** **LS-S11DA/F**		
	2N/O -		**LS-20A** **LS-S20A**				**LS-20A/F** **LS-S20A/F**		
	2N/O -		**LS-20B** **LS-S20B**						
metal version	- 2N/C ⊖		**LSM-02**				**LSM-02/F**		
	1N/O 1N/C ⊖		**LSM-11**		**LSM-11/P**		**LSM-11/F**		
	1N/O 1N/C ⊖		**LSM-11D**				**LSM-11D/F**		
	1N/O 1N/C ⊖		**LSM-11S**[2]		**LSM-11S/P**[1]		**LSM-11S/F**[1]		**LSM-11S/S**[1]
	2N/O -		**LSM-20**				**LSM-20/F**		
	1N/O 1N/C ⊖		**LSM-11DA**				**LSM-11DA/F**		
	2N/O -		**LSM-20A**				**LSM-20A/F**		

⊖ = positive opening safety function to IEC/EN 60947-5-1

[1] LS/LSM-..S = Snap-Action contact

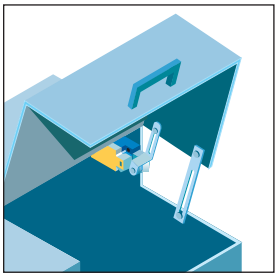
Contact sequence diagram for roller lever short	Roller lever short **Part no.**	Contact sequence diagram for roller lever long	Roller lever long **DIN EN 50 047** **Part no.**	Contact sequence diagram for roller lever large	Roller lever large **Part no.**	Contact sequence diagram for rotary lever, adjustable roller lever and actuating rod	Rotary lever **DIN EN 50 047** **Part no.**	Adjustable roller lever **Part no.**	Actuating rod **Part no.**
			**LS-02/L** **LS-S02/L**						
	**LS-11/LS** **LS-S11/LS**		**LS-11/L** **LS-S11/L**		**LS-11/LB** **LS-S11/LB**		**LS-11/RL** **LS-S11/RL**	**LS-11/RLA** **LS-S11/RLA**	
	**LS-11D/LS** **LS-S11D/LS**		**LS-11D/L** **LS-S11D/L**						
			**LS-11S/L**[1] **LS-S11S/L**[1]				**LS-11S/RL**[1] **LS-S11S/RL**[1]	**LS-11S/RLA**[1] **LS-S11S/RLA**[1]	**LS-11S/RR**[1] **LS-S11S/RR**[1]
			**LSM-02/L**						
			**LSM-11/L**				**LSM-11/RL**	**LSM-11/RLA**	
			**LSM-11D/L**						
			**LSM-11S/L**[1]				**LSM-11S/RL**[1]	**LSM-11S/RLA**[1]	**LSM-11S/RR**[1]

Door safety switch LSR safety/position switch LS ...-ZB(Z)

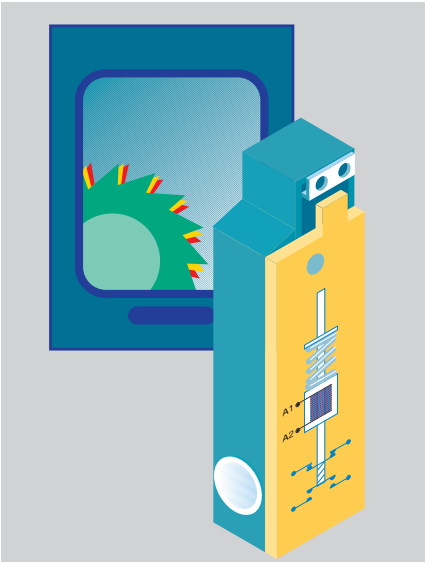


Safety for persons and processes
door safety switch LSR-... /T(K,S)

The safety of all personnel working in production halls must be ensured at all times. Protective doors and hinged flaps keep people out of hazardous areas. Where an attempt is made to open a protected door or flap during operation, the hinge-operated switches LSR/TS and the hasp-operated switches LSR/TKG immediately disconnect the power supply to the machine or installation. Opening is registered at an angle of only 5 degrees, and so even tampering is not possible.
Wherever tampering must be absolutely prevented and protruding actuating levers would be unacceptable, door switches offer protection on tooling and packaging machines or in areas where robots operate.



If the hasp-operated switches LSR are fitted inside a cover, tampering is completely eliminated.

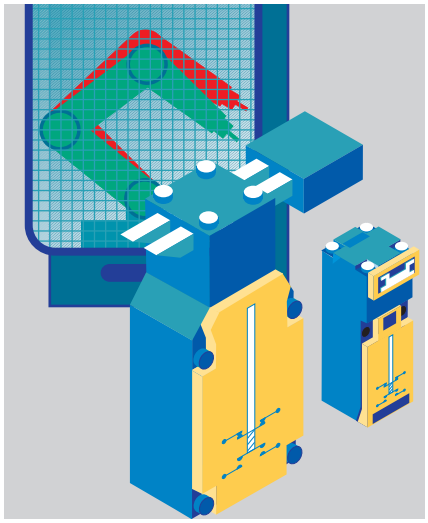


Protect and lock:
safety/position switch LS-...-ZBZ

By reliable securing and interlocking of protective doors, the LS-ZBZ increases the safety standards for the protection of personnel and processes.

The LS-ZBZ operates according to one of two principles: on the basis of magnet-powered or spring-powered interlocking.

The spring-powered interlock is optimally suited for enhanced personnel protection. The door or protective guard remains safely locked even in the event of power failure. In an emergency, the protective guard can be opened using an auxiliary release mechanism. Magnet-powered interlock is used in personnel and process protection. The protective cover is interlocked when operational voltage is applied, and can therefore be opened directly in the event of power failure.



Switch off the danger:
safety/position switches LS...ZB

Safety/position switches LS...ZB and LS4…ZB are used on centrifuges, motor and gearbox covers, presses, etc.. If the protective guard is opened, they disconnect the power and in so doing, remove the danger. LS…ZB and LS4…ZB comply with EN 1088 „Interlocks with and without mechanical securing action“. The selection of the necessary protective device is thus simplified. All safety position switches also fulfil the demands for use in safety circuits by their use of positively opening contacts.
Equipped with double-break contacts, they are also suitable for use in the configuration of redundant safety circuits. The switches featuring double break contacts are suitable for use with electronic devices in accordance with IEC/EN 61 131-2, enabling the safe exchange of information with any controller.

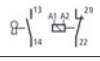
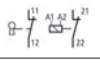
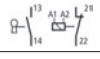
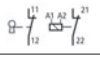
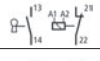
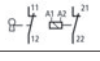
LS..., LSM.... Cage Clamp connection
(Cage Clamp is a registered trademark of Wago Kontakttechnik, 32423 Minden)

LS-S... screw terminal connection

Door safety switch, IP65

Complete units Contacts ■ closed ☐ open Zw = Positive opening sequence	Door flap safety switch LSR-…/TK narrow	**Complete units** Contacts ■ closed ☐ open Zw = Positive opening sequence	Door hinge safety switch LSR-…/TS narrow
Switching diagram	**Part no.**	**Switching diagram**	**Part no.**
	**LSR-S11-1-I/TKG**		**LSR-S11-1-I/TS**
	**LSR-S02-1-I/TKG**		**LSR-S02-1-I/TS**

LS...-ZBZ safety/position switches, IP65

Basic unit		Spring-powered interlock (closed-circuit principle)	Magnet-powered interlock (open, circuit principle)
	Rated control voltage U_s magnetic drive	**Part no.**	**Part no.**
	24 V DC 	**LS-S11-24 DFT-ZBZ/X**	**LS-S11-24 DMT-ZBZ/X**
	24 V DC 	**LS-S02-24 DFT-ZBZ/X**	**LS-S02-24 DMT-ZBZ/X**
	120 V AC 50/60 Hz 	**LS-S11-120 AFT-ZBZ/X**	**LS-S11-120 AMT-ZBZ/X**
	120 V AC 50/60 Hz 	**LS-S02-120 AFT-ZBZ/X**	**LS-S02-120 AMT-ZBZ/X**
	230 V AC 50/60 Hz 	**LS-S11-230 AFT-ZBZ/X**	**LS-S11-230 AMT-ZBZ/X**
	230 V AC 50/60 Hz 	**LS-S02-230 AFT-ZBZ/X**	**LS-S02-230 AMT-ZBZ/X**

LS...-ZB safety/position switches, IP65

Complete unit		**Part no.**
		**LS-11-ZB** **LS-S11-ZB** **LS-11S-ZB** **LS-S11S-ZB**
		**LS-02-ZB** **LS-S02-1-ZB**
		**LS4/S11-1/I/ZB** **LS4/S11-1/IA/ZB**
		**LS4/S12-7/IB/ZB**

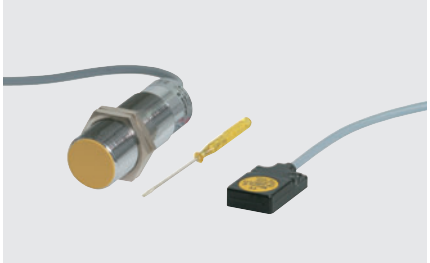
Actuators for combination with LS...-ZBZ basic units

Version		Max. mechanical holding force GS-ET-19 (04-2004)	**Part no.**
	Straight for sliding doors	1500 N	**LS-XG-ZBZ**
	Angled short, for swing doors	1500 N	**LS-XW-ZBZ**
	Angled long, for swing doors	1300 N	**LS-XWA-ZBZ**
	Flexible, angled for doors that do not close precisely	750 N	**LS-XF-ZBZ**
	Flexible, straight for doors that do not close precisely	1300 N	**LS-XFG-ZBZ**
	Straight, with increased tolerance in closing direction for doors that does not close precisely	1300 N	**LS-XNG-ZBZ**
	Angled, with increased tolerance in closing direction for doors that does not close precisely	500 N	**LS-XNW-ZBZ**

Proximity switches – safe switching without contact

Inductive proximity switches

Inductive proximity switches are the robust standard product to safely detect the presence of metallic objects. The non-contact detection with electronic output ensures almost an unrestricted lifespan as there is no wear, even under extremely contaminated conditions.



Capacitive proximity switches

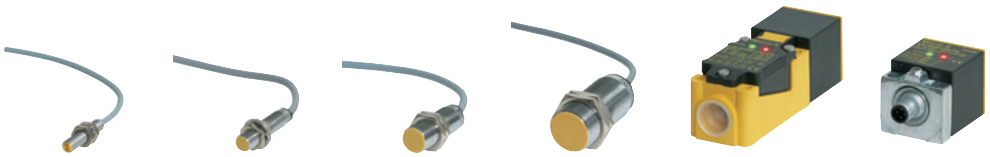
Capacitive proximity switches are used wherever non-metallic objects have to be detected. It is possible for example to control fill levels, or prevent that containers run dry or overflow. Substances can even be detected through glass, plastic, etc.

Optical proximity switches

The reflected-light beam switch contains a transmitter and receiver and can detect objects which are within an operating range of up to 300 mm. The reflected-light barrier operates with reflectors of different sizes. In order to detect objects with glossy surfaces, the series also includes types with polarising filters. Thus, ranges of up to 6000 mm can be covered.

Optical proximity switches LSO			
	Housing style (Round design)	**DC voltage version – switching to + pole (PNP)** U_e: 10..30V DC I_e max 150 mA	
		With 2 m connecting cable	With plug-in connection
	**Reflected-light beam without background suppression M 18 x 1**		
	Plastic	**LSO-R18P-S300-LD** Sd 300 mm, P	**LSO-R18P-S300-PD** Sd 300 mm, P
	Metal	**LSO-R18S-S300-LD** Sd 300 mm, P	**LSO-R18S-S300-PD** Sd 300 mm, P
	**Reflected-light beam with fixed background suppression M 30 x 1.5**		
	Plastic	**LSO-R30P-S400-LD** Sd 400 mm, P	**LSO-R30P-S400-PD** Sd 400 mm, P
	**Reflected-light barrier without polarisation filter M 18 x 1**		
	Plastic	**LSO-R18P-B2000-LD** Sd 2000 mm, P	**LSO-R18P-B2000-PD** Sd 2000 mm, P
	Metal	**LSO-R18S-B2000-LD** Sd 2000 mm, P	**LSO-R18S-B2000-PD** Sd 2000 mm, P
	**Reflected-light barrier with polarisation filter M 30 x 1.5**		
	Plastique	**LSO-R30P-B6000-LD** Sd 6000 mm, P	**LSO-R30P-B6000-PD** Sd 6000 mm, P
	**Light-barrier reflectors for reflected-light barrier**		
		40 mm **75 mm**	**LSO-XR40** **LSO-XR75**

Sd: operating range P = programmable (break contact or make contact)



Inductive proximity switches LSI						
Enclosure style	Round design				Rectangular design	
	DC voltage version – switching to + pole (PNP)					
	U_e: 10..30 V DC				U_e: 10..65 V DC	U_e: 10..30 V DC
	Part no. M 8x1	**Part no. M 12x1**	**Part no. M 18x1**	**Part no. M 30x1.5**	**Part no. 114x40x40**	**Part no. 65x40x40**
Plastic housing*, Fitting in metal: Flush		**LSI-R12P-F2-LD** Sn 2 mm, N/O	**LSI-R18P-F5-LD** Sn 5 mm, N/O	**LSI-R30P-F10-LD** Sn 10 mm, N/O	**LSI-Q40P-F20-CD** Sn 20 mm, C/O	
Plastic housing*, Fitting in metal: Non-flush		**LSI-R12P-NF4-LD** Sn 4 mm, N/O	**LSI-R18P-NF8-LD** Sn 8 mm, N/O	**LSI-R30P-NF15-LD** Sn 15 mm, N/O	**LSI-Q40P-NF40-CD** Sn 40 mm, C/O	
Plastic insulated housing with plug-in connection, Fitting in metal: Flush						**LSI-Q40P-F20-PD** Sn 20 mm, N/O
Plastic insulated housing with plug-in connection, Fitting in metal: Non-flush						**LSI-Q40P-NF35-CD** Sn 35 mm, N/O
Metal housing with 2 m connection cable, Flush	**LSI-R8S-F1-LD** Sn 1.5 mm, N/O	**LSI-R12M-F2-LD** Sn 2 mm, N/O	**LSI-R18M-F5-LD** Sn 5 mm, N/O	**LSI-R30M-F10-LD** Sn 10 mm, N/O		
Metal housing with plug-in connection, Flush	**LSI-R8S-F1-PD** Sn 1.5 mm, N/O	**LSI-R12M-F2-PD** Sn 2 mm, N/O	**LSI-R18M-F5-PD** Sn 5 mm, N/O	**LSI-R30M-F10-PD** Sn 10 mm, N/O		
Metal housing with plug-in connection, Non-flush	**LSI-R8S-NF3-PD** Sn 3 mm, N/O	**LSI-R12M-NF4-PD** Sn 4 mm, N/O	**LSI-R18M-NF8-PD** Sn 8 mm, N/O	**LSI-R30M-NF15-PD** Sn 15 mm, N/O		
Alternating voltage version 20-250 V AC, 50/60 Hz						
Plastic housing*, Fitting in metal: Flush		**LSI-R12P-F2-LA** Sn 2 mm, N/O	**LSI-R18P-F5-LA** Sn 5 mm, N/O	**LSI-R30P-F10-LA** Sn 10 mm, N/O	**LSI-Q40P-F20-CA** Sn 20 mm, P	
Plastic housing*,					**LSI-Q40P-NF35-CA** Sn 35 mm, P	

Capacitive proximity switches LSC					
Housing style	Round design			Rectangular design	
	DC voltage version – switching to + pole (PNP)				
	U_e: 10..30 V DC	U_e: 10..65 V DC		U_e: 10..30 V DC	U_e: 10..65 V DC
	Part no. M 12x1	**Part no. M 18x1**	**Part no. M 30x1.5**	**Part no. 32x20x8**	**Part no. 114x40x40**
Plastic insulated housing with 2 m connection cable, fitting in metal: Flush	**LSC-R12M-F3-LD** Sn 3 mm, N/O	**LSC-R18M-F5-LD** Sn 5 mm, N/O	**LSC-R30M-F10-LD** Sn 10 mm, N/O	**LSC-Q20M-F5-LD** Sn 5 mm, N/O	
Plastic insulated housing with terminal connection, fitting in metal: Flush					**LSC-Q40P-F20-CD** Sn 20 mm, C/O

* on round style: 2 m connecting cable,
on rectangular style: with terminal connection

Sn: rated switching distance

M12 x 1 plug connector

N/O = normally open
C/O = changeover
P = programmable (break contact or make contact)

ATEX

Rotary switches T and switch-disconnectors P for safe and reliable switching, disconnection, control and operation

The high-performance, robust and compact rotary switches T and switch-disconnectors P are used in industry, trade and building engineering applications. The IP65 degree of protection with the top mounting switches and the switch front enable use in harsh environments. Ten switch basic types and four different construction types, in a whole range of standard switches and across a wide performance range, are available. Customized circuits can also be implemented in addition to the standard configurations. The possibilities are almost unlimited. A comprehensive accessory range complements the switch range and round off the range of applications. The rotary switches T and the switch-disconnectors P are approved conform to the ATEX directive 94/9 EC for EX zone 22. The approval enables use in dust explosion hazardous areas.

Main switch with Emergency-Stop function

Process and processing machines require a power disconnecting device conform to EN 60204-1. Furthermore, standstill in an emergency must also be assured. As shown in the above textile processing machine, both of these functions are assumed by a switch-disconnector P3. Standstill in an emergency requires:

- priority function and operation in all operating modes
- the power supply, which is connected to the machine states which produce the danger, must switch off as quickly as possible.

Maintenance and manual override switches

A whole range of electric motors are required to operate the conveyor belts in conveyor systems. In conditioning plants, warehouses, airports etc., the individual conveyor belts are combined to a unit. The safety and availability of these systems demands that each individual drive can be isolated from the power supply. The isolation is performed using a T and P manual override switch. The switch can be secured against reapplication of power using three padlocks in the off state. Maintenance and repair work can be completed in safety.

Mini rotary switch TM

The mini rotary switch stands out particularly due to its small size and simple handling and mounting features. There are many construction types available for selection. The rating of the TM to AC23A is 3 kW at 400/415 V, 50-60 Hz. The rated uninterrupted current I_u is 10 A. The mini rotary switch TM is mainly used as an On-Off switch; changeover contact, step switch, control switch, coding switch and control circuit isolator. Customized circuits can be used.

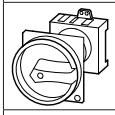
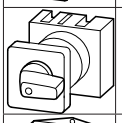
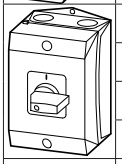
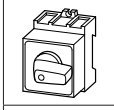
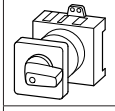
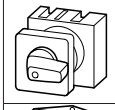
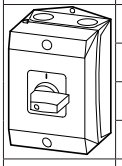
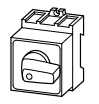
Rotary switch T

The rotary switch T represents a very flexible, compact and robust modular system. The T0, T3, T5B, T5, T6, T8 rating sizes are available in four different construction types. The rating of the T switch ranges from 6.5 kW to 132 kW with AC23A at 400/415 V, 50-60 Hz. The rated uninterrupted current I_u is between 20 A and 315 A.
The rotary switch T has a widely varied range of application uses. Customized versions are available.

Switch-disconnector P

The switch-disconnectors P1 up to 32 A, P3 up to 100 A, P5 up to 315 A are compact and robust. The manual operator acts directly on the contacts. The contacts are positively opened on de-energization. In addition to their use as switch disconnectors with and without the Emergency-Stop function, switch-disconnectors P can be used as On-Off switches as well as maintenance, manual override or safety switches.

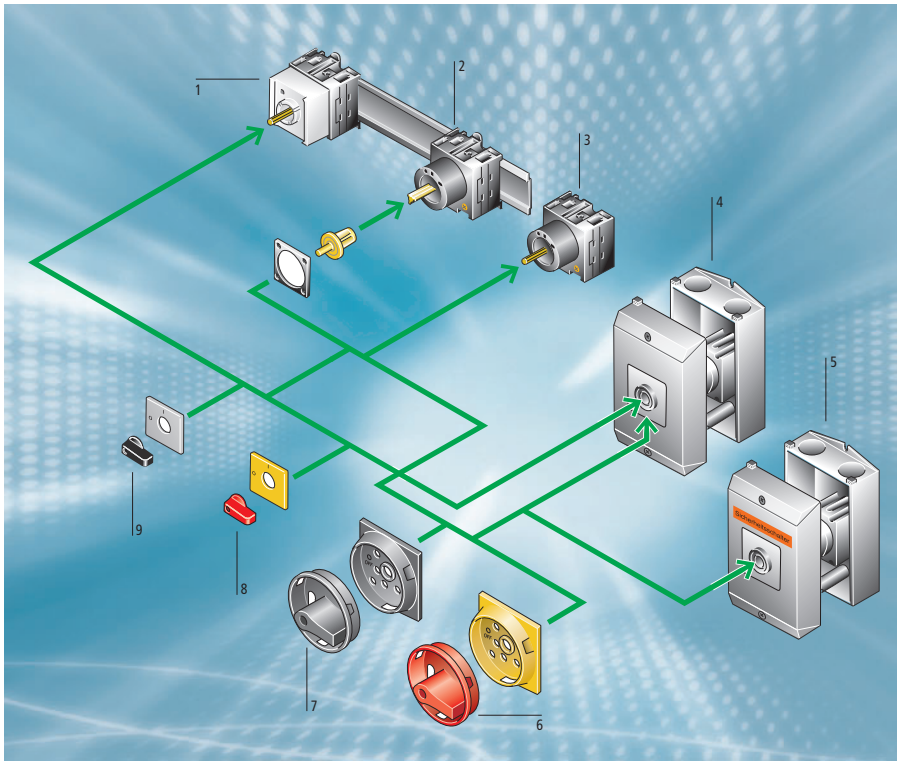
Switching and control in practice

Construction type				Construction type group																
Appea-rance	Construction type	Construction type description	Degree of pro-tection	A1	A2	A4	A5	C	D	F	G	H1	H2	I2	K4	K5	L4	L5	N	O
	**E/SVB**	**Flush mount control circuit isolater** [1]	IP65 front																	
	EA/SVB	**Flush mounting main switch,** for use as an Emergency-Stop device [2]	IP65 front	●	●	●	●	●	●											
	EA-SVB-SW	**Flush mounting main switch,** without Emergnecy-Stop function [3]	IP65 front	●	●	●	●	●	●											
	**I1/SVB**	**Surface mounting main switch,** for use as an Emergency-Stop device [2]	IP65	●																
	I2/SVB				●															
	I4/SVB					●														
	I5/SVB						●													
	I45/SVB									●										
	I48/SVB										●									
	**I1/SVB-SW**	**Surface mounting main switch,** without Emergency-Stop function [3]	IP65	●																
	I2/SVB-SW				●															
	I4/SVB-SW					●														
	I5/SVB-SW						●													
	I45/SVB-SW									●										
	I48/SVB-SW										●									
	**V/SVB**	**Rear mounting main switch,** for use as an Emergency-Stop device [2]	IP65 front	●	●	●	●	●	●	●	●									
	V/SVB-SW	**Rear mounting main switch,** without Emergency-Stop function [3]	IP65 front	●	●	●	●	●	●	●	●									
	**E**	**Flush mounting,** with thumb-grip	IP65 front									●	●	●	●	●	●	●	●	●
	**EZ**	**Centre mounting,** with thumb-grip	IP65 front									●	●	●						●
	**I1**	**Surface mounting,** with thumb-grip	IP65									●								
	I2												●	●						
	I4														●		●			
	I5															●		●		
	**IVS**	**Service distribution board mounting,** with thumb-grip	IP30 front									●	●				●	●		●
	**Z**	**Rear mounting,** with thumb-grip	IP65 front									●	●	●	●	●	●	●	●	●
	**E-RT**	**Flush mounting on-off switch,** for use as an Emergency-Stop device [4]	IP65 front																	
	**I1-RT**	**Surface mounting on-off switch,** for use as an Emergency-Stop device [4]	IP65																	
	I2-RT																			
	I4-RT																			
	I5-RT																			
	**IVS-RT**	**Service distribution board mounting on-off switch,** for use as an Emergency-Stop device [4]	IP30 front																	

Notes:
[1] can be locked in the 0 position with padlocking feature
[2] according to IEC/EN 60204-1, VDE0113, part 1 with red rotary handle and yellow locking collar, can be locked in 0 position
[3] with black rotary handle and locking collar, can be locked in 0 position
[4] according to IEC/EN 60 204-1, VDE 0113 part 1, with red thumb-grip and yellow front label

P	R	S1	S2	S4	S5	U2	U4	U5	V	W	X
									●		
●	●									●	●
●	●									●	●
	●										
											●
●	●										
		●	●	●	●	●	●	●			
		●									
			●			●					
				●			●				
					●			●			
		●	●	●	●						

Systematic overview of the construction types



1) service distribution board mounting, .../IVS
2) rear mounting .../Z or .../V/SVB-...
3) flush mounting .../E or .../EA/SVB-... ; centre mounting .../EZ
4) surface mounting .../I.. or .../I../SVB-...
5) safety switch .../I..-SI/...
6) red rotary handle and yellow locking collar
7) black rotary handle and locking collar
8) red thumb-grip and yellow front label
9) black rotary handle and locking collar

From the requirement to the part-no.:
Requirement: 2-pole main switch for rear mounting
Rated continuous current: 16 A
Switch selection according to overview list: **T0-2-102/..** (construction type group A1)
Construction type from construction type list: **V/SVB**
Order part no: **T0-2-102/V/SVB**

Requirement: Step switch without 0 position, 1 pole, 4 steps
Mounting in enclosure, rated uninterrupted current: 12 A
Switch selection according to overview list: **T0-2-8231/..** (construction type group H1)
Construction type from construction type list: **I2**
Order part no: **T0-2-8231/I2**

Ordering of non-standard contact sequences
An order form with notes for non-standard contact sequences is provided in the electronic catalogue:
http://catalog.moeller.net/en

Technical support can be obtained from your Eaton Moeller sales offices.

Overview of the rotary switch up to 100 A and switch-

Basic switch type	**T0**	Construction type group	**T3**	Construction type group	**T5B**	Construction type group	**T5**	Construction type group	**P1-25**	Construction type group
Max. rating to AC-23A, 400/415V, 50-60 Hz	6.5 kW		13 kW		22 kW		30 kW		13 kW	
Max. rated uninterrupted current I_u	20 A		32 A		63 A		100 A [1]		25 A	
Main switch without auxiliary contacts										
1 pole	T0-1-8200/..	A1	T3-1-8200/..	A2	T5B-1-8200/..	A4	T5-1-8200/..	A5	–	
2 pole	T0-1-102/..	A1	T3-1-102/..	A2	T5B-1-102/..	A4	T5-1-102/..	A5	–	
3 pole	T0-2-1/..	A1	–		–		–		P1-25/..	A2
3 pole + N	T0-2-8900/..	A1	–		–		–		P1-25/../ N	A2
6 pole	T0-3-8342/..	A1	T3-3-8342/..	A2	T5B-3-8342/..	A4	T5-3-8342/..	A5	–	
8 pole	T0-4-8344/..	A1	T3-4-8344/..	A2	T5B-4-8344/..	A4	T5-4-8344/..	A5	–	
Main switch without auxiliary contacts										
3 pole with auxiliary contact 1N/O / 0N/C	T0-2-15679/..	A1	–		–		–		–	
3 pole with auxiliary contact 1N/O / 1N/C	–		–		–		–		P1-25/.../ HI11	A2
6 pole with auxiliary contact 1N/O / 1N/C	T0-4-15682/..	A1	T3-4-15682/..	A2	T5B-4-15682/..	A4	T5-4-15682/..	A5	–	
3 pole with auxiliary contact 1N/O / 1N/C	T0-3-15683/..	A1	T3-3-15683/..	A2	–		–		–	
3 pole + N with auxiliary contact 1N/O / 1N/C	T0-3-15680/..	A1	T3-3-15680/..	A2	–		–		P1-25/.../ N/HI11	C
3 pole + N with overlapping auxiliary contact 1N/O / 1N/C	T0-3-8901/..	A1	T3-3-8901/..	A2	T5B-3-8901/..	A4	T5-3-8901/..	A5	–	
On-off switch without auxiliary contacts										
1 pole	T0-1-8200/..	H1	T3-1-8200/..	I2	T5B-1-8200/..	K4	T5-1-8200/..	K5	–	
2 pole	T0-1-102/..	H1	T3-1-102/..	I2	T5B-1-102/..	K4	T5-1-102/..	K5	–	
3 pole	T0-2-1/..	H1	–		–		–		P1-25/..	H2
3 pole + N	T0-2-8900/..	H1	–		–		–		P1-25/.../ N	H2
6 pole	T0-3-8342/..	H1	T3-3-8342/..	I2	T5B-3-8342/..	K4	T5-3-8342/..	K5	–	
8 pole	T0-4-8344/..	H1	T3-4-8344/..	I2	T5B-4-8344/..	K4	T5-4-8344/..	K5	–	
On-off switch with auxiliary contacts										
3 pole with auxiliary contact 1N/O / 0N/C	T0-2-15679/..	H1	–		–		–		–	
3 pole with auxiliary contact 1N/O / 1N/C	–		–		–		–		P1-25/.../ HI11	H2
6 pole with auxiliary contact 1N/O / 1N/C	T0-4-15682/..	H1	T3-4-15682/..	I2	T5B-4-15682/..	K4	T5-4-15682/..	K5	–	
3 pole with auxiliary contact 2N/O / 1N/C	T0-3-15683/..	H1	T3-3-15683/..	I2	–		–		–	
3 pole + N with overlapping Auxiliary contacts 1N/O / 1N/C	T0-3-8901/..	H1	T3-3-8901/..	I2	–		–		–	
On-off switch with Emergency-Stop function										
1 pole	T0-1-8200/..	S1	T3-1-8200/..	U2	T5B-1-8200/..	U4	T5-1-8200/..	U5	–	
2 pole	T0-1-102/..	S1	T3-1-102/..	U2	T5B-1-102/..	U4	T5-1-102/..	U5	–	
3 pole	T0-2-1/..	S1	–		–		–		P1-25/..	S2
3 pole + N	T0-2-8900/..	S1	–		–		–		–	

Notes: [1] 95A max at T5-4-8344/I5...

disconnector up to 315 A

	P1-32 15 kW 32 A	Construction type group	**P3-63** 37 kW 63 A	Construction type group	**P3-100** 50 kW 100 A	Construction type group	**P5-125** 45 kW 125 A	Construction type group	**P5-160** 55 kW 160 A	Construction type group	**P5-250** 90 kW 250 A	Construction type group	**P5-315** 110 kW 315 A	Construction type group
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	P1-32/..	A2	P3-63/..	A4	P3-100/..	A5	P5-125/..	C	P5-160/..	C	P5-250/..	C	P5-315/..	C
	P1-32/../N	A2	P3-63/../N	A4	P3-100/../N	A5	P5-125/../N	C	P5-160/../N	C	P5-250/../N	C	P5-315/../N	C
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		P5-125/.../HI10	C	P5-160/.../HI10	C	P5-250/.../HI10	C	P5-315/.../HI10	C
	P1-32/.../HI11	A2	P3-63/.../HI11	A4	P3-100/.../HI11	A5	–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	P1-32/.../N/HI11	C	P3-63/.../N/HI11	A4	P3-100/.../N/HI11	A5	–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	P1-32/..	H2	P3-63/..	L4	P3-100/..	L5	P5-125/..	N	P5-160/..	N	P5-250/..	N	P5-315/..	N
	P1-32/.../N	H2	P3-63/.../N	L4	P3-100/.../N	L5	–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	P1-32/.../HI11	H2	P3-63/.../HI11	L4	P3-100/.../HI11	L5	–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
	–		–		–		–		–		–		–	
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	–		–		–		–		–		–		–	
	P1-32/..	S2	P3-63/..	S4	P3-100/..	S5	–		–		–		–	
	–		–		–		–		–		–		–	

Overview of the rotary switch and switch-disconnector

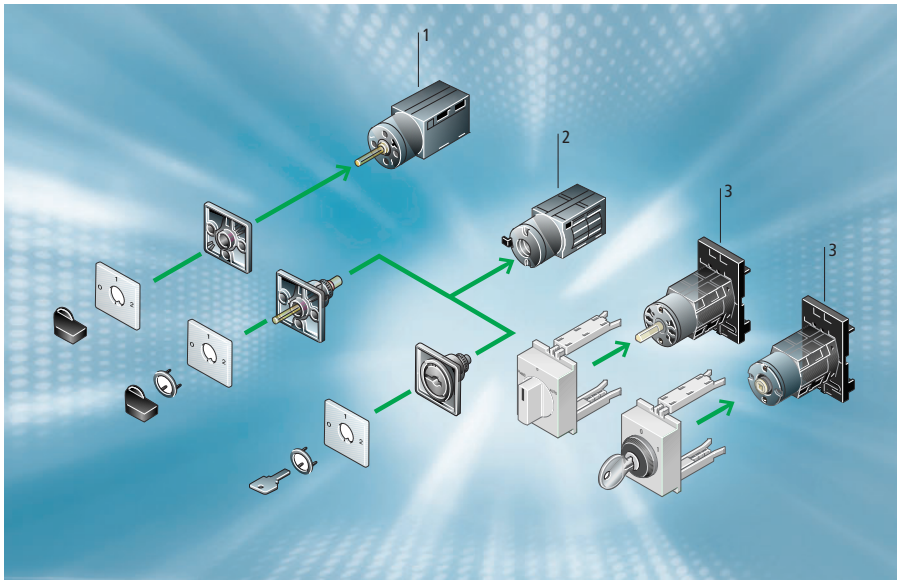
Basic switch type	**TM**	**T0**	Construction type group	**T3**	Construction type group	**T5B**	Construction type group
Max. rating to AC-23A, 400/415V, 50-60 Hz	3.0 kW	6.5 kW		13 kW		22 kW	
Max. rated uninterrupted current I_u	10 A	20 A		32 A		63 A	
Safety switch in surface mounting enclosure, with red handle and yellow locking collar, IP65							
3 pole	–	–		–		–	
6 pole	–					T5B-3-8342/I4-SI	–[1]
3 pole + N	–	–		–		–	
3 pole with auxiliary contact 1N/O / 0N/C	–	–		–		–	
6 pole with auxiliary contact 1N/O / 1N/C	–	–		–		T5B-4-15682/I4-SI	–[1]
6 pole with auxiliary contact 2N/O / 0N/C	–	–		–		T5B-4-8903/I4-SI	–[1]
Safety switch in surface mounting enclosure, with black handle and locking collar, IP65							
3 pole	–	–		–		–	
6 pole	–					T5B-3-8342/I4-SI-SW	–[1]
3 pole + N	–	–		–		–	
3 pole with auxiliary contact 1N/O / 0N/C	–	–		–		–	
6 pole with auxiliary contact 1N/O / 1N/C	–	–		–		T5B-4-15682/I4-SI-SW	–[1]
6 pole with auxiliary contact 2N/O / 0N/C	–	–		–		T5B-4-8903/I4-SI-SW	–[1]
Changeover contact with 0 position							
1 pole 1-0-2	–	T0-1-8210/..	H1	T3-1-8210/..	I2	T5B-1-8210/..	K4
2 pole 1-0-2	–	T0-2-8211/..	H1	T3-2-8211/..	I2	T5B-2-8211/..	K4
3 pole 1-0-2	–	T0-3-8212/..	H1	T3-3-8212/..	I2	T5B-3-8212/..	K4
3 pole 1-0-2, with an auxiliary contact per switch position	–	–		–		–	
4 pole 1-0-2	–	T0-4-8213/..	H1	T3-4-8213/..	I2	T5B-4-8213/..	K4
4 pole (one early make pole) 1-0-2	–	T0-4-8294/..	H1	T3-4-8294/..	I2	T5B-4-8294/..	K4
4 pole (one early make pole) MAINS-0-EMERGENCY CURRENT	–	–		T3-4-8902/..	I2	T5B-4-8902/..	K4
Changeover contact without 0 position							
1 pole 1-2	–	T0-1-8220/..	H1	T3-1-8200/..	I2	T5B-1-8200/..	K4
2 pole 1-2	–	T0-2-8221/..	H1	T3-2-8221/..	I2	T5B-2-8221/..	K4
3 pole 1-2	–	T0-3-8222/..	H1	T3-3-8222/..	I2	T5B-3-8222/..	K4
4 pole 1-2	–	T0-4-8223/..	H1	T3-4-8223/..	I2	T5B-4-8223/..	K4
5 pole 1-2	–	T0-5-8369/..	O	T3-5-8369/..	I2	T5B-5-8369/..	W
6 pole 1-2	–	T0-6-8370/..	O	T3-6-8370/..	P	T5B-6-8370/..	W
8 pole 1-2	–	T0-8-8372/..	O	T3-8-8372/..	P	T5B-8-8372/..	W
Reversing switch							
2 pole 1-0-2	–	T0-2-8400/..	H1	T3-2-8400/..	I2	T5B-2-8400/..	K4
3 pole 1-0-2	–	T0-2-8401/..	H1	T3-2-8401/..	I2	T5B-2-8401/..	K4
Star-delta switch							
3 pole 0-Y-	–	T0-4-8410/..	H1	T3-4-8410/..	I2	T5B-4-8410/..	K4
Reversing-star-delta switch							
3 pole -Y-0-Y-	–	T0-5-15876/..	O	T3-5-15876/..	I2	T5B-5-15876/..	N
multispeed switch, 3 poles, 2 speeds,							
2 seperate windings 0-1-2	–	T0-3-8451/..	H1	T3-3-8451/..	I2	T5B-3-8451/..	K4
Pole changing 0-1-2	–	T0-4-8440/..	H1	T3-4-8440/..	I2	T5B-4-8440/..	K4
Pole changing 1-0-2	–	T0-4-8441/..	H1	T3-4-8441/..	I2	T5B-4-8441/..	K4
Reversing-pole changing, 3 poles, 2 speeds, 2 directions,							
Pole changing 2-1-0-1-2	–	T0-6-15866/..	O	T3-6-15866/..	P	T5B-6-15866/..	N
Surface mounting switch according to ATEX directive 94/9 EC							
For use in ex-zone 22	–	●[2]		●[2]		●[2]	
Customized special switch	●	●		●		●	

Notes:
[1] The listed switch designations without construction type designation (A-Z) are completed types
[2] The basic types are available for ATEX application in dependence on the number of units or the switch type
[3] 95 A max at T5-4-8344/I5...

up to 100 A

	T5	Construction type group	P1-25	Construction type group	P1-32	Construction type group	P3-63	Construction type group	P3-100	Construction type group
	30 kW		13 kW		15 kW		37 kW		50 kW	
	100 A [3]		25 A		32 A		63 A		100 A	
	–		P1-25/I2-SI	–[1]	P1-32/I2-SI	–[1]	P3-63/I4-SI	–[1]	P3-100/I5-SI	–[1]
	T5-3-8342/I5-SI	–[1]								
	–		P1-25/I2-SI/N	–[1]	P1-32/I2-SI/N	–[1]	P3-63/I4-SI/N-	–[1]	P3-100/I5-SI/N	–[1]
	–		P1-25/I2-SI/HI11	–[1]	P1-32/I2-SI/HI11	–[1]	P3-63/I4-SI/HI11	–[1]	P3-100/I5-SI/HI11	–[1]
	T5-4-15682/I5-SI	–[1]	–		–		–		–	
	T5-4-8903/I5-SI	–[1]	–		–		–		–	
	–		P1-25/I2-SI-SW	–[1]	P1-32/I2-SI-SW	–[1]	P3-63/I4-SI-SW	–[1]	P3-100/I5-SI-SW	–[1]
	T5-3-8342/I5-SI-SW	–[1]								
	–		P1-25/I2-SI/N-SW	–[1]	P1-32/I2-SI/N-SW	–[1]	P3-63/I4-SI/N--SW	–[1]	P3-100/I5-SI/N-SW	–[1]
	–		P1-25/I2-SI/HI11-SW	–[1]	P1-32/I2-SI/HI11-SW	–[1]	P3-63/I4-SI/HI11-SW	–[1]	P3-100/I5-SI/HI11-SW	–[1]
	T5-4-15682/I5-SI-SW	–[1]	–		–		–		–	
	T5-4-8903/I5-SI-SW	–[1]	–		–		–		–	
	T5-1-8210/..	K5	–		–		–		–	
	T5-2-8211/..	K5	–		–		–		–	
	T5-3-8212/..	K5	–		–		–		–	
	–		–		–		–		–	
	T5-4-8213/..	K5	–		–		–		–	
	T5-4-8294/..	K5	–		–		–		–	
	T5-4-8902/..	K5	–		–		–		–	
	T5-1-8200/..	K5	–		–		–		–	
	T5-2-8221/..	K5	–		–		–		–	
	T5-3-8222/..	K5	–		–		–		–	
	T5-4-8223/..	K5	–		–		–		–	
	T5-5-8369/..	W	–		–		–		–	
	T5-6-8370/..	W	–		–		–		–	
	T5-8-8372/..	W	–		–		–		–	
	–		–		–		–		–	
	–		–		–		–		–	
	–		–		–		–		–	
	–		–		–		–		–	
	T5-3-8451/..	N	–		–		–		–	
	T5-4-8440/..	N	–		–		–		–	
	T5-4-8441/..	N	–		–		–		–	
	–		–		–		–		–	
	●[2]		●[2]		●[2]		●[2]		●[2]	
	●		–		–		–		–	

Switching and control in practice

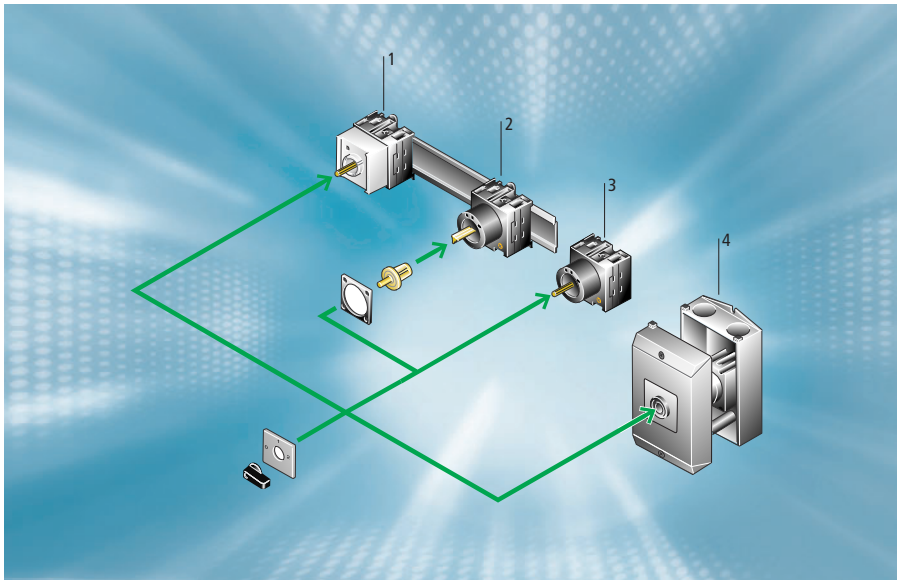


Control switch TM

1. flush mounting

2. centre mounting

3. service distribution board mounting



Control switch TO

1. service distribution board mounting

2. rear mounting

3. flush mounting/centre mounting

4. top mounting

Auxiliary current control switch

Rotary switches T and TM for auxiliary current circuits simplify command functions at central points. This saves time and introduces clarity to the production process. Coding switches, step switches, sequence and manual/automatic switches are frequent applications for the auxiliary current control switch. Particularly suitable are rotary switches T0 and mini rotary switches TM; they also feature space-saving installation. Rotary switches are suitable for switching electronic circuits conform to IEC/EN 61131-2, VDE 0411 part 500. The T0 can master a whole range of switching applications with up to 22 contacts and 12 switch positions. Rotary switches T0 with their large surfaces can also be operated when the operator is wearing gloves. The TM is ideal because of its small size and fits nicely with the command and signalling range RMQ. All contacts feature double breaking contacts.

Overview of rotary switches up to 20 A

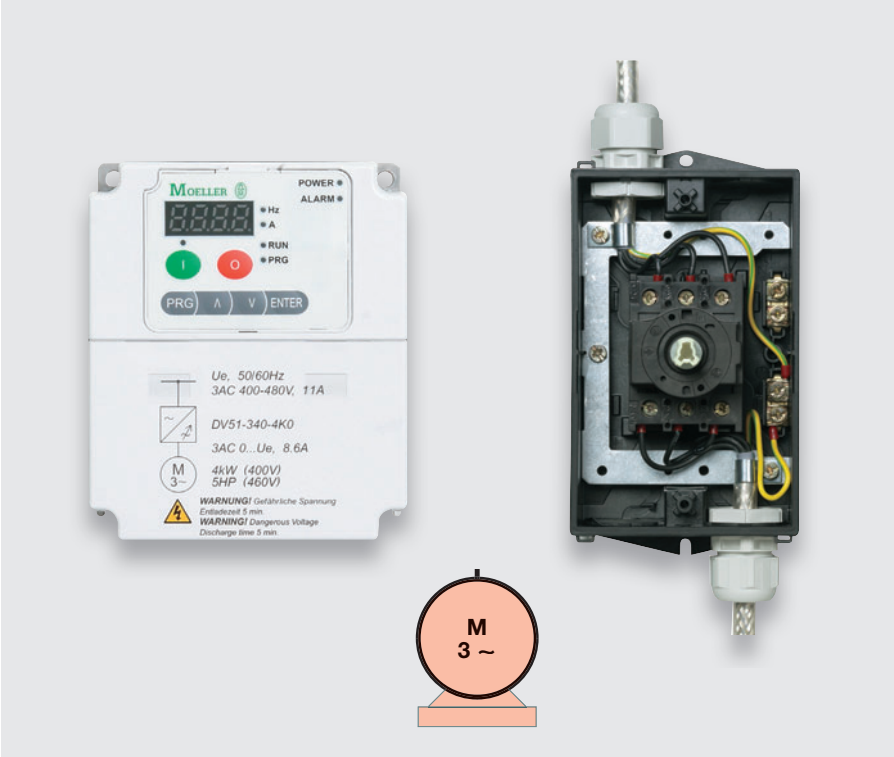
Basic switch type	TM	T0	Construction typ group
Max. rated uninter-rupted current I_u	10 A	20 A	
Step switch with 0 position			
1 pole 2 step; 0-1-2	TM-1-8240/..		W
1 pole 3 step; 0-1-2-3	TM-2-8241/..		W
1 pole 4 step; 0-1-2-3-4	TM-2-8242/..		W
1 pole 5 step; 0-1-2-3-4-5	TM-3-8243/..		W
1 pole 6 step; 0-1-2-3-4-5-6	TM-3-8244/..		W
1 pole 6 step; 0-1- bis-9	TM-3-8247/..		W
2 pole 2 step; 0-1-2	TM-2-8260/..		W
2 pole 3 step; 0-1-2-3	TM-3-8261/..		W
2 pole 4 step; 0-1-2-4	TM-4-8262/..		W
3 pole 2 step; 0-1-2	TM-3-8280/..		W
3 pole 3 step; 0-1-2-3	TM-5-8281/..		W
3 pole 4 step; 0-1-2-3-4	TM-6-8282/..		W
1 pole 2 step; 0-1-2		T0-1-8240/..	H1
1 pole 3 step; 0-1-2-3		T0-2-8241/..	H1
1 pole 4 step; 0-1-2-3-4		T0-2-8242/..	H1
1 pole 5 step; 0-1-2-3-4-5		T0-3-8243/..	H1
1 pole 6 step; 0-1-2-3-4-5-6		T0-3-8244/..	H1
3 pole 2 step; 0-1-2		T0-3-8280/..	H1
3 pole 3 step; 0-1-2-3		T0-5-8281/..	O
3 pole 4 step; 0-1-2-3-4		T0-6-8282/..	O
Step switch without 0 position			
1 pole 3 step; 1-2-3	TM-2-8230/..		X
1 pole 4 step; 1-2-3-4	TM-2-8231/..		X
1 pole 5 step; 1-2-3-4-5	TM-3-8232/..		W
1 pole 6 step; 1-2-3-4-5-6	TM-3-8233/..		W
1 pole 10 step; 1-2-bis -10	TM-5-8237/..		W
2 pole 5 step; 1-2-3-4-5	TM-5-8252/..		W
2 pole 6 step; 1-2-3-4-5-6	TM-5-8253/..		W
3 pole 3 step; 1-2-3	TM-5-8270/..		W
3 pole 4 step; 1-2-3-4	TM-6-8271/..		W
1 pole 2 step; 1-2		T0-1-8220/..	H1
1 pole 3 step; 1-2-3		T0-2-8230/..	H1
1 pole 4 step; 1-2-3-4		T0-2-8231/..	H1
1 pole 5 step; 1-2-3-4-5		T0-3-8232/..	H1
1 pole 6 step; 1-2-3-4-5-6		T0-3-8233/..	H1
2 pole 4 step; 1-2-3-4		T0-2-8251/..	H1
3 pole 2 step; 1-2		T0-3-8222/..	H1
3 pole 3 step; 1-2-3		T0-5-8270/..	O
3 pole 4 step; 1-2-3-4		T0-6-8271/..	O

Basic switch type	TM	T0	Construction typ group
Max. rated uninter-rupted current I_u	10 A	20 A	
On-off switch			
1 pole; 0-1	TM-1-8290/..		X
2 pole; 0-1	TM-1-8291/..		X
3 pole; 0-1	TM-2-8292/..		X
3 pole + N; 0-1	TM-2-8293/..		X
6 pole; 0-1	TM-3-8326/..		W
1 pole; 0-1		T0-1-15401/..	H1
2 pole; 0-1		T0-1-15402/..	H1
3 pole; 0-1		T0-2-15403/..	H1
3 pole + N; 0-1		T0-2-15404/..	H1
Selector switch with 0 position			
1 pole; 1-0-2	TM-1-8210/..		X
2 pole; 1-0-2	TM-2-8211/..		X
3 pole; 2-0-1	TM-3-8212/..		W
4 pole; 2-0-1	TM-4-8213/..		W
1 pole; 2-0-1		T0-1-15421/..	H1
2 pole; 2-0-1		T0-2-15422/..	H1
3 pole; 2-0-1		T0-3-15423/..	H1
Selector switch via 0 position			
1 pole; 1-2	TM-1-8220/..		X
2 pole; 1-2	TM-2-8221/..		X
3 pole; 1-2	TM-3-8222/..		W
4 pole; 1-2	TM-4-8223/..		W
5 pole; 1-2	TM-5-8369/..		W
6 pole; 1-2	TM-6-8370/..		W
Manual/automatic switch with 0 position			
1 pole; manual-0-auto	TM-1-15431/..		X
2 pole; manual-0-auto	TM-2-15432/..		X
3 pole; manual-0-auto	TM-3-15433/..		W
1 pole; manual-0-auto		T0-1-15431/..	H1
2 pole; manual-0-auto		T0-2-15432/..	H1
3 pole; manual-0-auto		T0-3-15433/..	H1
without 0 position			
1 pole; manual-auto		T0-1-15451/..	H1
2 pole; manual-auto		T0-2-15452/..	H1
3 pole; manual-auto		T0-3-15453/..	H1
with button function for manual			
1 pole; manual->0-auto		T0-1-15434/..	H1
2 pole; manual->0-auto		T0-2-15435/..	H1
1 pole; auto-0-manual<-start		T0-2-15907/..	H1

Basic switch type	TM	T0	Construction typ group
Max. rated uninter-rupted current I_u	10 A	20 A	
Measurement selector switch voltage			
3x phase-phase with 0 position		T0-2-15920/..	H1
3x phase-phase without 0 position		T0-2-15922/..	H1
3x phase-N with 0 position		T0-2-15921/..	H1
3x phase-phase and 3x phase-N with 0 position		T0-3-8007/..	H1
3x phase-phase and 3x phase-N without 0 position, complete rotation advance/retract		T0-3-15924/..	H1
Current selector switch			
0-L1-L2-L3, complete rotation advance/retract		T0-3-8048/..	H1
Measurement selector switch voltage and current			
1-0-2-0, complete rotation advance/retract, measurement viatransducer		T0-3-8030/..	H1
Control circuit isolater 90°			
1 pole, 0-1, red handle yellow locking collar	TM-1-8290/ E/SVB		—[1]
1 pole, 0-1, black rotary handle/locking collar	TM-1-8290/ E/SVB-SW		—[1]
2 pole, 0-1, red handle yellow locking collar	TM-1-8291/ E/SVB		—[1]
2 pole, 0-1, black rotary handle/locking collar	TM-1-8291/ E/SVB-SW		—[1]
3 pole, 0-1, red rotary handle yellow locking collar	TM-2-8292/ E/SVB		—[1]
3 pole, 0-1, black rotary handle/locking collar	TM-2-8292/ E/SVB-SW		—[1]
3 pole + N, 0-1, red rotary handle yellow locking collar	TM-2-8293/ E/SVB		—[1]
3 pole + N, 0-1, black rotary handle/locking collar	TM-2-8293/ E/SVB-SW		—[1]
6 pole, 0-1, red rotary handle yellow locking collar	TM-3-8326/ E/SVB		—[1]
6 pole, 0-1, black rotary handle/locking collar	TM-3-8326/ E/SVB-SW		—[1]

Notes: [1] The listed switch designations without constructions type designation (A-Z) are completed types

Practical Installation



Screening connection to the switch enclosure!

The actuation of three-phase motors is implemented more and more frequently via frequency inverters. The motor cable is screened in order to comply with the EMC guidelines. We can provide a mounting plate screen for simple and interruption free application of the screen with a maintenance and manual override switch.

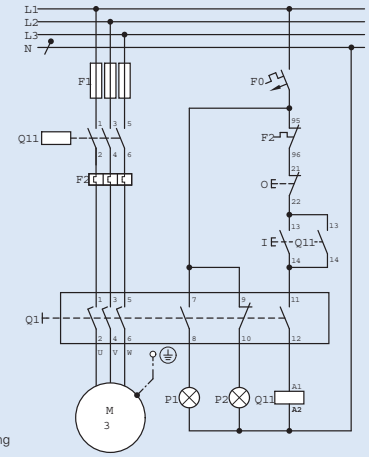
MBS-I2 for CI-K2
MBS-I4 for CI-K4

CI-K the clever enclosure

The enclosure CI-K has a unique combination: plastic insulated housing with flexible push-through diaphragm for main and control cables. Enclosure sizes I1 and I2 provide faster connection from above, below or from the rear. The sizes I3 to I5 provide the push-through diaphragm for the control cables.

Safety switch with load shedding and signalling

The safety switches P and T are functionally designed as maintenance and manual override switches. Safe isolation of a load from the mains is the primary function. The switch can be loaded with rated uninterrupted current I_u due to the load shedding circuit. The switch switches without a load! The additional signalling contacts can be used for indicating the switch position. The respective processing and use in the application program of the system enhances safety.



P1 = on
P2 = off
Q11 = load shedding

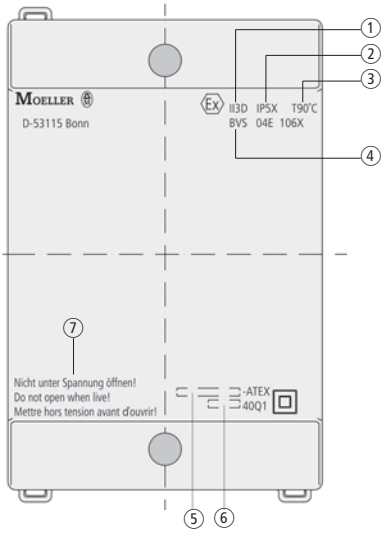
ATEX

Rotary switch T and Switch-disconnector P with ATEX approval

The surface mounting switches in the Product Overview and our main catalogue and the basic types mentioned can be ordered with the approval to ATEX guideline 94/9 EC.
The listed circuits are complemented by special circuits.

ATEX rotary switches T
- **T0-.../I1** up to 20 A
- **T3-.../I2** up to 32 A
- **T5B-.../I4** up to 63 A
- **T5-.../I5** up to 100 A

ATEX switch-disconnector P
- **P1-25/I2** up to 25 A
- **P1-32/I2** up to 32 A
- **P3-63/I4** up to 63 A
- **P3-100/I5** up to 100 A



1. categories
2. degree of protection
3. temperature class
4. test numbers
5. type
6. production code
7. warning text

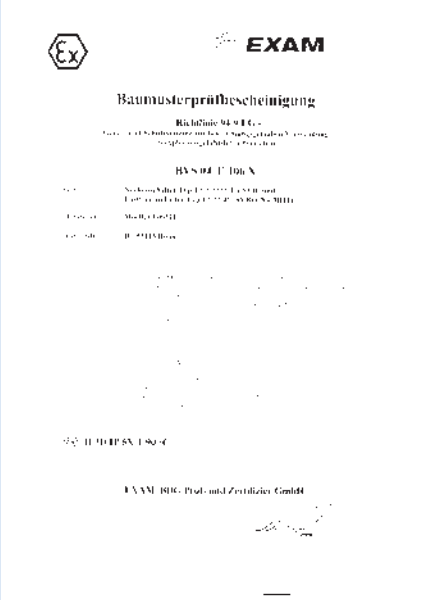
The marking of the housing is conform to the ATEX guideline 94/9 EC.

www.moeller.net/atex

ATEX = **At**mospheres **Ex**plosibles = explosive atmospheres

Eaton Moeller now offers the following in conformity with the manufacturers guidelines: ATEX guideline 94/9 EC (mandatory from 06/2003) rotary switches T from 20 A to 100 A and switch-disconnectors P from 25 A to 100 A. The switches are approved for device group II, with area of application "all except mining" as well as for category 3. The approval has the test number BVS 04 E 106 X. The devices are marked with equipment designation EX II3D IP5X T90°C. According to the guideline for operators: ATEX guideline 1999/92/EC (mandatory from 06/2006) all the approved rotary switches and switch-disconnectors with test number BVS 04 E 106 X can be used in dust areas, zone 22, category 3.

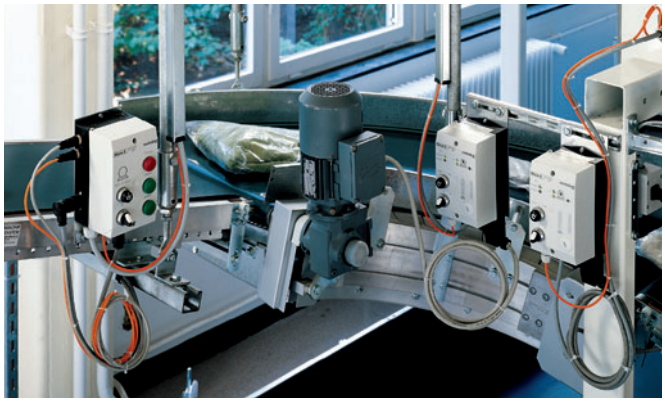
The rotary switches and switch-disconnectors in surface mounting enclosures with the ATEX approval are used in dust hazard areas, for example in mills, metal grinding plants, wood processing and wood process areas, cement factories, the aluminium industry, the foodstuffs industry, grain storage and processing facilities, agriculture, pharmaceutical industry, etc.


EXAM
Baumusterprüfbescheinigung

Approval certificate for use of the Eaton Moeller rotary switch T and switch-disconnector P in surface mounting enclosure conform to ATEX guideline 94/9 EC.

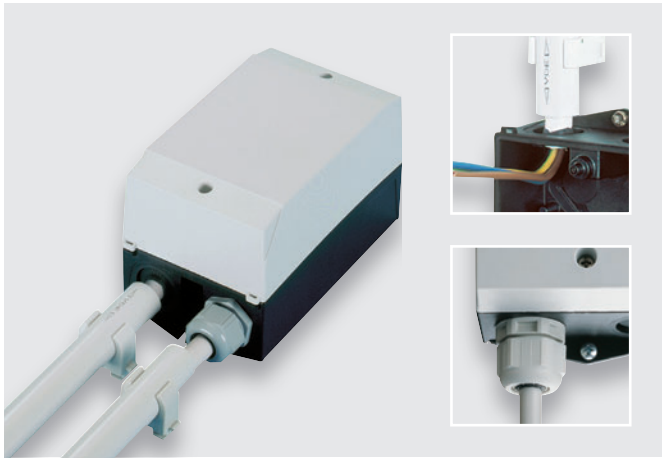
Reliable Protection, Simple Wiring Using the Enclosure System CI-K

The most important function of enclosures is the protection of devices. This means that protection from environmental influences such as dust, humidity, impact and chemicals, as well as protection of the operator by total insulation are the central priorities. We went beyond this. The new small enclosures CI-K significantly reduce your installation costs, and you have the option of having the enclosure covers tailored to your application.



Small enclosures CI-K: Reliable protection for distributed switching and automation devices at any site.

Small enclosures CI-K are the flexible housings for virtually any switching and automation devices on systems and machinery at practically any point of application. The enclosures offer flexibility for installation of all kinds of devices, whether fitted on to top-hat rail, on mounting plates or into the front. They offer reliable protection for rotary switches, control circuit devices, miniature circuit-breakers, frequency inverters, motor-starters or control relays, to mention just a few examples. The versatility of these enclosures is due to their high degree of protection IP 65, as well as material properties such as high mechanical and chemical stability.
Small enclosures CI-K are being used all over, in logistics centres, in the chemical industry, in shopping centres, in airports, ……

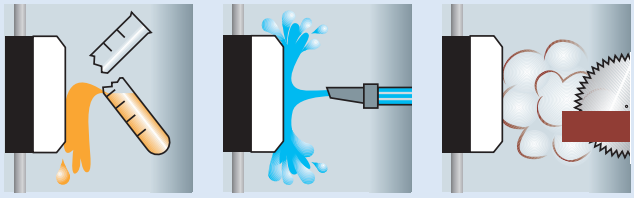


Wiring without cable glands

Use of the new enclosures CI-K1 and CI-K2 is a favourable option because of the flexible push-through cable-entry diaphragms. Here, the cable is simply pushed directly through the elastic diaphragm without the need for tools. The high-quality material tightly grips the cable with degree of protection IP 65. Thus you always have the choice between metric cable glands and the diaphragm.

Customizing CI-K

Small enclosures CI-K enable individual customer requirements to be taken care of. Any text you want to have applied can be directly laser inscribed on to the enclosure, saving you the expense for additional designation labels. Furthermore, the installation apertures for volume applications can be customized for you on request.



Quality that meets the most stringent requirements
Glass-fibre reinforced polycarbonate guarantees mechanical stability and excellent chemical resistance. The high degree of enclosure protection, IP 65, ensures optimum protection for the switchgear. Total insulation provides the best possible operator protection, and the sealing glands enable unauthorized opening of the enclosures to be prevented.

Small Enclosure CI-K

Enclosure size	Enclosure dimensions			Mounting systems		Enclosure base
	Width mm	Height mm	Depth mm	Mounting plate/ Mounting depth mm	Carrier rail/ Mounting depth mm	Soft cable-entry diaphragm/ Total number X size; Max. cable size
CI-K1	80 80 80	120 120 120	95 95 95	– – –	• /72 • /72 • /72	• /4 x M20;12mm – –
CI-K2	100 100 100 100 100 100	160 160 160 160 160 160	100 100 145 145 80 80	• /79 – • /79 – – –	– • /73 – • /73 • /46 • /70	• /4 x M25;16mm; • /4 x M25;16mm; • /4 x M25;16mm; • /4 x M25;16mm; • /4 x M25;16mm; • /4 x M25;16mm;
CI-K2H	100 100 100 100 100 100	160 160 160 160 160 160	100 100 145 145 80 80	• /79 – • /79 – – –	– • /73 – • /73 • /46 • /70	– – – – – –
CI-K2X	100 100 100 100	160 160 160 160	100 100 145 145	• /79 – • /79 –	– • /73 – • /73	– – – –
CI-K3	120 120 120 120	200 200 200 200	125 125 160 160	• /98 – • /133 –	– • /93 – • /128	– – – –
CI-K3X	120 120 120 120	200 200 200 200	125 125 160 160	• /98 – • /133 –	– • /93 – • /128	– – – –
CI-K4	160 160 160 160	240 240 240 240	125 125 160 160	• /98 – • /133 –	– • /93 – • /128	– – – –
CI-K4X	160 160 160 160	240 240 240 240	125 125 160 160	• /98 – • /133 –	– • /93 – • /128	– – – –
CI-K5	200 200 200 200	280 280 280 280	125 125 160 160	• /98 – • /133 –	– • /93 – • /128	– – – –
CI-K5X	200 200 200 200	280 280 280 280	125 125 160 160	• /98 – • /133 –	– • /93 – • /128	– – – –
CI-B CI-C CI-D	87 110 110	149 165 222	128 128 128	• /110 • /110 • /110	– – –	– – –

		Cover version				Part no.	Cover	
Hard cable-entry knockouts Total number x Size;	NA version	Non-transpa-rent	Transpa-rent	Cap aperture dimen-sion	Hinged lid		Customized laser inscription	Customized cutout service
							To order via CI-K-Combination-*	
–	–	•	–	–	–	**CI-K1-95-TS**	•	•
• /4 x M20	–	•	–	–	–	**CI-K1H-95-TS**	•	•
–	A	•	–	–	–	**CI-K1H-95-TS-NA**	–	–
–	–	•	–	–	–	**CI-K2-100-M**	•	•
–	–	•	–	–	–	**CI-K2-100-TS**	•	•
–	–	•	–	–	–	**CI-K2-160-M**	•	•
–	–	•	–	–	–	**CI-K2-160-TS**	•	•
–	–	•	–	•	–	**CI-K2-80-A**	•	–
–	–	•	–	–	•	**CI-K2-80-K**	•	–
• /4 x M25/20	–	•	–	–	–	**CI-K2H-100-M**	•	•
• /4 x M25/20	–	•	–	–	–	**CI-K2H-100-TS**	•	•
• /4 x M25/20	–	•	–	–	–	**CI-K2H-160-M**	•	•
• /4 x M25/20	–	•	–	–	–	**CI-K2H-160-TS**	•	•
• /4 x M25/20	–	•	–	•	–	**CI-K2H-80-A**	•	–
• /4 x M25/20	–	•	–	–	•	**CI-K2H-80-K**	•	–
–	A	•	–	–	–	**CI-K2X-100-M-NA**	–	–
–	A	•	–	–	–	**CI-K2X-100-TS-NA**	–	–
–	A	•	–	–	–	**CI-K2X-160-M-NA**	–	–
–	A	•	–	–	–	**CI-K2X-160-TS-NA**	–	–
• /4 x M25/20;1 x M20	–	•	–	–	–	**CI-K3-125-M**	•	•
• /4 x M25/20;1 x M20	–	•	–	–	–	**CI-K3-125-TS**	•	•
• /4 x M25/20;1 x M20	–	•	–	–	–	**CI-K3-160-M**	•	•
• /4 x M25/20;1 x M20	–	•	–	–	–	**CI-K3-160-TS**	•	•
–	K	•	–	–	–	**CI-K3X-125-M-NA**	–	–
–	K	•	–	–	–	**CI-K3X-125-TS-NA**	–	–
–	K	•	–	–	–	**CI-K3X-160-M-NA**	–	–
–	K	•	–	–	–	**CI-K3X-160-TS-NA**	–	–
• /4 x M32/25;2 x M20	–	•	–	–	–	**CI-K4-125-M**	•	•
• /4 x M32/25;2 x M20	–	•	–	–	–	**CI-K4-125-TS**	•	•
• /4 x M32/25;2 x M20	–	•	–	–	–	**CI-K4-160-M**	•	•
• /4 x M32/25;2 x M20	–	•	–	–	–	**CI-K4-160-TS**	•	•
–	K	•	–	–	–	**CI-K4X-125-M-NA**	–	–
–	K	•	–	–	–	**CI-K4X-125-TS-NA**	–	–
–	K	•	–	–	–	**CI-K4X-160-M-NA**	–	–
–	K	•	–	–	–	**CI-K4X-160-TS-NA**	–	–
• /4 x M50/40/25;2 x M20	–	•	–	–	–	**CI-K5-125-M**	•	•
• /4 x M50/40/25;2 x M20	–	•	–	–	–	**CI-K5-125-TS**	•	•
• /4 x M50/40/25;2 x M20	–	•	–	–	–	**CI-K5-160-M**	•	•
• /4 x M50/40/25;2 x M20	–	•	–	–	–	**CI-K5-160-TS**	•	•
–	K	•	–	–	–	**CI-K5X-125-M-NA**	–	–
–	K	•	–	–	–	**CI-K5X-125-TS-NA**	–	–
–	K	•	–	–	–	**CI-K5X-160-M-NA**	–	–
–	K	•	–	–	–	**CI-K5X-160-TS-NA**	–	–
• /4 x M20	–	–	•	–	–	**CI-B**	–	–
• /4 x M20	–	–	•	–	–	**CI-C**	–	–
• /4 x M20	–	–	•	–	–	**CI-D**	–	–

A = • /4 x 1/2 inch knockout apertures K = smooth all-round with lathe centre UL File No E54120

Exactly on time and economic switching – timing relays ETR and DIL ET

Tailor-made for every application; all components feature the benefits of a series well thought-out right down to the finest detail. The timing relays DIL ET have been matched to the construction design of the contactors DIL E; the ETR4 variant has been optimised for the measurement and monitoring relay as well as the safety relay; the timing relays ETR2 are optimised for use in service distribution boards (space unit 17.5 mm). Thus, the space in the control panel can be optimally used and the system is provided with a common design appearance.

All devices are devices for world markets to IEC/EN 60947 with UL/CSA approval. Many relays feature multi-voltage coils. This simplifies stock keeping and enhances the flexibility when reacting to customer requirements. Depending on the application, it is possible to choose between single-function and multi-function relays.

Timing controlled processes can be found in all parts of automated manufacturing: from the bottling plant to the conveyor belt.

Exactly timed operation is a prerequisite for safety and effectiveness with all automated sequences regardless of if they are at the airport, in manufacturing or in buildings.

Escalators, elevators and doors also require exactly timed switching in buildings.

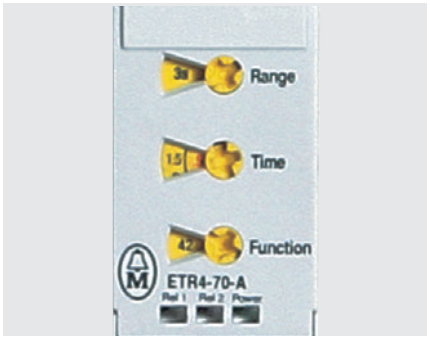
Generous time range

Response delay is one of the most important time-dependent functions. Timing relays meet this requirement with a wide choice of time ranges. Signals can be briefly extended or extremely long processes can be catered for, with accuracy, thanks to the relay's multiple time ranges from 0.05 seconds to 100 hours. In order to set this up, you first select one the ten time ranges (Range). Then you fine-tune this setting on the Time dial, where the setting is in "real time", allowing it to be read directly on the scale.

Remote time setting

A remote potentiometer can be connected to connection Z1/Z2 on the ETR4-70/DILET70. The time can be externally set with the remote potentiometer. If timing relays are installed in the enclosure or in control panels, the time setting can be undertaken when the door is closed.

Information concerning the new electronic timer modules can be found in the section on contactors and relays.



Signalling, no problem

The opto-isolated input B1 allows actuation of the timing relay ETR4 from any point in the circuit. This saves one actuating contact and the additional signal wiring. It is possible to actuate the signal input even via voltages other than the control voltage. For example, the ETR4 may be supplied at 230 V 50 Hz, while signal input actuation is via 24 V DC.

The red LEDs indicate the switching status of the timing relay. The green LED lights up when power is applied, and flashes when the set time is running.

Timing relays – all functions at a glance

	DILET11-30-A	DILET11-30-W	DILET11-M-A	DILET70-M-W	DILET70-A	DILET70-W	ETR4-11-A	ETR4-11-W	ETR4-69-A	ETR4-69-W	ETR4-70-A	ETR4-51-A
Time range												
1.5 – 30 s	•	•										
3 – 60 s												•
0.05 s – 60 h			•	•	•	•						
0.05 s – 100 h							•	•	•	•	•	
Functions												
On-delayed (11)	•	•	•	•	•	•	•	•	•	•	•	
Off-delayed (12)				•	•				•	•	•	
On and off delayed (16)				•	•				•	•	•	
Fleeting contact on energization (21)				•	•				•	•	•	
Fleeting contact on de-energization (22)				•	•				•	•	•	
Flashing, pulse generating (42)				•	•				•	•	•	
Flashing, pause initiating (43)												
Flashing two speeds, pulse generating or initiating (44)												
Star-delta (51)												•
Pulse generating (81)				•	•				•	•	•	
Pulse shaping (82)				•	•				•	•	•	
On-Off function				•	•				•	•	•	
Features												
Width												
45 mm	•	•	•	•	•	•						
22.5 mm							•	•	•	•	•	•
17.5 mm (modular installation device)												
50 ms changeover pause												•
Multi-voltage coil	•	•	•	•	•	•	•	•	•	•	•	•
Connection for remote potentiometer				•	•						•	
LED function display	•	•	•	•	•	•	•	•	•	•	•	•
Potential-free control contact				•	•							
Operation												
Time range preselect		•	•	•	•	•	•	•	•	•	•	
7 time ranges												
10 time ranges	•	•	•	•	•	•	•	•	•	•	•	•
Time fine setting	•	•	•	•	•	•	•	•	•	•	•	•
Function selector				•	•				•	•	•	•
Control voltage												
24 – 48 V DC												
24 – 240 V DC	•		•		•		•		•		•	•
24 – 240 V AC 50/60Hz	•		•		•		•		•		•	•
400 V AC 50/60Hz		•		•		•		•		•		
Contacts												
1 changeover contact	•	•	•	•	•	•	•	•	•	•	•	•
2 changeover contact												
Convertible 1 time, 1 non-delayed contact or 2 timed contacts											•	
Accessories												
Remote potentiometer					•	•					•	



	ETR4-51-W	ETR2-11	ETR2-12	ETR2-21	ETR2-42	ETR2-44	ETR2-69	ETR2-11-D	ETR2-12-D	ETR2-69-D
	•									
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								•	•	•

Seven time ranges ETR2

0.05 – 1.00 s	5 – 100 min
0.50 – 10.0 s	0.5 – 10 h
5.00 – 100 s	5 – 100 h
0.50 – 10 min	

Ten time ranges ETR4

0.05 – 1.00 s	15.0 – 300 s
0.15 – 3.00 s	1.50 – 30.0 min
0.50 – 10.0 s	15.0 – 300 min
1.50 – 30.0 s	1.50 – 30.0 h
5.00 – 100 s	5.0 – 100 h

Ten time ranges DILET-11, -70

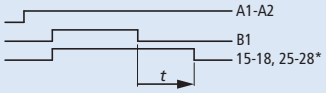
0.05 – 1.00 s
0.15 – 3.00 s
0.5 – 10.0 s
3.00 – 60.0s
0.15 – 3 min
0.5 – 10 min
3 – 60 min
0.15 – 3.0 h
0.5 – 10 h
3 – 60 h

12 functions

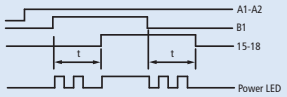
* 25-28 only for ETR2…-D

11 On-delayed

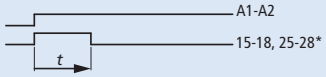
12 Off-delayed



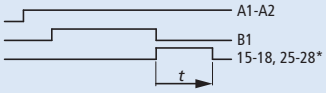
16 On- and Off-delayed



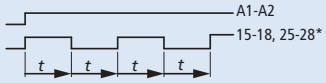
21 Fleeting contact on energization



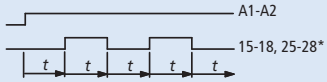
22 Fleeting contact on de-energization



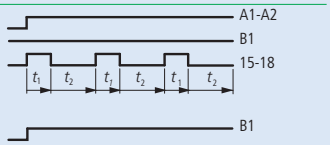
42 Flashing pulse initiating



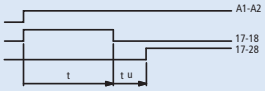
43 Flashing, pause initiating



44 Flashing, 2 speeds

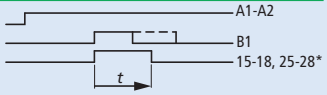


51 Star-delta

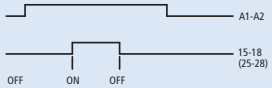


81 Pulse generating

82 Pulse shaping



On-Off function



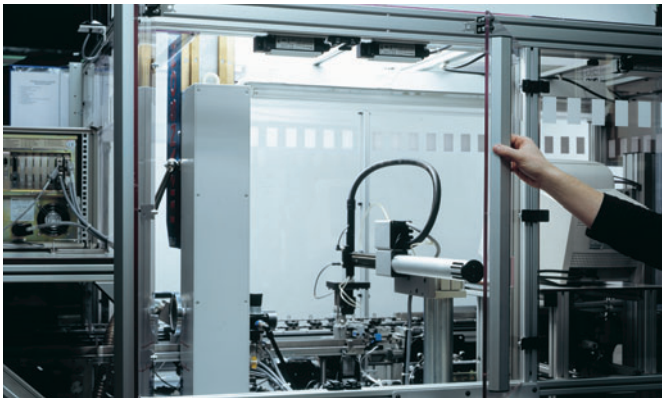
Safety guaranteed – safety relays ESR

The EC machinery directive 2006/42/EC demands that there is no danger posed by machines for people, machines and the environment. Monitoring and processing of safety-oriented functions such as standstill in an emergency, monitoring of safety doors / protective covers, protection of hazardous areas with light curtains / optical sensors, safe operation with two-hand switches etc., are the basis for functional safety. Eaton Moeller offers a whole range of safety components (SRP / CS) with Safety Technology to suit the field of application and the required level of protection.

The new ESR5 product family safety relays are characterised by the handling simplicity, space-saving design as well as the highest levels of reliability on machines and systems. With the ESR5 device series, applications for the highest safety demands compliant to EN ISO 13849-1 up to PL e, to IEC 62061 up to SIL CL 3, and to IEC 61508 up to SIL 3 are implemented.

Stop in an emergency

Standstill in an emergency is absolutely essential for protection of persons and machines. According to the IEC 60204 an adequate number of EMERGENCY-STOP buttons must be installed on the machine and system for signalling purposes. Eaton Moeller offers a range of buttons for these applications, e.g. from the RMQ-Titan range as well as foot and palm switches FAK. The buttons are positively opening and tamper-proof.



Monitoring mobile protective mechanisms

Safety of persons in manufacturing plants has the highest priority. Opening of protective doors and hinged flaps can be monitored by the installation of safety switches. Eaton Moeller offers the ideal position switch for this purpose. They are also tamper-proof and positively opening. Safety position switches with mechanical securing action can be used for coasting and dangerous movements. Opening of doors is deliberately enabled, for example, at the end of a movement.

Safely monitored Emergency-Stop circuits

The electronic safety relays ESR from Eaton Moeller switch several enable paths for immediate or time-delayed disconnection of the energy supply as soon as the EMERGENCY-STOP button is pressed. Depending on the configuration, they detect faults such as cross-shorts, short-circuits, open circuits and bridging in safety circuitry. After successful elimination of the dangers / faults, the ESR safety relays are acknowledged and the enable paths are re-enabled. The safety relays comply with the demands of the valid standards in terms of type and circuitry such as:

- EN 954-1; category B up to 4
- EN ISO 13849-1; PL a to e
- IEC 62061, SIL CL 1 to 3.

Monitoring mobile protective mechanisms

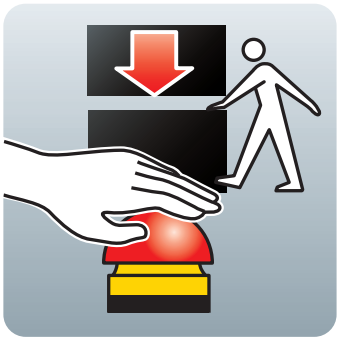
The monitoring of protective screens on machines and processing centres is another important function of the electronic safety relay ESR from Eaton Moeller. Depending on the safety level, one or two position switches signal that the protective door is in the closed position. Instead of restart-monitoring, you can also implement an automatic start with the safety relays. Thus, you reduce the cycle times in production without dispensing with safety.

www.moeller.net/safety

Safety for your applications

Stopping in an emergency

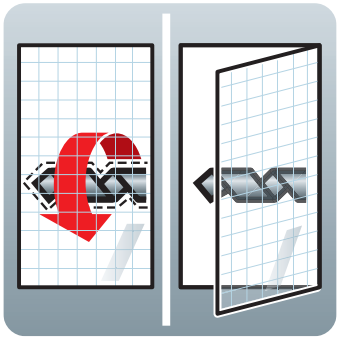
Safety in an emergency must be provided for persons and machines according to the valid machinery directives. The provision of a signal to the safety circuit is provided by an EMERGENCY-OFF button, e.g. M22-PV… or FAK… Depending on the level of danger involved the safety relay ESR circuitry is configured on a one or two-channel basis.



EMERGENCY-STOP buttons provide the signal in safety circuits

Monitoring mobile protective mechanisms

Personnel safety has highest priority in production premises. By installing safety switches, it is possible to monitor when protective doors or protective hinged covers are being opened. In addition to the ideal position switch for each location, Eaton Moeller also offers electronic safety relays that monitor the safety function.

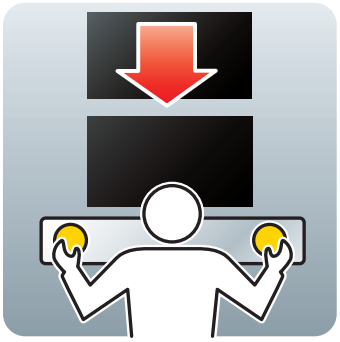


Safety position switch LS-Titan is used for monitoring safety doors and protective covers. The signal is evaluated in the safety relay.

	Part no.	Application	Emergency-Stop	Safety door	Light curtain
ESR5... 	**ESR5-NO-21-24VAC-DC**	Emergency-Stop, safety door	x	x	
	ESR5-NO-31-24VAC-DC	Emergency-Stop, safety door	x	x	
	ESR5-NO-41-24VAC-DC	Emergency-Stop, safety door	x	x	
	ESR5-NO-31-230VAC	Emergency-Stop, safety door	x	x	
	ESR5-NO-31-24-230VAC-DC	Emergency-Stop, safety door	x	x	
	ESR5-NV3-30	Emergency-Stop, safety door, Light curtain off-delayed 0.1-30 s	x	x	x
	ESR5-NZ-21-24VAC-DC	Two-hand control and safety door		x	
	ESR5-NE-51-24VAC-DC	Contact expansion			
	ESR5-VE3-42	Contact expansion, off-delayed 0.3-3 s			

Safe handling with protective controls

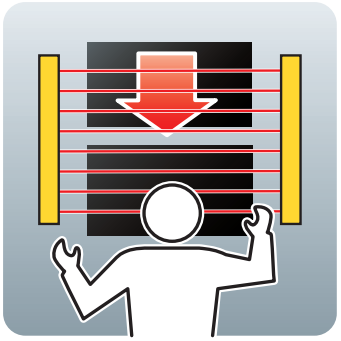
As the name suggests, two-hand controls must be actuated by two hands within 500 ms of one another, in order to start up or maintain the operating status of a machine. This protects the operating personnel during the danger period.



Two-hand controls prevent the operator from reaching into the press during start-up.

Safety during repair and maintenance

In addition to the safety doors, protective covers and two-hand operation for example, the use of optical light curtains and light grids is a further possibility to ensure the safety of machines and systems. The access to dangerous zones is monitored by light grids and curtains. An forbidden intrusion into dangerous zones is detected and evaluated by safety relays ESR. The energy supply is switched off.



Light grids guarantee the safety of machines and systems

Two-hand control	1-channel	2-channel	Cross circuit recognition	Off-delayed	Reset button monitoring	Feedback circuit	Enable current paths, non-delayed	Enable current paths, delayed	Signal current paths	Feedback current paths	For use with relays: Emergency-Stop, safety door, two-hand	Enclosure width (mm)
	x	x	x			x	2		1			22.5
	x	x	x			x	3		1			22.5
	x					x	4		1			22.5
	x	x	x		x	x	3		1			45
	x	x	x		x	x	3		1			45
	x	x	x	x	x	x	2	2				22.5
x		x	x			x	2		1			22.5
	x						5		1	1	x	22.5
	x			x			4		2	1	x	22.5

Optimum protection for smooth operation – measuring and monitoring relays EMR4

Measuring and monitoring relays are required for the most varied range of applications. EMR4 range measuring and monitoring relays cover a wide range of applications: Current monitors for universal use, phase monitors for monitoring destruction/damage protection for individual system sections, phase sequence relays monitoring the rotating field, unbalance relays for reliable phase loss detection, multifunctional three-phase monitors, asymmetric phase monitoring relays in a single device, level monitoring relays for monitoring fill levels and earth-leakage monitors for enhanced operational safety. All relays are devices for world markets to IEC/EN 60947 and UL/CSA approval. Many relays feature multi-voltage coils. This simplifies stock keeping and enhances the flexibility when reacting to customer requirements.

Level monitoring relays ensure defined mixing ratios of many diverse liquids, whether in the petrochemical or the food industry. Two electrodes monitor the maximum and minimum filling levels, while a third electrode is used as earth.

EN 60 204, the European Standard for "Safety of Machines", stipulates that insulation monitors should be used to increase operational safety by monitoring auxiliary circuits for earth faults. Insulation monitoring relays EMR4-R demonstrate their full potential here.

They signal an earth fault via a changeover contact and enable the fault to be cleared without the user experiencing costly downtimes. And, there is yet another safety feature: a Test button, with which the integrity of the function can be checked at any time.

Phase monitor EMR4-W – destruction/damage protection for individual system sections

The phase monitor EMR4-W in addition to the monitoring the rotary field, also monitors the level of the applied voltage – i.e. monitoring destruction/damage protection of individual system sections. A dial allows easy setting of the required voltage for both the minimum undervoltage and maximum overvoltage within a defined window.

Both on-delayed and off-delayed functions are possible.
The on-delayed setting enables short overvoltages or voltage dips to be bridged.

The relay picks up if the phase sequence and the voltage are correct. After it has dropped out, the device does not pick up again until the voltage goes over a 5 % hysteresis.

Earth-leakage monitor EMR4-R – for increased operating safety

The EN 60204 „Safety of machinery" stipulates that auxiliary circuits must be protected with earth-leakage monitors in order to increase operating safety. The earth-leakage monitors EMR4-R are primarily used for this purpose, as well as in areas for medical applications with similar requirements.
A changeover contact indicates an earth fault and therefore allows faults to be rectified without the need for expensive downtimes.
The devices can be provided with an optional fault memory that requires a fault to be acknowledged after it has been rectified. A test button is provided to test the functioning of the device at any time.

One device is available for both AC and DC circuits, thus enabling the entire range of control voltages to be covered. The DC devices feature a multi-voltage coil to provide both AC and DC supply as required.

Phase sequence relay EMR4-F500-2 – compact rotary field monitoring

The phase sequence relay EMR4-F500-2 with its compact 22.5 mm width is used for monitoring the clockwise rotation of movable motors for which the phase sequence is important, such as with pumps, saws, drilling machines. This means additional space in the control panel thanks to the narrow width and protection against damage by means of phase sequence.

Current monitor EMR4-I – for universal use

The current monitors EMR4-I are suitable for both AC and DC monitoring tasks. The selectable lower or upper tripping limit means that they can be used for the underload or overload monitoring of pumps and drilling machines. They are available in two versions, each with three measuring ranges (30/100/1000 mA, 1.5/5/15 A). The multi-voltage coil allows these relays to be used for a wide range of applications. The second changeover contact is provided for direct status indication.

Unbalance relay EMR4-A – reliable phase loss detection

The unbalance relay EMR4-A with its 22.5 mm module width is the ideal protective device for phase loss protection. The detection of phase loss on the basis of phase shift means that reliable phase loss detection is ensured and overloads are prevented, even when large amounts of energy are regenerated to the motor. The relay can be used for protecting motors with a rated voltage of 380 V – 415 V at 50 Hz.

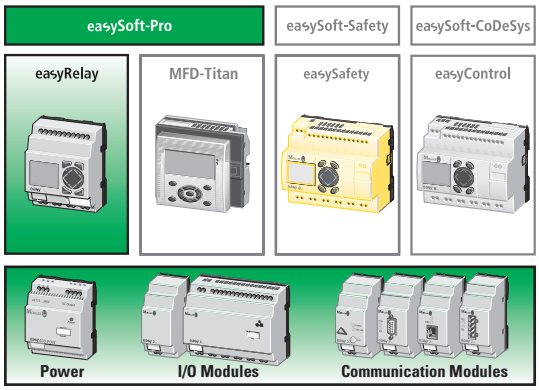
Level relay EMR4-N – increased safety with open-circuit protection

The level relays EMR4-N are used primarily to protect pumps from running dry or for the control of liquid levels.
They operate by means of sensors which measure conductivity, with one sensor monitoring the maximum level and one sensor the minimum. A third sensor is used for the chassis potential. The 22.5 mm wide EMR4-N100 device is suitable for conductive liquids, and is provided with a switch to select between Level control and Dry run protection as required. This offers increased safety thanks to the open-circuit design used in both cases.

Multi-functional three-phase monitor – compact rotary field monitoring with various functions

With the multi-functional three-phase monitors the phase parameters, phase sequence, phase loss, phase unbalance, overvoltage and undervoltage are detected.
Depending on the device version, the adjustable threshold value for asymmetry is in the range between 2-15%, and the threshold values for undervoltage and overvoltage are adjustable or fixed. The various possibilities and setting values can be taken from the table opposite. The EMR4-AWN... is a new version which features the "with neutral conductor monitoring" function.

	EMR4-F500-2	EMR4-W500-2-C	EMR4-W500-2-D	EMR4-W580-2-D	EMR4-A400-1	EMR4-I1-2-A	EMR4-I15-2-A	EMR4-I15-2-B	EMR4-N100-1-B	EMR4-N500-2-B	EMR4-N500-2-A	EMR4-RAC-1-A	EMR4-RDC-1-A	EMR4-AW300-1-C	EMR4-AW500-1-D	EMR4-AWN170-1-E	EMR4-AWN280-1-F	EMR4-W300-1-C	EMR4-W500-1-D	EMR4-W380-1	EMR4-W400-1	EMR4-A300-1-C	EMR4-A500-1-D
Phase sequence	•	•	•	•	•									•	•	•	•	•	•	•	•	•	•
Phase failure														•	•	•	•	•	•	•	•	•	•
U<0.6xUe	•	•	•	•																			
U<0.95xUe					•																		
Unbalance																							
2-15%														•	•	•	•					•	•
5-15%					•																		
Monitoring voltage (measured voltage)																							
200-500 V AC (= supply voltage)	•																						
380-415 V AC (= supply voltage)		•																					
160-300 V AC (= supply voltage)														•				•				•	
300-500 V AC (= supply voltage)															•				•				•
90-170 V AC (= supply voltage)*																•							
180-280 V AC (= supply voltage)*																	•						
380 V AC (= supply voltage)																				•			
400 V AC (= supply voltage)																					•		
Undervoltage																							
Measurement range min. 160-220 V AC														•				•					
Measurement range min. 300-380 V AC		•	•												•				•				
Measurement range min. 350-430 V AC				•																			
Measurement range min. 90-120 V AC*																•							
Measurement range min. 180-220 V AC*																	•						
342 V AC fixed																				•			
360 V AC fixed																					•		
Overvoltage																							
Measurement range min. 220-300 V AC														•				•					
Measurement range min. 420-500 V AC		•	•												•				•				
Measurement range min. 500-480 V AC				•																			
Measurement range min. 120-170 V AC*																•							
Measurement range min 240-280 V AC*																	•						
418 V AC fixed																				•			
440 V AC fixed																					•		
Current measurement range																							
0.003-1 A					•																		
0.3-15 A						•	•																
Monitoring																							
Adjustable upper and lower threshold					•	•																	
Adjustable upper threshold							•																
Sensitivity (level)																							
5-100 kOhm									•														
250 Ohm - 500 kOhm										•	•												
Insulation resistance																							
in DC networks													•										
10-110 kOhm													•										
in AC networks												•											
1-110 kOhm												•											
Supply voltage																							
24-240 V AC/DC						•	•				•	•	•										
220-240 V AC								•	•	•													
200-500 V AC	•																						
380-415 V AC					•																		
160-330 V AC		•																					
300-500 V AC			•	•											•				•				•
160-300 V AC														•				•				•	
90-170 V AC*																•							
180-280 V AC*																	•						
380 V AC																				•			
400 V AC																					•		
Features																							
Width																							
22.5 mm	•				•				•			•	•	•	•	•	•	•	•	•	•	•	•
45 mm		•	•	•		•	•	•		•	•												
On-delay																							
0.5 s				•																			
0.1-30 s					•	•	•																
On or off delay (selective;)																							
0.1-10 s		•	•	•										•	•	•	•	•	•	•	•	•	•
0.5-10 s										•	•												
Status display via LED	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Contacts																							
1 changeover contact					•				•			•	•										
2 changeover contact	•	•	•	•		•	•	•		•	•			•	•	•	•	•	•	•	•	•	•
Accessories																							
Sealable shroud	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Note																							
* With neutral conductor monitoring Measurement/setting between phase and neutral pole																•	•						



Refreshingly Easy.
The Clever easyRelays.

The easy500/700 and easy800 control relays come with a full range of technical resources to implement applications for industrial and building automation, machine building or plant construction. A host of different device versions with various functions, voltage types, expansion and networking options are available for implementing the right solution. As well as offering the main functions of the easy500/700 such as multi-functional relays, impulse relays, counters, analog value comparators, time switches, automatic DST function and retentive actual values, the easy800 offers a host of function blocks such as PID controllers, maths function blocks, value scaling, and many more. Its ability to network up to 8 devices makes the easy800 the most powerful control relay on the market.

Lighting control systems in buildings:

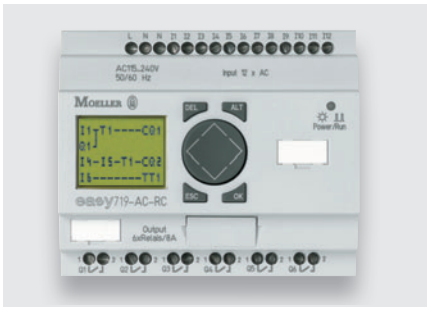
- The lighting can be switched On and Off centrally or remotely using an impulse relay function.
- The timer-controlled Off pulse enables the lighting to be switched off centrally for energy saving.
- A base unit controls up to 12 independent lighting groups. Purpose-dedicated lighting control, such as central lighting for cleaning, automatic half-strength staircase lighting, or an early warning pulse for the lights-out phase can be configured.
- Installation in low-voltage distribution boards facilitated by the standard 45mm front dimension, as well as component sizing at 4 times, 6 times, 8 times and 12 times the width of an MCB.

Machine control:

- A plug-in memory module enables the easy circuit diagram to be duplicated without the PC. Later modifications to the circuit can be carried out externally, and the memory module can then be shipped in order to transfer the modification to the easy.
- The ability to preset the startup behaviour to RUN or STOP modes facilitates commissioning.
- Short-circuit recognition and selective disconnection of the transistor outputs in the event of short-circuit and overload.

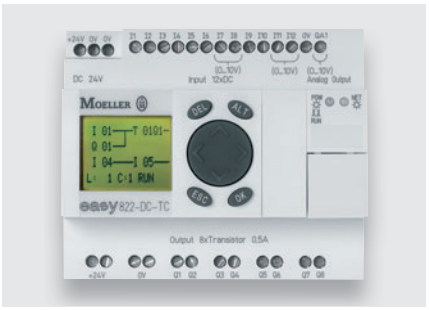
eay500 control relay
Compact device

- Up to 12 I/O
- 128 rungs of 3 contacts and 1 coil each
- 16 operating and message texts
- 2 analog inputs (10-bit)
- 2 high-speed inputs 1 kHz
- 2 frequency counters 1 kHz
- 1 Ethernet gateway[1)]



eay700 control relay
Local and distributed expansion

- Up to 40 I/O
- 128 rungs of 3 contacts and 1 coil each
- 16 operating and message texts
- 4 analog inputs (10-bit)
- 2 high-speed inputs 1 kHz
- 2 frequency counters 1 kHz
- 1 Ethernet gateway[1)]
- 1 easy expansion device or 1 network module



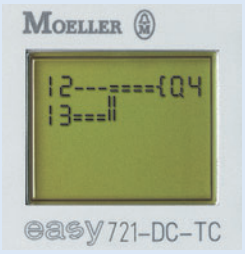
eay800 control relay
Expandable: integrated network, control functions

- Up to 320 I/O
- 256 rungs of 4 contacts and 1 coil each
- 32 operating and message texts
- 4 analog inputs (10-bit)
- 4 fast frequency counters 5kHz
- 2 incremental value counters 3 kHz
- 1 Ethernet gateway[1)]
- 1 digital expansion or network gateway
- Networkable via easyNet with up to 8 stations
- 1 analog output (10-bit)

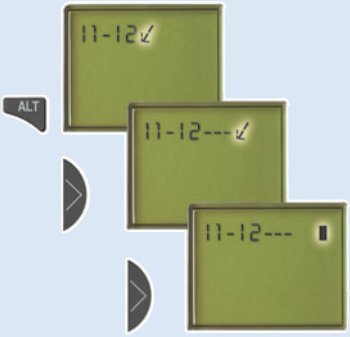
[1)] optional with Ethernet-Gateway EASY209-SE

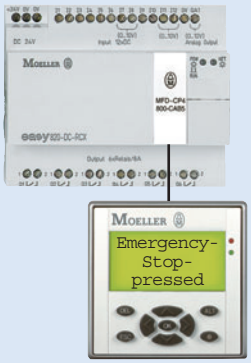
easy500/easy700 and easy800 Control Relays.

easy to operate
Anyone who can read circuit diagrams immediately feels at home with the easy. Every circuit diagram can be entered on a 1:1 basis on the display. The smart device operates as expected with make/break contacts and coils. All basic and special functions can be wired together – simply at the touch of a button.



Power flow display = Power flow

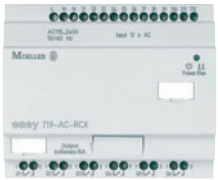




EASY512...

EASY512...

EASY719...



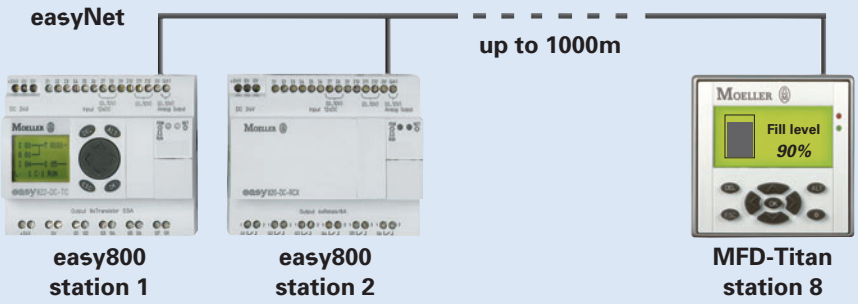
EASY719...

Basic units	**500 series basic units**							**700 series basic units**				
Application	**Compact**							**Expandable (EASY2..., EASY4..., EASY6...)**				
Part no.	**EASY512-AB-RC** *)	**EASY512-AC-R**	**EASY512-AC-RC** *)	**EASY512-DA-RC** *)	**EASY512-DC-R**	**EASY512-DC-RC** *)	**EASY512-DC-TC** *)	**EASY719-AB-RC** *)	**EASY719-AC-RC** *)	**EASY719-DA-RC** *)	**EASY719-DC-RC** *)	**EASY721-DC-TC** *)
Supply voltage	24 V AC	100 - 240 V AC		12 V DC	24 V DC			24 V AC	100 - 240 V AC	12 V DC	24 V DC	
Heat dissipation	5 VA	5 VA		2 W	2 W			7 VA	10 VA	3.5 W	3.5 W	
Inputs, digital	8	8	8	8	8	8	8	12	12	12	12	12
of which optional: Inputs, analog 0 - 10 V	2	-	-	2	2	2	2	4	-	4	4	4
of which optional: Counter inputs	-	-	-	4	4	4	4	-	-	4	4	4
Outputs (R=Relay, T=Trans.)	4R	4R	4R	4R	4R	4R	4T	6R	6R	6R	6R	8T
Expandable/networkable	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / Yes	- / Yes	- / Yes	- / Yes	- / Yes
7-day/year time switch	Yes / Yes	- / -	Yes / Yes	Yes / Yes	- / -	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
Continuous current outputs [1]	8 A	8 A	8 A	8 A	8 A	8 A	0.5 A	8 A	8 A	8 A	8 A	0.5 A
Connection cables	0.2 - 4.0 mm² (AWG 22-12), rigid 0.2 - 2.5 mm² (AWG 22-12), flexible							0.2 - 4.0 mm² (AWG 22-12), rigid 0.2 - 2.5 mm² (AWG 22-12), flexible				
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4							EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4				
Ambient operating temperature	- 25 °C ... + 55 °C							- 25 °C ... + 55 °C				
Certification, standards	EN 50178, IEC/EN 60947, UL, CSA							EN 50178, IEC/EN 60947, UL, CSA				
Dimensions (W x H x D) mm	71.5 x 90 x 58 mm							107.5 x 90 x 58 mm				

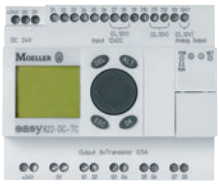
[1] Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A / 24 V DC, max 4 outputs switchable in parallel
*) Add X for types without integrated display or keypad

easy800 and MFD-Titan make over 300 I/O points available

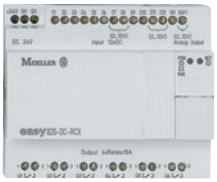
easy800 and MFD-Titan combine virtually all the features of a PLC with the convenient handling of the well-known easy product line. Thanks to their integrated networking capability for up to eight devices, applications with over 300 I/O points can be implemented. The control system can be designed either using a single local program or using several programs distributed on the different devices.



EASY819-AC-RC



EASY822-DC-TC



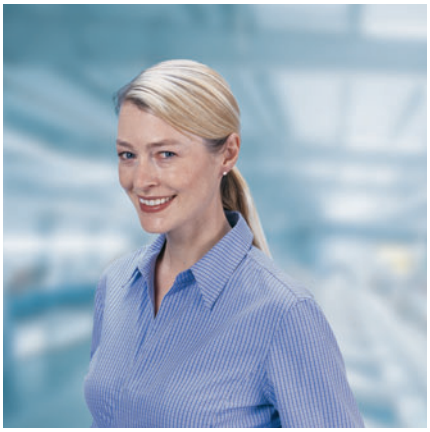
EASY820-DC-RCX

Software, see the easySoft section

Basic units	800 series basic units				
Application	Expandable (EASY2... , EASY4... , EASY6...), networkable (easyNet)				
Part no.	EASY819-AC-RC *)	EASY819-DC-RC *)	EASY820-DC-RC *)	EASY821-DC-TC *)	EASY822-DC-TC *)
Supply voltage	100 - 240 V AC	24 V DC			
Heat dissipation	10 VA	3.4 W			
Inputs, digital	12	12	12	12	12
of which optional: Inputs, analog 0 - 10 V	-	4	4	4	4
of which optional: Counter inputs	-	4	4	4	4
Outputs (R=Relay,T=Trans.), also (A=analog)	6R	6R	6R 1A	8T	8T 1A
Expandable/networkable	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
7-day/year time switch	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
Continuous current outputs [1]	8 A	8 A	8 A	0.5 A	0.5 A
Connection cables	0.2 - 4.0 mm² (AWG 22-12), rigid 0.2 - 2.5 mm² (AWG 22-12), flexible				
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4				
Ambient operating temperature	- 25 °C ... + 55 °C				
Certification, standards	EN 50178, IEC/EN 60947, UL, CSA				
Dimensions (W x H x D) mm	107.5 x 90 x 72 mm				

[1] Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A / 24 V DC, max 4 outputs switchable in parallel
*) Add X for types without integrated display or keypad

"easy gives us the flexibility we need. The expansion devices can be adapted optimally to the tasks required. In this way, you only pay for what you need".



Visualization, Control, Regulation and Communication. Easy with the MFD-Titan®.

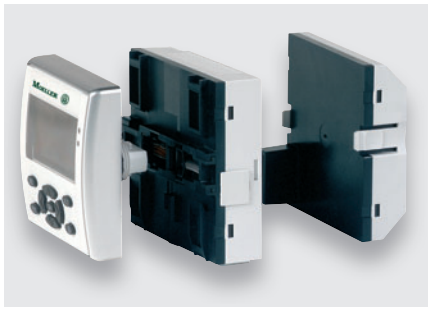
With the MFD-Titan multi-function display you can create solutions with control and visualization functions for large-scale and complex automation tasks. If you wish to display texts, message texts or fault messages, graphics, pictures, operating instructions, the current date and time; or even acknowledge fault messages, input values or start operations, the MFD-Titan is ideal for implementing all these tasks. EASY-SOFT-PRO is the software tool you use both for programming all the required functions and editing all the visualization screens. Protection to IP65 means that the display can also be used in harsh environments. Like easy800, MFD-Titan can be expanded and networked to standard bus systems and can also be networked via "easyNet". The MFD-80... display can also be provided with customised inscriptions such as your company name. Further information on this is provided in the section on the Labeleditor.

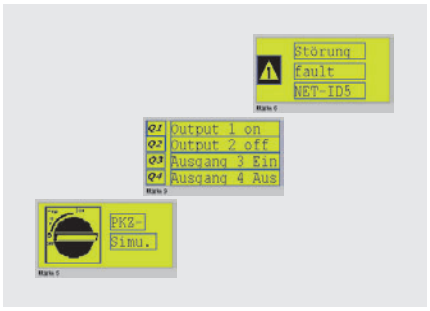
New operator and control concept for textile machines

The newly enhanced machine series from Meyer presents the market with innovative fixing and setting machines. It was MFD-Titan that made all these improvements possible. The new safety concept not only increases reliability but also simplifies the operator's job. All the functions can be set up as it were intuitively, and can be readjusted if necessary on an ergonomically designed and generously sized operator interface. MFD-Titan is a product that belongs to the next generation in automation, combining as it does control and visualization functions in one unit. It requires just one software package for the control function, the visualization and networking. This fact significantly reduced the time that had to be spent on engineering and programming by the machine builders at Meyer.

Control engineering for a crane installation

The MFD-Titan in the control cabin functions as operator interface: In addition to allowing centralised visualization of fault messages from individual network stations, the display also indicates their operational status. A menu also enables the operator to call up graphics showing speeds, limit switch positions, operational hours run and schedules for maintenance. The MFD-Titan networked with the easy control relay can together deal with the following tasks and functions: Single and double lifting gear mode, highly precise synchronisation control, lifting operation interruption, selective load measuring, linear field-weakening, dynamically adapted control procedures, soft start and soft stop, load independent travel, configurable setpoint channels.





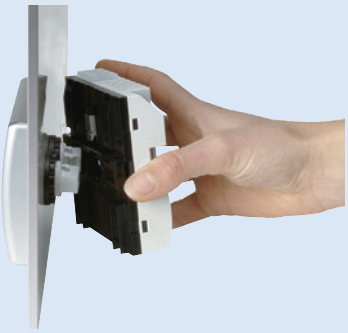
MFD-Titan multi-function display

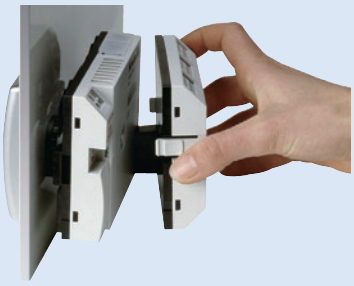
Leistungsstarke Visualisierung: E/A's erweiterbar; integriertes Netzwerk; Reglerfunktionen

- Over 300 I/O
- 256 rungs of 4 contacts and 1 coil each
- 4 analog inputs (10-bit) optional (not 230 V DC)
- 4 fast frequency counters 5 kHz 2 incremental value counters 3 kHz
- 1 easy expansion device or 1 network module
- Networkable via easyNet with up to 8 stations
- 1 analog output (10-bit)
- 1 Ethernet gateway[1)]
- LCD display, 132 x 64 pixels, 4x16 or 2x9 lines x characters
- Bitmaps freely scaleable
- Value display/entry
- Bargraph
- Clock
- Static, rolling text, ticker text

[1)] optional with Ethernet-Gateway EASY209-SE

MFD-Titan. Multi-Function Display.





MFD-Titan
When fitted with a power supply/CPU module and optional input/output modules, the display can also be expanded into a compact HMI control device.

This then combines the complete functionality of an easy800 with powerful visualization functions. The two modules are simply plugged together. Plug & Work.

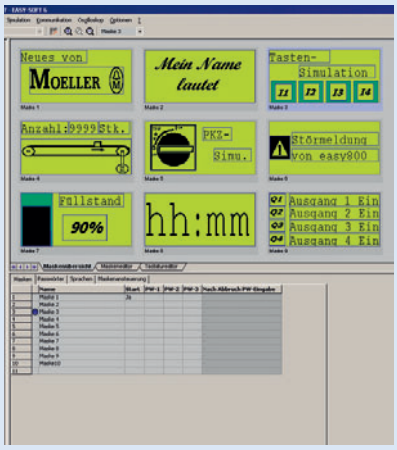
Software, see the easySoft section

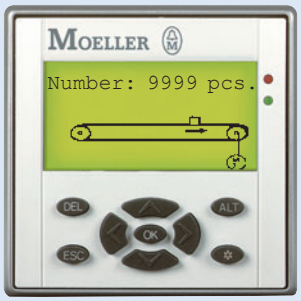
MFD-80-B

MFD-CP8-NT

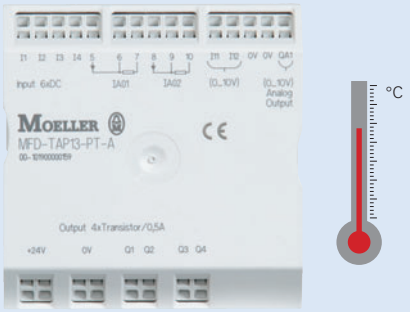
Basic units	MFD-Titan					
Application	Display		Power supply/CPU			
Part no.	MFD-80	MFD-80-B	MFD-CP8-ME[3]	MFD-CP8-NT[4]	MFD-AC-CP8-ME[3]	MFD-AC-CP8-NT[4]
Supply voltage	Supply via MFD-CP4...		24 V DC		100 - 240 V AC	
Heat dissipation	3 W		3 W		8 W	
Inputs, digital	-	-	-	-	-	-
of which the following can be used as: Inputs, analog 0 - 10 V	-	-	-	-	-	-
of which the following can be used as: Counter inputs	-	-	-	-	-	-
Inputs, temperature (12-bit, PT=PT100, NI=NI1000)	-	-	-	-	-	-
Outputs (R=Relay, T=Trans.)	-	-	-	-	-	-
also (A=analog)	-	-	-	-	-	-
LCD display / keypad	Yes / -	Yes / Yes	- / -	- / -	- / -	- / -
7-day/year time switch	- / -	- / -	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
Continuous current outputs[1]	-	-	-	-	-	-
Connection cables	-	-	0.2 - 4.0 mm² (AWG 24-12), rigid 0.2 - 2.5 mm² (AWG 24-12), flexible			
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4					
Ambient operating temperature	Safely legible at - 5 °C ...+ 50 °C[2]		- 25 °C ... + 55 °C			
Certification, standards	EN 50178, IEC/EN 60947, UL, CSA					
Dimensions (W x H x D) mm	86.5 x 86.5 x 20 mm		107.5 x 90 x 29.5 mm			

[1] Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A / 24 V DC, max 4 outputs switchable in parallel
[2] With backlight in continuous operation - 10 °C ... 0 °C
[3] without integrated easyNet interfacing [4] with integrated easyNet interfacing





Screen editor
The screen editor provides a host of different screen elements for creating visualizations with the MFD-Titan multi-function display.



Temperature controller
Direct temperature measurement with a precise 12-bit resolution in a compact visualization unit.

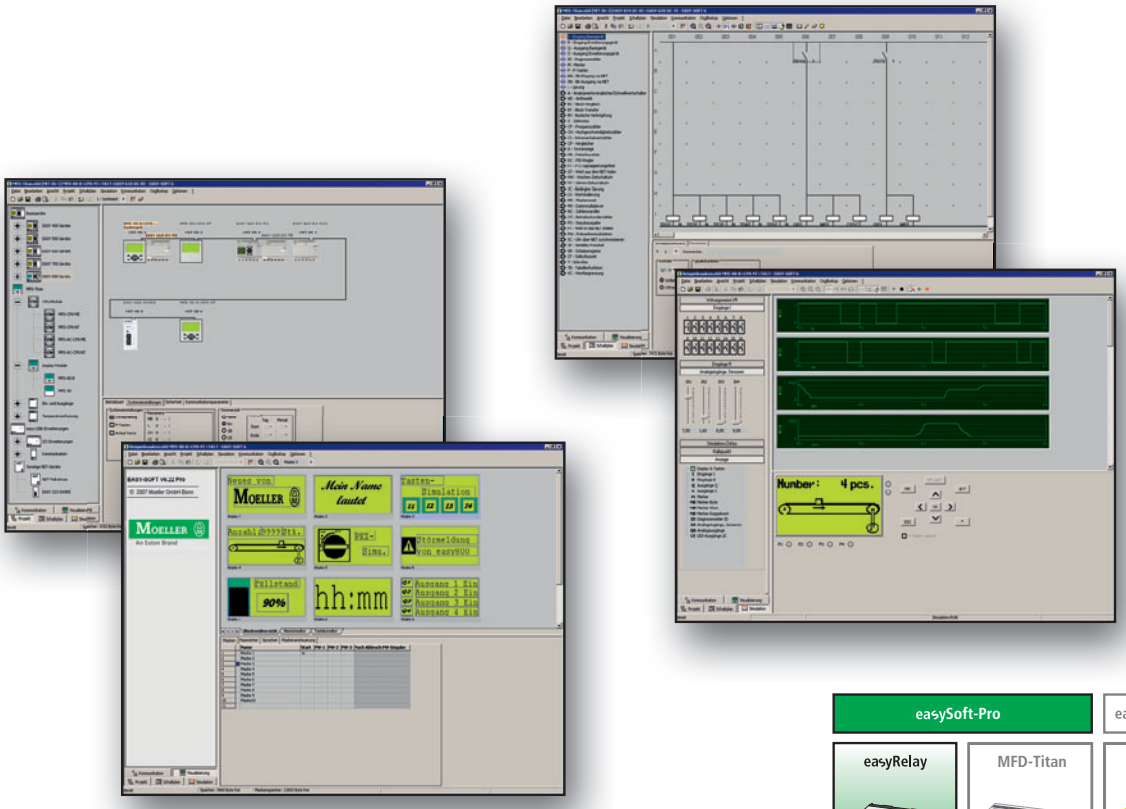
MFD-R16

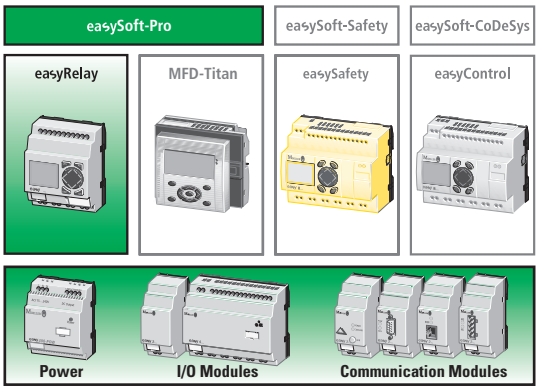
MFD-TA17

MFD-TP12-PT-A

	Expansions										
	Inputs / outputs					Temperature controller					
	MFD-AC-R16	MFD-R16	MFD-RA17	MFD-T16	MFD-TA17	MFD-TP12-NI-A	MFD-TP12-PT-A	MFD-TP12-PT-B	MFD-TAP13-NI-A	MFD-TAP13-PT-A	MFD-TAP13-PT-B
Supply via MFD-CP8-..											
	0.5 W					1 W					
	12	12	12	12	12	6	6	6	6	6	6
	-	4	4	4	4	2	2	2	2	2	2
	-	4	4	4	4	4	4	4	4	4	4
	-	-	-	-	-	2NI	2PT	2PT	2NI	2PT	2PT
	4R	4R	4R	4T	4T	4T	4T	4T	4T	4T	4T
	-	-	1A	-	1A	-	-	-	1A (12-bit)	1A (12-bit)	1A (12-bit)
	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
	8 A	8 A	8 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A
0.2 - 4.0 mm² (AWG 24-12), rigid 0.2 - 2.5 mm² (AWG 24-12), flexible											
EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4											
- 25 °C ... + 55 °C											
EN 50178, IEC/EN 60947, UL, CSA											
88.1 x 90 x 25 mm											

In stand-alone operation the MFD-...CP8-... CPU slices can also be mounted on a 35 mm top-hat rail to DIN 50022 or screw mounted with ZB4-101-GF1 fixing brackets





Entry Parameterization and Visualization. easySoft. User-Friendly Circuit Diagram

easySoft makes things particularly easy for users. The graphical editor shows the circuit diagram immediately in the display format required. Selection menus and drag & drop functions simplify circuit diagram creation. Simply select contacts and coils and connect with the mouse – that's it!
The screen editor provides a host of different screen elements for creating visualizations with the MFD-Titan multi-function display.

easySoft:

- user-friendly circuit diagram input tool
- clear parameter definition of function blocks
- simple setpoint entry
- wide range of display features for messages and variables
- simple, fast and affordable visualization
- time-saving offline program simulation

Software packages
In addition to the editing features directly provided on the easy… control relay and MFD-Titan multi-function display themselves, the following scaled software packages are available for user-friendly circuit diagram entry:

- **EASY-SOFT-BASIC** for programming the easy400/500, easy600/700
- **EASY-SOFT-PRO** for programming easy400/500, easy600/700, easy800/MFD-Titan and for creating visualization applications with MFD-Titan
- **easyOPC server** is a standardized interface to higher-level computer systems (OPC clients) for monitoring of systems. You can have read and write access to the data of easyRelay and MFD-Titan with every OPC client. The OPC server is included free-of-charge in the EASY-SOFT-PRO.

The menus and dialogs of easySoft are available in 13 languages:
- German
- English
- French
- Italian
- Dutch
- Polish
- Portuguese
- Rumanian
- Russian
- Spanish
- Czech
- Turkish
- Hungarian

The following fonts can be displayed:
- Western European
- Central European
- Cyrillic

easySoft also provides the following display formats for viewing, editing and printing out your program:
- IEC display format with contact and coil symbols, international standard
- easy circuit diagram format, 1:1 representation as shown on the easy display
- ANSI format, in compliance with the American Standard

easySoft supports you when configuring, programming and defining parameters for easy400/500/600/700/800 control relays and the MFD-Titan multi-function display. The devices that can be selected in easySoft have different functions.

The Screen Editor provides the following screen elements for creating visualization systems with the MFD-Titan multi-function display simply, quickly and inexpensively:

Graphic elements
- Bit display
- Bitmap
- Message bitmap
- Bar graph

Button elements
- Latching button
- Button field

Text elements
- Static text
- Message text
- Screen menu
- Running text
- Rolling text

Value display elements
- Date and time display
- Numerical value
- Timing relay value display

Value entry elements
- Value entry
- Timing relay value entry
- Date and time display
- 7-day time switch entry
- Year time switch entry

easySoft also enables you to manage easy800Relays or MFD-Titan MFD... CP8... units connected via easyNet. The program for the possible maximum of 8 stations on the easyNet is created in easySoft.
easySoft also enables simple and time-saving commissioning of the easy800 control relays or MFD-Titan MFD... CP8... units connected to easyNet.

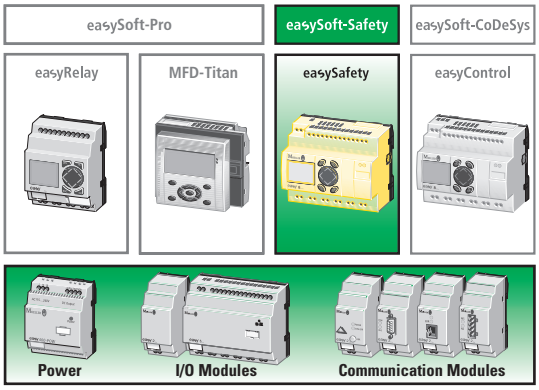
easySoft's integrated offline simulation tool enables users to check the correct functioning of the "circuit diagram" with the application software before commissioning. The simulation is run without easy or MFD-Titan devices having to be connected.
Comments and names for contacts, coils and function blocks allow you to create a clear and easy to understand program structure.

A cover sheet with a customised company logo and freely definable title fields, as well as the cross-reference list with comments provide a clear and complete documentation of your application from the program printout.

USB programming cable
The easyRelay, easyControl or easySafety device series can now also be programmed easily via the USB interface of a PC. The product is supplied with a CD containing drivers and documentation.

Modem cable
The pre-assembled cable allows the problem-free connection of a serial printer to the easy device series, for tasks such as the documenting of alarm or fault messages. It also enables serial data exchange with a modem or is used as a programming access with 57.6 Kbaud. The two meter cable can be used with a 9-pole SUB-D terminal (either male or female) depending on the function required.

Designation	Description	easy500 / easy700	easy800 / easyMFD	easyControl	easySafety
EASY-USB-CAB	USB programming cable 2m	Yes	–	–	–
EASY800-USB-CAB	USB programming cable 2m	–	Yes	Yes	Yes
EASY800-MO-CAB	Modem cable up to 57.6 Kbaud (freely configurable modem, printer, programming cable)	–	Yes	Yes	Yes

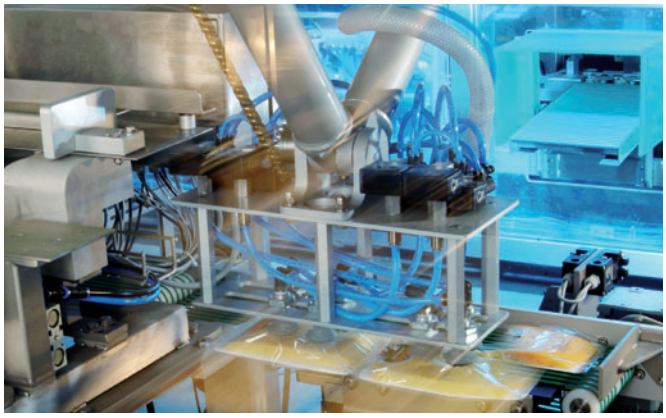


Functional Safety and Control Task easySafety – All in One

The safety of persons and machinery must be ensured throughout the entire life cycle of a machine/plant. In practice, safety-related components such as position switches, light curtains, two-hand controls, emergency-stop buttons etc. are used for this personnel protection.

This safety-related information is monitored and evaluated with the new easySafety control relay, in compliance with the most stringent safety standards.

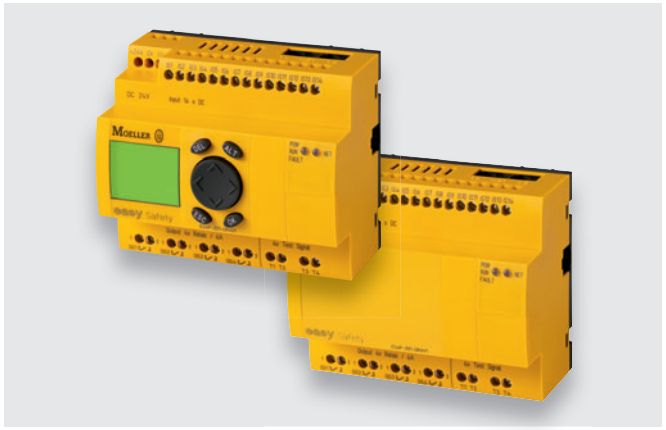
Applications using easySafety can thus meet the requirements of international standards, category 4 to EN954-1, PL e to EN ISO 13849-1, SILCL 3 to IEC 62061 and SIL 3 to IEC 61508.



Safety and standard technology efficiently combined!
easySafety adds a "yellow" control relay to the easy product family, and is primarily used for solving the safety-related tasks of a machine in addition to standard control tasks.
Whether for simple or complex machines, the required protection of persons and processes is ensured by the compact easySafety device.
The simplicity of the easy circuit diagram philosophy has been furthered so that today's easy users can quickly learn how to operate it.

Controlling the unforeseeable safely and economically!
Whether for simple or complex machines, the required protection of persons and processes is ensured by the compact easySafety device. This large number of safety function blocks, which are implemented in a single device, reduces stock-keeping costs and at the same time increases the flexibility needed to meet the requirements of different applications safely and quickly.
A beginners' course in the Online Help simplifies the entry level for easySafety as well as the use of the easySoft-Safety PC software.

The right easySafety – for simple to demanding safety tasks!



The rugged

ES4P-221-DRXX1, ES4P-221-DRXD1

- 14 safety inputs
- 4 safety relay outputs
- 4 test signals
- 16 operating and message texts
- easyNet on board
- easyLink on board
- Safety and standard circuit diagram
- With and without display

The versatile

ES4P-221-DMXX1, ES4P-221-DMXD1

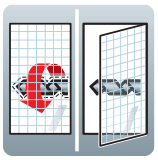
- 14 safety inputs
- 4 safety transistor outputs + 1 redundant safety relay output
- 4 test signals
- 16 operating and message texts
- easyNet on board
- easyLink on board
- Safety and standard circuit diagram
- With and without display

Additional remote display connectable via integrated RS232 interface

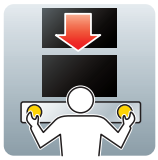
easySafety – All in One
Safety and Control Relays for Many Safety Functions

Armed with a host of safety function blocks, easySafety integrates both safety and standard functions in a single all-in-one device. The safety control relay thus offers a standard circuit diagram in addition to the safety circuit diagram contained in the safety configuration. This circuit diagram can be used for standard tasks such as the processing of diagnostics messages or the general control tasks on a machine. Users are thus provided with a wide range of application options in a single device thanks to the large number of safety function blocks available. In this way users stay flexible and are able to respond immediately to current and future changes in application requirements. This saves financial resources and offers future security, whilst also reducing stock-keeping costs for special safety relays.

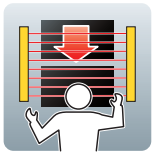
Circuits for stopping in an emergency
Enables the safe stopping of a hazardous movement; immediate stopping for Stop category 0 and controlled stopping for Stop category 1 in accordance with EN 60 204-1; used in single or dual-channel safety monitoring of emergency-stop circuits.



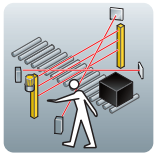
Guard door monitoring with and without interlocking/guard locking
Used with moving guards such as doors, barriers or flaps. Positions are reliably detected, monitored and enabled to safety-related requirements – optional interlock device with guard locking when increased personal and process protection are required. This securely keeps the guard closed until the next machine standstill.



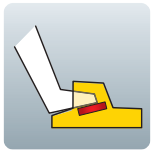
Safe operation with two-hand control
Type III to EN 574. Used for hazardous machine movement such as presses, punching, shearing – the safe enabling of hazardous movement only if both hands of the operator are outside of the hazardous area and the two-hand control switches are actuated synchronously within 0.5 seconds.



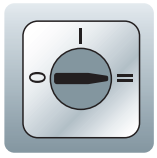
Electro-sensitive protective equipment (ESPE)
Protection of the hazardous location or area in the vicinity of machines by means of contactless guards such as light grids/light barriers/light curtains.



Optional with muting function
that temporarily bypasses the protective function of a guard such as a light grid. Typical application for the material feed of a machine without interrupting the working process.

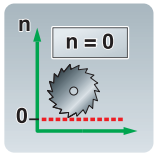


Enabling switch
The manual or foot operated enabling device allows the temporary enabling of a guard, such as a safety door, by continuous actuation. This may be necessary for setting or servicing a machine.

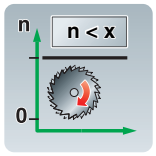


Mode switch
Used for the safe selection and acceptance of a preselected operating mode on an external control device.

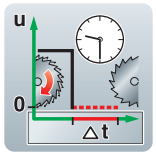
Start element
Used for the safe starting of an application by an external start actuator or a start condition from the safety circuit diagram.



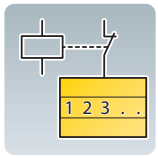
Zero monitoring
Used when the entry or access to the hazardous area is not permitted until the hazardous driving force has come to a standstill.



Overspeed monitoring
Used for safety-related overspeed monitoring of a motor or shaft. The drive is disabled if the maximum speed is exceeded.



Safety-related timing relay
Used for changing the switch duration and the on or off switch points of an enable contact in the safety circuit. Safety-related timing relay with on and/or off delayed or single pulse function.

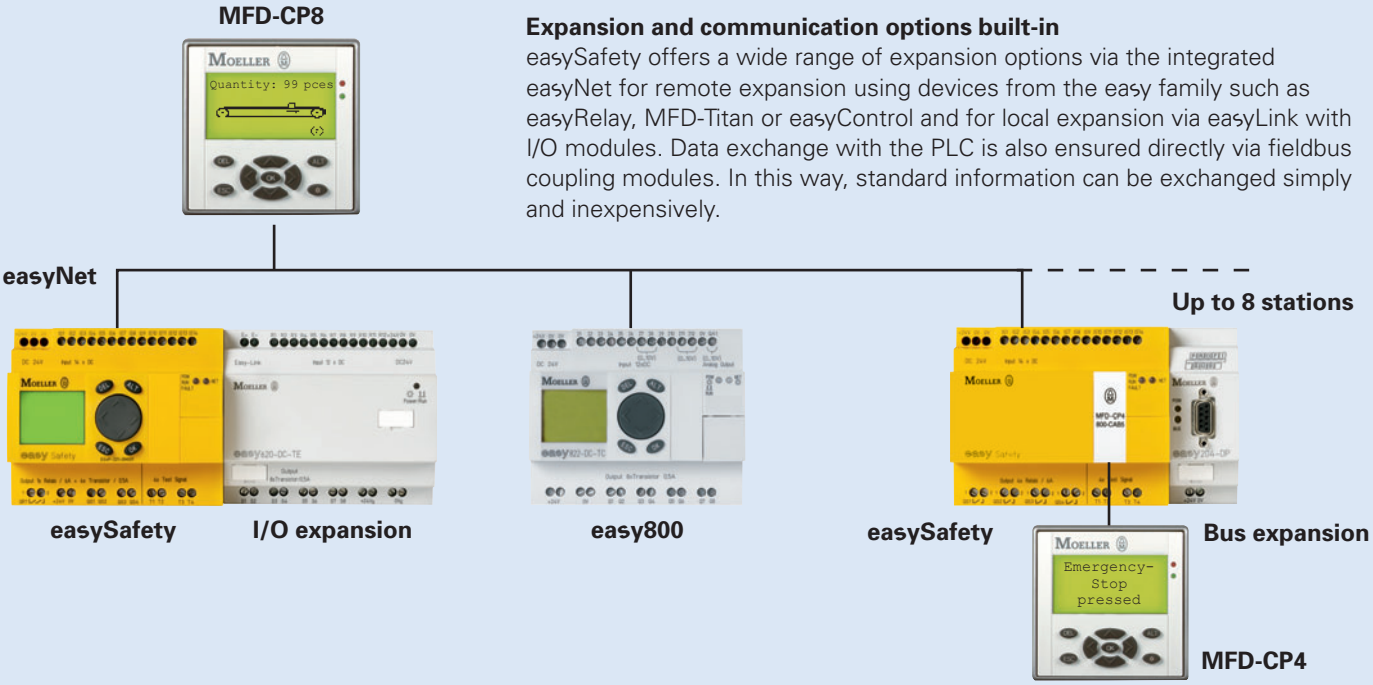


Feedback loop monitoring (EDM)
Used for the safety-related monitoring of externally connected actuators, e.g. contactors, relays or valves.

easySafety – Versatile Solutions with the Complete easy Range

Online catalogue Quicklink to www.moeller.net

OC24EN



Expansion and communication options built-in

easySafety offers a wide range of expansion options via the integrated easyNet for remote expansion using devices from the easy family such as easyRelay, MFD-Titan or easyControl and for local expansion via easyLink with I/O modules. Data exchange with the PLC is also ensured directly via fieldbus coupling modules. In this way, standard information can be exchanged simply and inexpensively.

Basic units	Inputs/outputs						Expansion/communication			Circuit diagram	
	Safety inputs	Safety relay outputs	Safety tran. outpits	Rednt. safety relay outputs	Test signals	Display	easyNet	easyLink	Open fieldbuses	Safety	Stan-dard
ES4P-221-DMXX1	14	–	4	1	4	–	up to 8 Net stations	digital I/O Standard expansions	Profibus DP CanOpen DeviceNet AS-i	yes	yes
ES4P-221-DMXD1	14	–	4	1	4	yes				yes	yes
ES4P-221-DRXX1	14	4	–	–	4	–				yes	yes
ES4P-221-DRXD1	14	4	–	–	4	yes				yes	yes

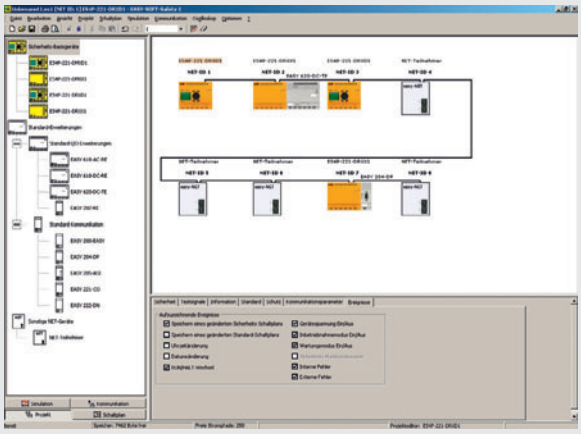
Accessories	
ES4A-MEM-CARD1	Memory module
ESP-Soft	easySoft-Safety + easySoft Pro
EASY800-PC-CAB	Standard easy USB programming cable
EASY800-USB-CAB	Standard easy serial programming cable
ES4A-221-DMX-SIM	I/O-Simulator

Memory module for reliable data storage and program transfer

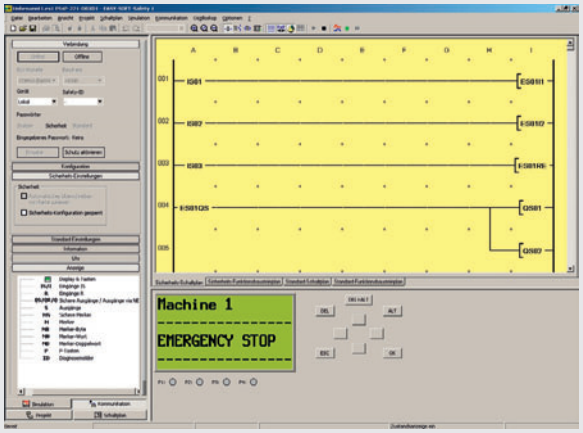
All in One – User-Friendly Software for Safety and Standard Circuits

easySoft-Safety is a user-friendly configuration environment for creating safety applications and also general control tasks in the conventional easy circuit diagram language.

- Manipulation protection for the machine builder: protects the safety application from manipulation and/or unauthorised access
- Know-how protection for the designer: prevents the undesired transfer or application know-how
- Flexibiity for the operator: enables the safe paramterisation of the standard application and a wide range of diagnostic options at any time



Project view



Safety circuit diagram

Circuit diagram view
Separate circuit diagrams ensure a strict separation between safety tasks and standard tasks. This firstly prevents unauthorised access or manipulation of safety processes through the use of separate passwords. Secondly, operators still have the freedom to adapt non-critical standard functions as well as machine diagnostics to the application at hand.

Safety circuit diagram
All typical safety functions are selected from a list containing a large number of safety function blocks, and the process defined by assigning them to the safety inputs and outputs.

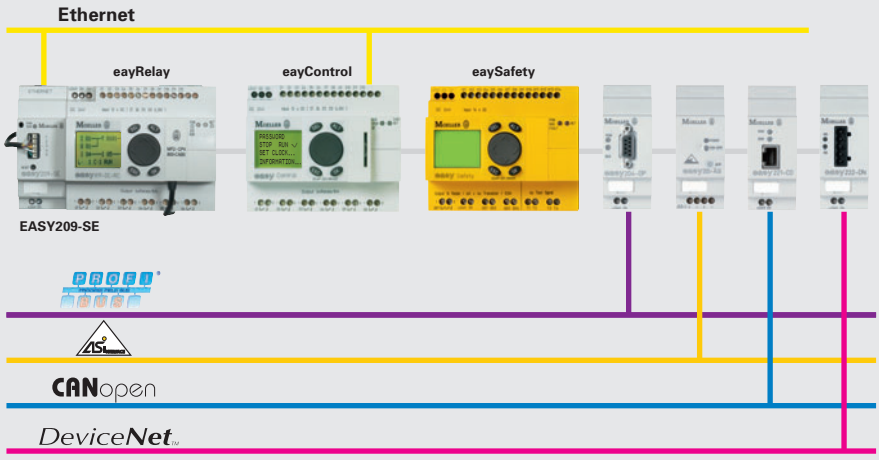
Simulation view
The ability to simulate the project on the PC ensures a considerable time saving during the design phase.

Project view
Project view allows the graphical configuration of the project by drag and drop using easySafety variants in the machine. Either as a stand-alone solution or integrated in the easyNet network.

Password protection
The multi-level password protection concept ensures optimum protection against unauthorised changes in the safety configuration, manipulation protection and know-how protection.

Communication view
Communication view enables direct diagnostics of the connected device via the status display.

easy Expansions and Communication Modules.

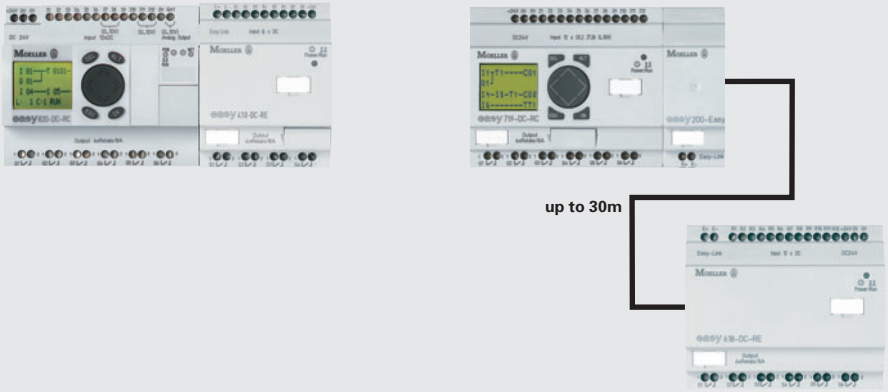


Communication via fieldbus systems is often an integral part of the automation concept.

The communication modules of the easyRelays, MFD-Titan and easyControl make it possible to exchange data with higher-level automation systems. Communication modules are available for the following bus systems:

- AS-Interface
- Profibus DP
- CANopen
- DeviceNet

Ethernet connection via EASY209-SE.

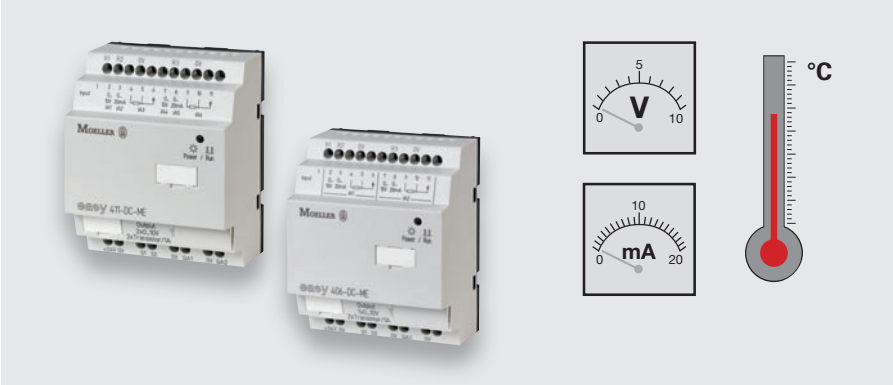


The expandable basic units enable the implementation of both local and remote I/O expansions.

In conjunction with the EASY4… and EASY6… expansion modules, a unit can be provided with up to 24 inputs and 16 outputs.These expansion modules are fitted directly on the basic unit and are connected via the easyLink interface. Alternatively, a simple connection can be set up using the EASY200-EASY coupling module and up to 30 metres of two-wire cable, thus making it possible to create extensive or expanded configurations.
If that isn't enough, the EASY202-RE expansion module provides two additional relay outputs.

SmartWire:
Plug & Work for motor starters

Eaton Moeller motor starters of the SmartWire gateway series with SmartWire without complex control wiring and PLC I/O assemblies can be directly connected to the easyNet, CANopen or Profibus.
In order to make the starter SmartWire compatible, the user simply plugs the SmartWire module onto the contactor. All motor starters are interconnected with the prefabricated SmartWire connection cable. Communication with the control is implemented via the SmartWire gateway.



Analogue input/output expansions

The new analogue easyLink input/output expansion modules for easy800, MFD-CP8 and easySafety enable comprehensive and flexible analogue value processing. The expansions each feature 2 temperature, current and voltage inputs which can be configured individually for each application


EASY202-RE


EASY410-DC-TE


EASY618-DC-RE


EASY204-DP


EASY221-CO


EASY222-DN


EASY209-SE

Accessories	Expansion modules, digital inputs/outputs		Expansion modules, digital inputs/outputs						Expansion modules						
Application	easyLink								Communication						
Typ	EASY406-DC-ME	EASY411-DC-ME	EASY202-RE	EASY410-DC-RE	EASY410-DC-TE	EASY618-AC-RE	EASY618-DC-RE	EASY620-DC-TE	EASY200-EASY	EASY204-DP	EASY205-ASI	EASY221-CO	EASY222-DN	EASY209-SE	EASY223-SWIRE
Use for:															
easy500	-	-	-	-	-	-	-	-	-	-	-	-	-	Yes	-
easy700	-	-	Yes[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
easy800	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MFD-CP8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ES4P	-	-	Yes	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes
Supply voltage	24 V DC	24 V DC	-	24 V DC	24 V DC	100-240 V AC	24 V DC	24 V DC	-	24 V DC	-	24 V DC	24 V DC	24 V DC	24 V DC
Inputs, digital	1 (3)	1 (3)	-	6	6	12	12	12	-	-	-	-	-	-	-
Inputs, analog	2 *	6 **	-	-	-	-	-	-	-	-	-	-	-	-	-
Outputs (R=Relay, T=Trans.)	2T	2T	2R	4R	4T	6R	6R	8T	-	-	-	-	-	-	-
Ausgänge, analog (0-10 V)	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Continuous current outputs[1]	1A	1A	8A	8A	0,5A	8A	8A	0,5A	-	-	-	-	-	-	-
Connection cables	0.2 - 4.0 mm² (AWG 22-12), rigid 0.2 - 2.5 mm² (AWG 22-12), flexible								0.2 - 4.0 mm² (AWG 22-12), rigid 0.2 - 2.5 mm² (AWG 22-12), flexible						-
Degree of protection	IP 20								IP 20						
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4								EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4						
Ambient operating temperature	- 25 °C ... + 55 °C								- 25 °C ... + 55 °C						
Certification, standards	EN 50178, IEC/EN 60947, UL, CSA								EN 50178, IEC/EN 60947, UL, CSA						
Dimensions (W x H x D) mm	71.5 x 90 x 58		35.5 x 90 x 58	71.5 x 90 x 58		107.5 x 90 x 58			35.5 x 90 x 58						35.5 x 90 x 101

1) Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A / 24 V DC, max 4 outputs switchable in parallel
2) Not use in combination with basic unit EASY719-DA...
* 2 x 0-10 V or 2x 0-20 mA or 2x Pt100 (2/3-wire connection); voltage inputs (0-10 V) can also be used digitally
** 2 x 0-10 V and 2x 0-20 mA and 2x Pt100 (2/3-wire connection); voltage inputs (0-10V) can also be used digitally

"Remote" Display: easy Text Display With Optimum Protection.

MFD-80-B

MFD-CP4

Basic units	MFD-Titan						
Application	Display		Power supply unit/ communication module				
Part no.	MFD-80	MFD-80-B	MFD-CP4-500	MFD-CP4-800	MFD-CP4-CO	MFD-AC-CP4-500	MFD-AC-CP4-800
Supply voltage	Supply via ...-CP...		24 V DC			100/240 V AC	
Heat dissipation	3 W		1.5 W			10 VA	
LCD display / keypad	Yes / -	Yes / Yes	- / -	- / -	- / -	- / -	- / -
Connection cables	-	-	0.2 - 4.0 mm² (AWG 24-12), rigid 0.2 - 2.5 mm² (AWG 24-12), flexible				
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4						
Ambient operating temperature	Safely legible at - 5 °C ...+ 50 °C [1]		- 25 °C ... + 55 °C				
Certification, standards	EN 50178, IEC/EN 60947, UL, CSA						
Dimensions (W x H x D) mm	86.5 x 86.5 x 20 mm		78 x 58 x 36.2 mm				

[1] With backlight in continuous operation - 10° C ... 0° C

Plug & Work

With Eaton Moeller's MFD-CP4-500 / MFD-CP4-800 supply and communication module, all easyRelay and easyControl applications can include a remote display that is protected to IP65.
The Plug & Work technology allows users to connect the MFD-Titan display (MFD-80 or MFD-80-B) to the easyControl relay via the MFD-CP4 power supply and communication module.
For this purpose the MFD-CP4 module is factory shipped with five metres of serial connection cable that can be cut to any required length.
The benefits are multiple. Users do not require any software or drivers for the connection, since MFD-CP4 offers genuine Plug & Work functionality.
The I/O wiring can be kept in the control cabinet. The display can also be fastened simply with 2 x 22.5 mm fixing holes. The display is protected to IP65, comes with a backlight and offers optimum legibility.

New easyPower switched-mode power supply units

easyPower power supply units are primary switched mode power supplies that are optimally adapted to the easyRelay, easyControl and easySafety product series in terms of functions and design.

The new high-performance power supply units support safe operation in plants and machines. They are simple and flexible in handling.

A permanently lit LED indicates that the output voltage is in order. The LED starts flashing as soon as the protective function of the easyPower supply unit is active.

The AC 85 V to 264 V wide range input and radio interference class B enable the easyPower switched-mode power supply units to be used flexibly in a wide range of applications.

EASY200-POW

EASY430-POW

EASY500-POW

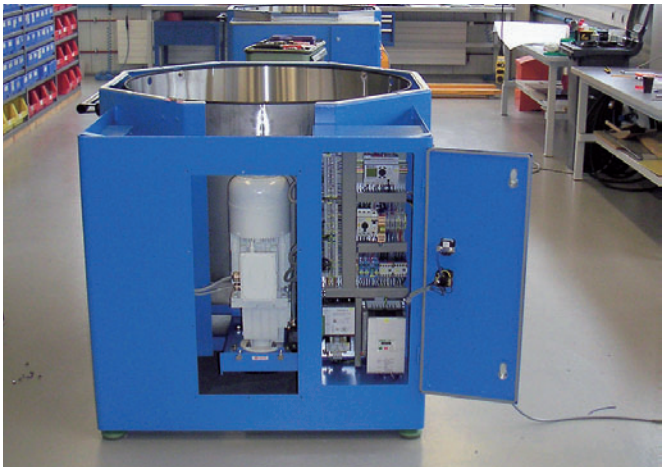
EASY600-POW

	EASY200-POW 24 V **350 mA** 12 V / 20 mA	**EASY430-POW** 24 V / **1.25 A**	**EASY500-POW** 24 V / **2.5 A**	**EASY600-POW** 24 V / **4.2 A**
Input	Single phase AC			
Nominal voltage	**AC 100 –240 V** (wide range input)			
Voltage range	85–264 V AC			
Frequency	47– 63 Hz			
Output				
Rated output current	**0.35 A** (24 V) 20 mA (12 V)	**1.25 A** (24 V)	**2.5 A** (24 V)	**4.2 A** (24 V)
Can be connected in parallel for increased power	–	Yes		
Protection				
Use of current limit	> 1.2 x I_{rated}			
Overload-proof	Yes, with current limit			
Reduction of output voltage after current limit	< 18 V			
Resistant to continuous short-circuit	Yes, hiccup mode, approx. 10 Hz			
Dimensions in mm (W x H x D)	35.5 x 90 x 58	71.5 x 90 x 58		107.5 x 90 x 58
Status display	– –	LED = green for output voltage OK LED = flashing for overload indication		
Standards, certification	EN 55011, EN 55022, IEC/EN 61000-4, IEC 60068-2-27, SELV output voltage Uout to EN 60950 and EN 50178 CE, UL, CSA			

"The flexible easy family really impressed me with its comprehensive accessory range"

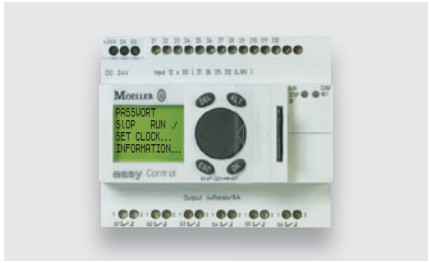
Control, Operation and Visualization with CoDeSys

For switching and protecting, commanding and controlling, signalling and visualization, Eaton Moeller offers holistic solutions – from a single source. Eaton Moeller offers a wide range of automation devices, from the simple compact PLC to the powerful IT controller with integrated web server. With all devices, easySoft-CoDeSys is the only software required for both the visualization and the programming. This saves time and effort for the engineering, communication and documentation.



Enercon develops and produce gearless wind power turbines that are still today setting standards on the market in terms of power, reliability and lifespan. Research and development at Enercon determine the level of innovation. The company's slogan clearly indicates its primary motivation: energy for the world. To meet its demanding requirements, Enercon chose Eaton Moeller's XC100-FC modular PLC with a fibre optic fieldbus interface for controlling and monitoring the aviation beacon system.

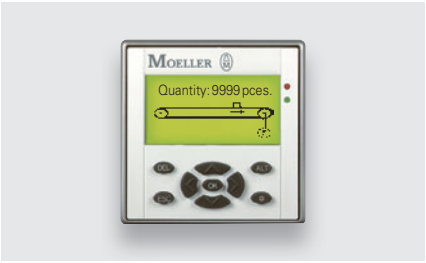
Finishing machines at Polyservice have a simple and durable design as well as a flexible structure. The form and quality of the parts, as well as the type of finishing, determine which plant and which process engineering application is to be used: rotary and microvibrators, satellite and centrifugal disc systems, as well as sieve vibrators and drying centrifuges, which can be operated individually or in combination. The Polysat5 satellite centrifugal finisher from Polyservice uses cost-efficient components from Eaton Moeller such as easy800, electrical switching devices (FAZ, DIL, RMQ), operator panels and frequency inverters.



EC4P

The compact EC4P PLC system offers a host of functions for covering the automation tasks of small-scale applications in one device. This allows digital and analog inputs/outputs and the integrated display.

Versions with Ethernet even allow remote programming via a network. As well as its local expansion capability with easy I/O modules, the device can also be expanded via easyNet or CANopen. The remote CANopen EC4E modules can be used for expansions via CANopen.



MFD4 und MFD80

Display systems are being used increasingly in applications. With smaller PLCs, the costs for these devices and the effort required for configuring the data exchange between the PLC and the display unit are often quite considerable. With both the MFD4 and MFD80, only one software, easySoft-CoDeSys, is required for programming and visualization. Naturally a tremendous cost saving!

The MFD4 multi-function display comes with a 5.7" TFT display, resistive touch technology and a wide range of communication options (CANopen, Ethernet, easyNet).

The MFD80 features a graphical display with 132 x 64 pixels. It can either be used with a CANopen communication port (MFD-CP4-CO) or with a serial interface (MFD-CP4).

XC100/200

The modular PLC system consists of a CPU module and up to 15 XI/OC signal modules. The CPU module is always provided with a programming interface (serial or Ethernet) – as well as a CANopen fieldbus interface together with inputs and outputs providing technology functions. The compact design guarantees the large number of up to 32 I/O signals per module. The Ethernet interface simplifies communication with other controllers or with IT. OPC servers, web servers, email or direct coupling to database systems are typical applications.

Modular PLCs – Powerful Modular Controllers Tailor-Made for the Application

XC100 and XC200 modular PLCs stand out on account of their highly scalable design. Different CPU performance classes and a wide range of expansion modules are available. An important feature is their ability to be integrated in modern communication concepts. The data exchange via the Ethernet interface to OPC clients or the integrated web server allows the creation of innovative solutions.

XC100

The XC100 series modular PLC is a powerful automation system for small and medium-sized applications, and is locally expandable with up to 15 XI/OC modules.

Memory card:
MMC
Integrated fieldbus:
CANopen (1 MBaud)
OPC server
Additional interfaces:
RS232

XC-CPU101-C64K-8DI-6DO/XV

Program memory	64 KByte
Data memory	64 KByte

XC-CPU101-C128K-8DI-6DO/XV

Program memory	128 KByte
Data memory	128 KByte

XC-CPU101-C256K-8DI-6DO/XV

Program memory	256 KByte
Data memory	256 KByte

XC100-FC

The XC-CPU101-FC is a modular PLC with an integrated CANopen fieldbus interface using fibre optic technology. It is therefore particularly suitable for use in environments susceptible to severe electromagnetic interference.

Memory card:
MMC
Integrated fieldbus:
CANopen (FO)
OPC server
Additional interfaces:
RS232

XC-CPU101-FC128K-8DI-6DO

Program memory	128 KByte
Data memory	128 KByte

XC200

The modular PLC of the XC200 series offers a high CPU performance and outstanding communication options. This includes an integrated Ethernet interface in addition to an RS232 interface and CANopen fieldbus interface. A technological highlight of the range is that all XC-201…-XV devices come with an integrated web server.

Memory card:
MMC
Expandability:
Up to 15 XI/OC modules
Integrated fieldbus:
CANopen (1 MBaud)
OPC server
Additional interfaces:
RS232, USB, Ethernet

XC-CPU201-EC256K-8DI-6DO/-XV

Program memory	512 KByte
Data memory	256 KByte

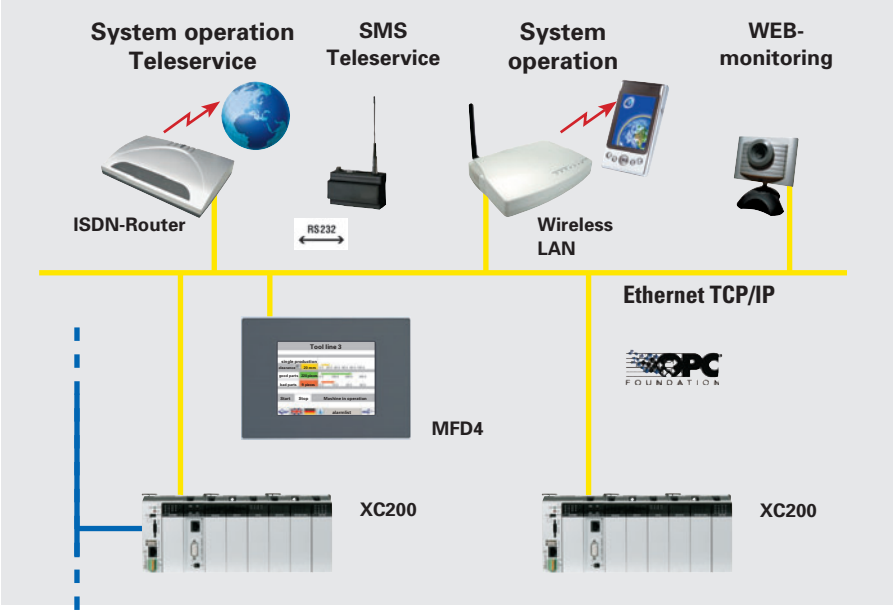
XC-CPU201-EC512K-8DI-6DO/-XV

Program memory	2048 KByte
Data memory	512 KByte

Flexible automation – XC100/200 modular PLCs

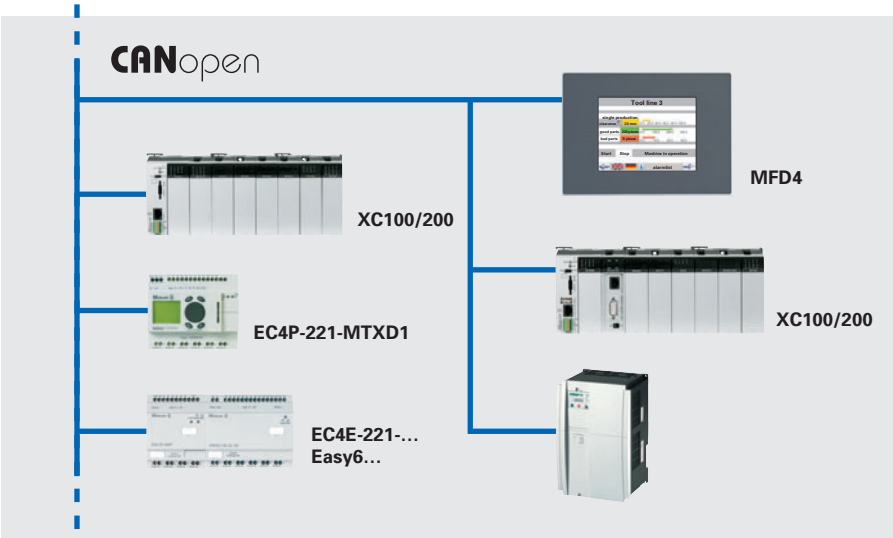
Modular PLCs stand out on account of their flexibly scalable design. This offers users the flexibility required to create individual automation systems of their own.

Another important feature is their ability to be integrated in modern communication concepts. Ethernet access is indispensable for a large number of applications:
for efficient communication between the controllers on the one hand, and for data exchange to higher-level control systems on the other, using communication standards such as OPC.



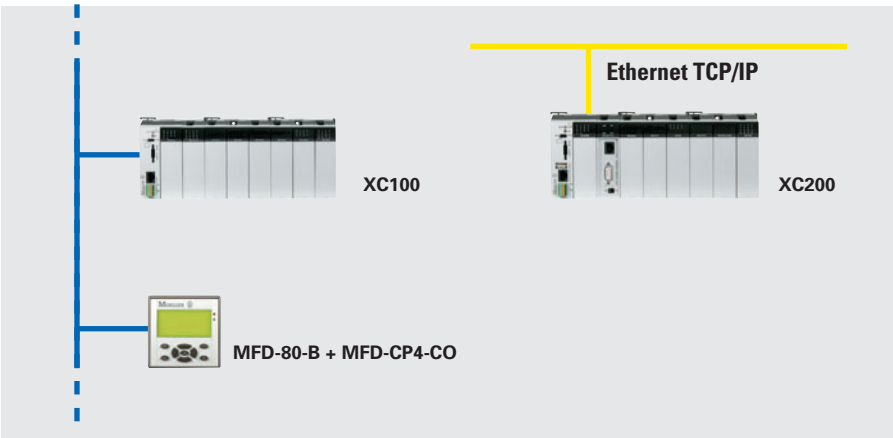
Ethernet on board

The 10/100 Mbit Ethernet interface of XC200 guarantees the perfect connection to IT communication. Whether for fast programming access, data exchange between the PLCs, web server or OPC server: it couldn't be simpler.



Integrated CANopen interface

The CANopen fieldbus system is designed for fast and efficient communication. The integrated CANopen interface enables the XC100 and XC200 to communicate with a wide range of devices, such as remote I/O, drives or visualisation systems.



Simple modular expansion

The XC100 and XC200 can naturally also be used as conventional modular PLCs for compact applications.
This is made possible by the high channel density of 32 I/Os per module.

XI/OC – Simple Expansion

Analog I/O modules

XI/OC – compact I/O and more

XI/OC are local expansion modules for direct connection to all XControl PLCs. Up to 15 modules can be connected directly to each PLC. You can also choose between a wide range of digital, analog and technology functions.

Compact design

Up to 32 I/O points can be connected on only 30 mm mounting width and at a height/depth of 100 mm. This saves space in the control panel and enables the creation of compact automation solutions.

Free selection of terminal design

All connections can be implemented using pluggable screw and spring-loaded terminal blocks.
As well as simplifying pre-wiring, this is also advantageous for exchanging modules quickly.

High-speed analog inputs

A 1 ms conversion time for inputs and outputs of the analog combination modules frees up performance capacity for processing analog signals in your application.

Positioning made easy:

The XIOC-2CNT-2AO-INC counter module allows direct connection of two 5 V incremental encoders, including the power supply. The two integrated +/- 10V analog outputs provide the interface to the drive. The modular XC100/200 PLC, the counter module and the Motion-Control-Toolbox are the ideal tools for implementing efficient and accurate positioning solutions.

Cost-optimised designing

What's the point of integrating unnecessary reserves if there's an alternative? The XIOC-16DX digital combination module offers the flexibility needed. With 4 inputs and 12 freely configurable inputs/outputs you can configure your own I/O level with a cost-optimised and compact design.

Analog input modules

XIOC-8AI-U1 8 inputs, 0-10 V
XIOC-8AI-U2 8 inputs, +/-10 V
XIOC-8AI-I2 8 inputs, 4-20 mA
XIOC-4T-PT 4 inputs PT100/1000
XIOC-4AI-T 4 inputs thermocouples

Analog output modules

XIOC-2AO-U2 2 outputs, +/-10 V
XIOC-4AO-U1 4 outputs, 0-10 V
XIOC-2AO-U1-2AO-I2
2 outputs, 0-10 V,
2 outputs, 4-20 mA

Analog combination modules

XIOC-2AI-1AO-U1
2 inputs, 0-10 V
1 output, 0-10 V
XIOC-4AI-2AO-U1
4 inputs, 0-10 V
2 outputs, 0-10 V
XIOC-2AI-1AO-U1-I1
2 inputs,
0-10 V, 0-20 mA
1 output,
0-10 V, 0-20 mA
Can be switched individually
XIOC-4AI-2AO-U1-I1
4 inputs,
0-10 V, 0-20 mA
2 outputs,
0-10 V, 0-20 mA
Can be switched individually

Digital I/O modules

Digital input modules

XIOC-8DI	8 inputs, 24 V DC
XIOC-16DI	16 inputs, 24 V DC
XIOC-32DI	32 inputs, 24 V DC

Digital output modules

XIOC-8DO	8 outputs, 24 V DC
XIOC-16DO (-S)	16 outputs, 24 V DC
XIOC-32DO	32 outputs, 24 V DC
XIOC-12DO-R	12 relay outputs

Digital combination modules

XIOC-16DX	Configurable inputs/ outputs 4 inputs, 24 V DC 12 outputs, 24 V DC

Counter modules

XIOC-1CNT-100KHZ
1 Counter input up to 100 kHz 24 V DC
2 Digital outputs
XIOC-2CNT-100KHZ
2 Counter inputs up to 100 kHz 24 V DC
4 Digital outputs
XIOC-2CNT-2AO-INC
2 Counter inputs up to 400 kHz 5 V DC
2 Analog outputs, +/-10 V

Network modules

XIOC-SER
Serial interface RS232C, 485, 422
Modbus Master/Slave Suconet K-Slave
XIOC-NET-DP-M
PROFIBUS-DP Master
XIOC-NET-DP-S
PROFIBUS-DP-Slave
XIOC-NET-SK-M
Suconet-K-Master

Accessories

Backup battery:
XT-CPU-BAT1

Programming cable:
XT-SUB-D/RJ45 (XC100, XC200)
XT-CAT5-X-2 (XC200)

Connection terminals:
XIOC-TERM-18S
(screw terminals)

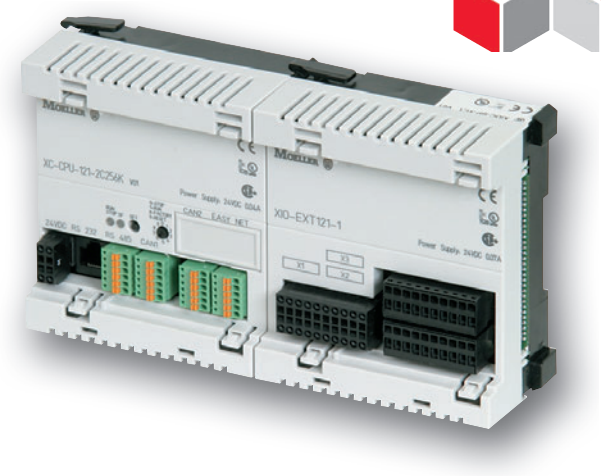
XIOC-TERM-18T
(spring-loaded terminals)

Memory card:
XT-MEM-MM32M for data, program and recipe memory

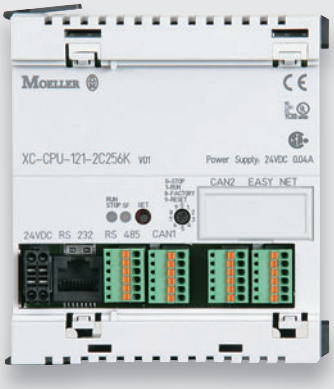
Connection cable:
XIOC-TERM-30-CNT4 (for CNT 100kHz)
XIOC-TERM-32 (for 32DI/DO)

Rack:
XIOC-BP-2 (for 2 XI/OC modules)
XIOC-BP-3 (for 3 XI/OC modules)
XIOC-BP-EXT (for expansions from 8 modules for 3 XI/OC modules)
XIOC-BP-XC (for PLC)
XIOC-BP-XC1 (for PLC and 1 XI/OC module)

XC121 – The Compact PLC for Machine Building



The XC-CPU121 is particularly suitable for applications where space is at premium and with high communication requirements. Two serial interfaces and two CAN interfaces are provided on the basic unit. This flexibility is -also reflected in terms of I/O expansion. Eight of the 18 digital I/Os can be used as either inputs or outputs. Eight analog inputs/outputs complete the I/O level. Programming is carried out with easySoft-CoDeSys. The XC121 has the following shipping approvals: DNV, GL, ABS, BV and LR.



XC-CPU121-2C256

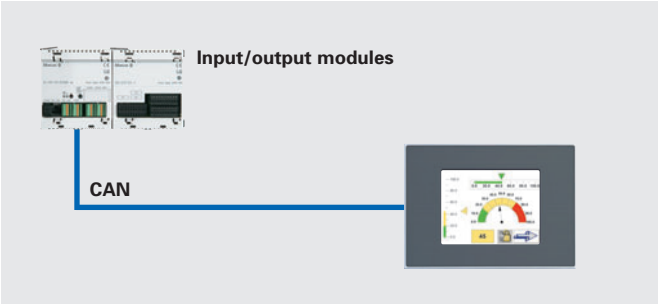
Program	256 KB
Data	244 K B
Processing speed	0.3 ms/K
Serial interfaces	
Type	1 RS232, 1 RS232/RS485
Max. baud rate	56 K
Fieldbus	
Number	2
Protocol	CANopen
Max. baud rate	1 MB
Memory card	MMC
OPC server	yes

XIO-EXT121-1

Digital inputs	10 (24 V DC)
(of which 6 interrupt inputs)	
Digital inputs/outputs	8
Input	24 V DC
Output	24 V DC, 0.5 A
Analog inputs	2 PT100
	2 inputs 0–10 V
	2 inputs 0–20 mA
Analog outputs	2 outputs 0–10 V

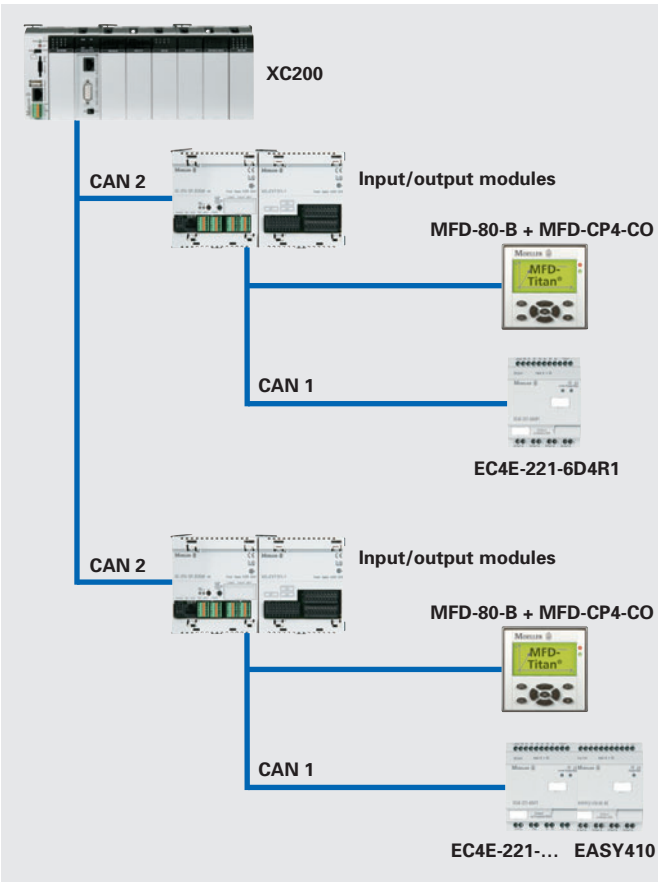
Its excellent provision of communication interfaces is an outstanding feature of the XC121. Two CANopen and two serial interfaces allow flexible applications in different network environments.

Examples of this include:
- Connection of two CANopen networks
- Modbus master/slave (RS232 or RS485) – CANopen
- RS232 - CANopen



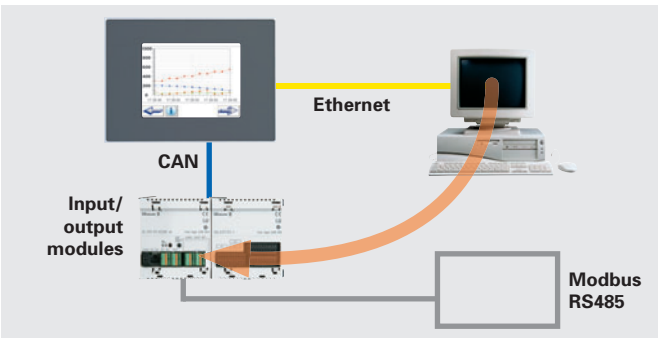
Wide range of functions where space is at a premium

The XC121 offers ideal features for simply HVAC (heating, ventilation, air conditioning) applications. Digital and analog (also PT100) signals, as well as the memory card for logging operating data, suitable libraries for closed-loop control and HVAC applications. Visualization can be implemented with the MFD80 IP65 text display with an MFD-CP4-CO CAN interface and the possibility of customised laser inscription, or the MFD4 touch display.



Communication gateway

The two CAN interfaces and the two serial interfaces allow flexible use in different network environments. One interface can be used for remote visualization devices or I/O expansions whilst the other can be used for communication with higher-level PLC systems. These interfaces can also be run with different baud rates in order to meet the requirements at hand.



Programming via the network

The XC121 can also be programmed via the CAN network. If the PLC is connected with an MFD4 display via the CAN network, programming can even be implemented centrally via Ethernet. This uses Ethernet via the MFD4 and the CAN fieldbus via the XC121 for communication.

easyControl – Lots of Power in the Compact Class, Ethernet and High Performance

EC4P controllers now offer the performance of a PLC in the housing of the renowned easy control relay. This enables the convenient creation of solutions for small and medium-sized control tasks. Simple programming to IEC-61131 using easySoft-CoDeSys is the basis for this, in conjunction with a powerful CPU. This communication capability of the controller is a special feature. Serial and Ethernet interfaces for programming and connecting to OPC clients, as well as CANopen and easyNet for networking with other fieldbus components allow a wide range of communication options. Added to this is the flexible I/O provision. The digital and analog inputs and outputs provided, as well as the integrated technology functions allow the simple and efficient implementation of many applications.

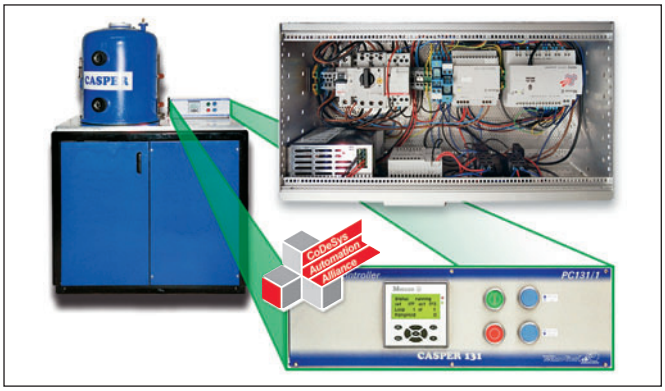
1 Flexible interfaces
Whether CANopen or easyNet: The combined CAN interface enables you to choose your own network structure.

2 Updates simply easy
The slot for a memory module makes program or firmware updates child's play. The memory module is also fully suitable for archiving data.

3 Ethernet on board
The Ethernet interface enables easyControl to be integrated easily. This simplifies programming and connections, such as visualization systems via OPC.

4 User-friendly operation
As the only compact PLC with both an integrated and remote display, the easyControl allows simple operation and visualization.

5 Expansion via easy Link
If more inputs/outputs are required, an expansion can be fitted directly to the basic unit. Digital and analog expansions are possible.



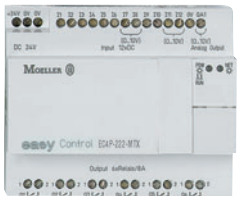
Sintering metals precisely controlled with easyControl

Indutherm Erwärmungsanlagen is a company that uses Eaton Moeller's easyControl and easyHMI for its SU 400, a specially developed sintering unit for diffusion bonding. This required a PLC with a user-friendly operator unit and programming to IEC-61131-3. The easyControl EC4P handles the control of the entire process, as well as the logging of operating and fault messages. Display and operation are implemented with the MFD80 multi-function display. Only one software is needed for programming the EC4P and creating the display screens: easySoft-CoDeSys.

easyControl controls and regulates display degassing unit

TechnoGrav is a company which offers professional and extensive service for vacuum systems and pumps. The basic requirement placed on the EC4P controller was to control several versions of degassing units with a single controller. Display and operation of the process are implemented with the MFD80 multi-function display. The extensive options of easySoft-CoDeSys make it possible to incorporate all variants in a single project. Function blocks provided by the easyControl closed-loop control library handle the pressure dependent control of the degassing unit.

EC4P-221-MTXD1



EC4P-222-MTXX1

Basic units	**easyControl**							
Application	**Compact PLC for different applications**							
Part no.	**EC4P-221-MTXD1*) EC4P-221-MTXX1*)**	**EC4P-221-MRXD1*) EC4P-221-MRXX1*)**	**EC4P-221-MTAD1*) EC4P-221-MTAX1*)**	**EC4P-221-MRAD1*) EC4P-221-MRAX1*)**	**EC4P-222-MTXD1*) EC4P-222-MTXX1*)**	**EC4P-222-MRXD1*) EC4P-222-MRXX1*)**	**EC4P-222-MTAD1*) EC4P-222-MTAX1*)**	**EC4P-222-MRAD1*) EC4P-222-MRAX1*)**
Supply voltage	24 V DC							
Heat dissipation	7 W							
Inputs, digital	12	12	12	12	12	12	12	12
of which the following can be used as: Inputs, analog 0 - 10 V	4	4	4	4	4	4	4	4
Outputs (R=Relay,T=Trans.), also (A=analog)	8T	6R	8T 1 A	6R 1 A	8T	6R	8T 1 A	6R 1 A
Continuous current outputs [1]	0.5 A	8 A	0.5 A	8 A	0.5 A	8 A	0.5 A	8 A
Expandable/networkable	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes
easyNet/CANopen	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes	Yes /Yes
Ethernet	-	-	-	-	Yes	Yes	Yes	Yes
Temperature range	–25 °C bis +55 °C							
Shipping approvals	DNV, GL, ABS, BV, LR							

[1] Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A / 24 V DC, max 4 outputs switchable in parallel
*) D1 with display, X1 without display

easy Expansions – CANopen Expansions

easy expansions

easy expansions are connected directly to the easyControl PLC via easyLink. The range offered consists of digital, analog and communication modules. These allow expansions of up to 24/16 digital inputs/outputs.

EASY202-RE

EASY410-DC-TE

EASY618-DC-RE

EASY204-DP

EASY221-CO

EASY222-DN

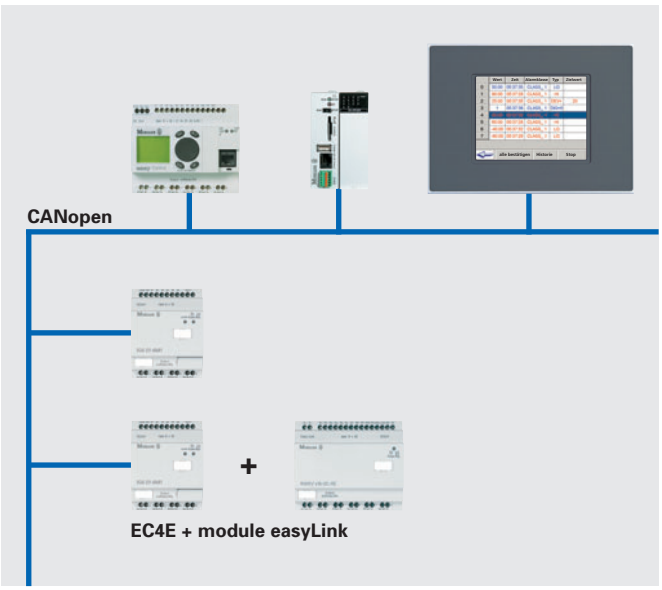
Application	Expansions, analog inputs/outputs		Expansions, digital inputs/outputs						Expansion modules				
	easyLink								Communication				
Part no.	**EASY406-DC-ME**	**EASY411-DC-ME**	**EASY202-RE**	**EASY410-DC-RE**	**EASY410-DC-TE**	**EASY618-AC-RE**	**EASY618-DC-RE**	**EASY620-DC-TE**	**EASY200-EASY**	**EASY204-DP**	**EASY205-ASI**	**EASY221-CO**	**EASY222-DN**
Supply voltage	24 V DC	24 V DC	-	24 V DC	24 V DC	100-240 V AC	24 V DC	24 V DC	-	24 V DC	-	24 V DC	24 V DC
Inputs, digital	1 (3)	1 (3)	-	6	6	12	12	12	-	-	-	-	-
Inputs, analog	2*	6**	-	-	-	-	-	-	-	-	-	-	-
Outputs, digital (R=relay, T= trans.)	2T	2T	2R	4R	4T	6R	6R	8T	-	-	-	-	-
Outputs, analog (0-10 V)	1	2	-	-	-	-	-	-	-	-	-	-	-
Continuous current of outputs, digital[1)]	1A	1A	8A	8A	0.5A	8A	8A	0.5A	-	-	-	-	-
Degree of protection	IP 20								IP 20				
Ambient operating temperature	- 25 °C ... + 55 °C								- 25 °C ... + 55 °C				
Dimensions (W x H x D) mm	71.5 x 90 x 58		35.5 x 90 x 58	71.5 x 90 x 58		107.5 x 90 x 58			35.5 x 90 x 58				

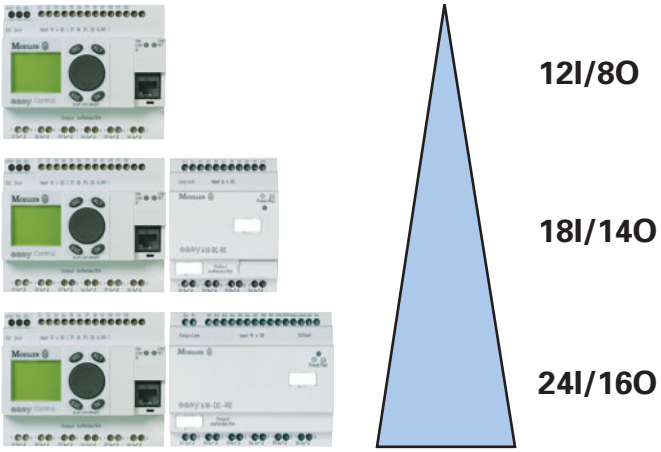
1) Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A / 24 V DC, max. 4 outputs switchable in parallel
* 2 x 0-10 V or 2x 0-20 mA or 2x Pt100 (2/3 wire connection); voltage inputs (0-10 V) also suitable for optional digital use
** 2 x 0-10 V and 2x 0-20 mA and 2x Pt100 (2/3-wire connection); voltage inputs (0-10V) also suitable for optional digital use

CANopen expansions

EC4 modules with CANopen fieldbus can be connected to all controllers with a CANopen master. In addition to easyControl, this includes the XC100 and 200 modular PLCs, XC121 compact PLC and the MFD4 HMI-PLC. The CAN modules can also be expanded with a digital or analog easy expansion module.

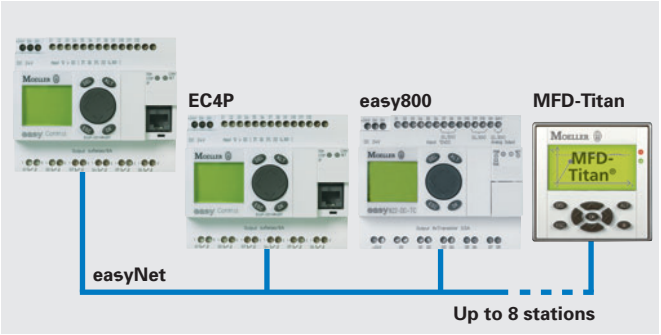
Application	Expansions, CANopen with digital inputs/outputs	
Part no.	**EC4E-221-6D4R1**	**EC4E-221-6D4T1**
Supply voltage	24 V DC	24 V DC
Input, digital	6	6
Outputs (R=relay, T= trans.)	4R	4T
Continuous current of outputs, digital1)	8 A	0.5 A
Degree of protection	IP 20	
Ambient operating temperature	- 25 °C ... + 55 °C	
Dimensions (W x H x D) mm	71.5 x 90 x 58	





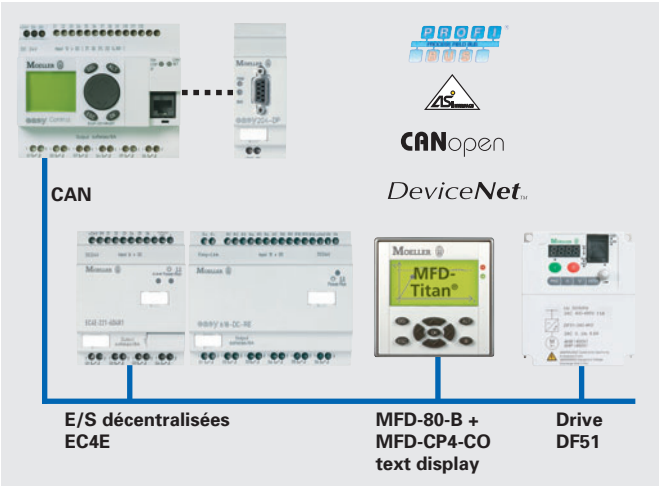
Scalable stand-alone application

The easyControl is well equipped with 12 inputs (of which 4 are analog), 8 outputs and an additional analog output for many small applications. If more inputs/outputs are required, you can implement up to 24I/16Q with easyLink modules. The device can also be used in the extended temperature range down to -25 °C.



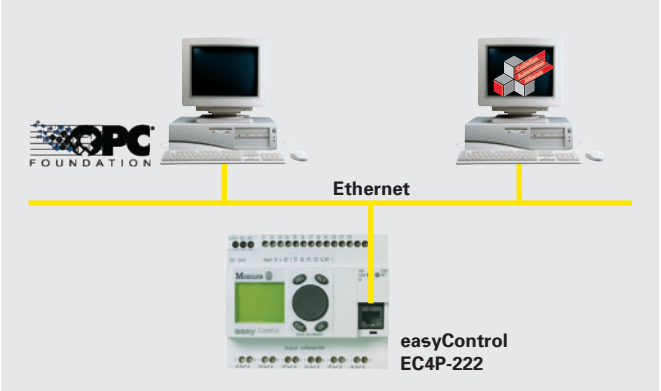
Flexible networking options

easyControl is provided with an easyNet/CANopen interface. This enables data to be exchanged via the easyNet with easy800 stations. In CANopen mode, CANopen fieldbus devices can be connected as required, for example EC4E I/O expansions or the MFD80 text display can be connected with the MFD-CP4-CO CAN interface. If required this application can then be connected as a pre-processing unit to higher-level controllers via a fieldbus module. Modules are available for PROFIBUS DP, DeviceNet, AS-Interface or DeviceNet.

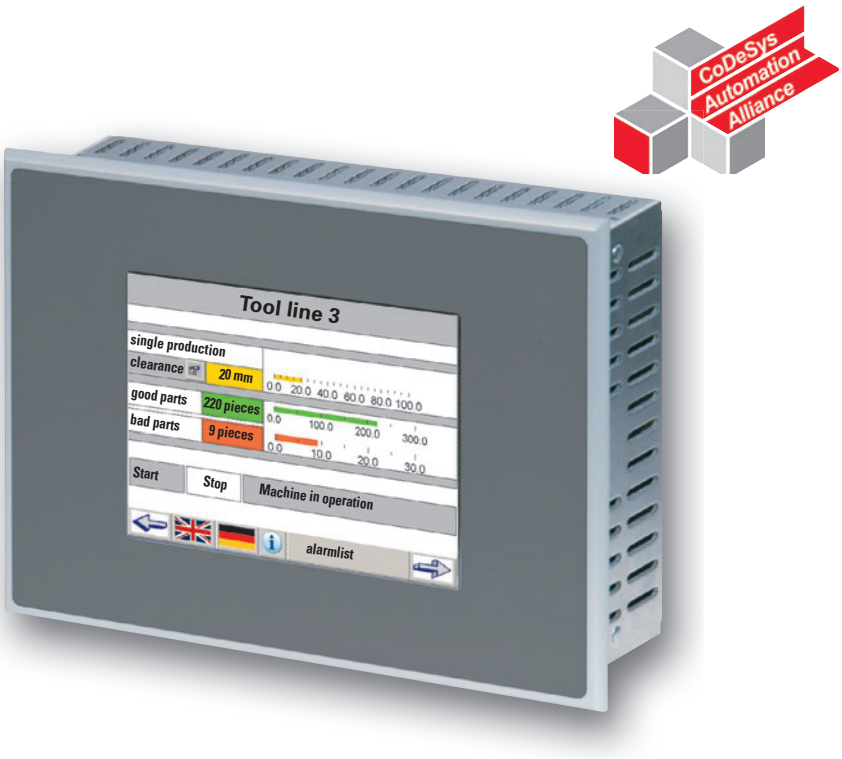


Access via Ethernet

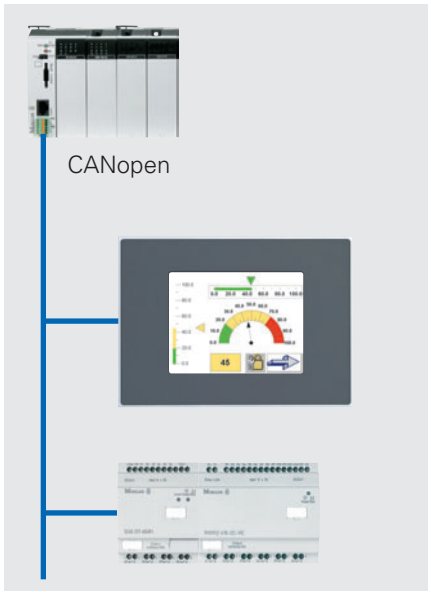
Existing Ethernet infrastructures simplify central access to the controller systems. easyControl devices with an Ethernet interface can be integrated here simply. This therefore enables remote programming or access to PLC data via OPC.



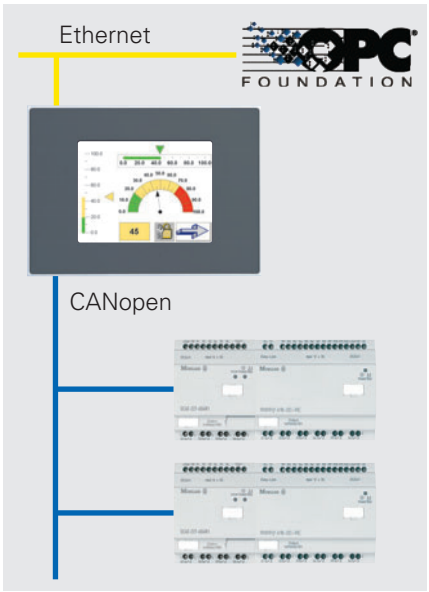
MFD4 Multi-Function Display For Universal Use



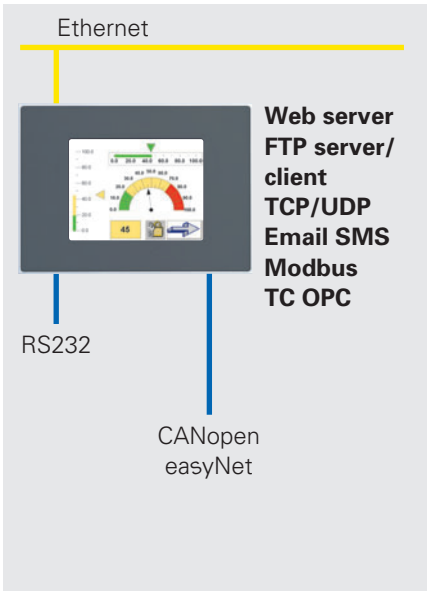
The MFD4-5-XRC-30 multi-function display is a new component in Eaton Moeller's automation range. The device comes with a 5.7" TFT display, resistive touch technology and a wide range of communication options. The integrated PLC turns the device into a genuine multi-talent. easySoft-CoDeSys is the only software required for both the visualization and the programming. The device also comes with a web server that enables users to access and make entries on visualization screens via the Internet.



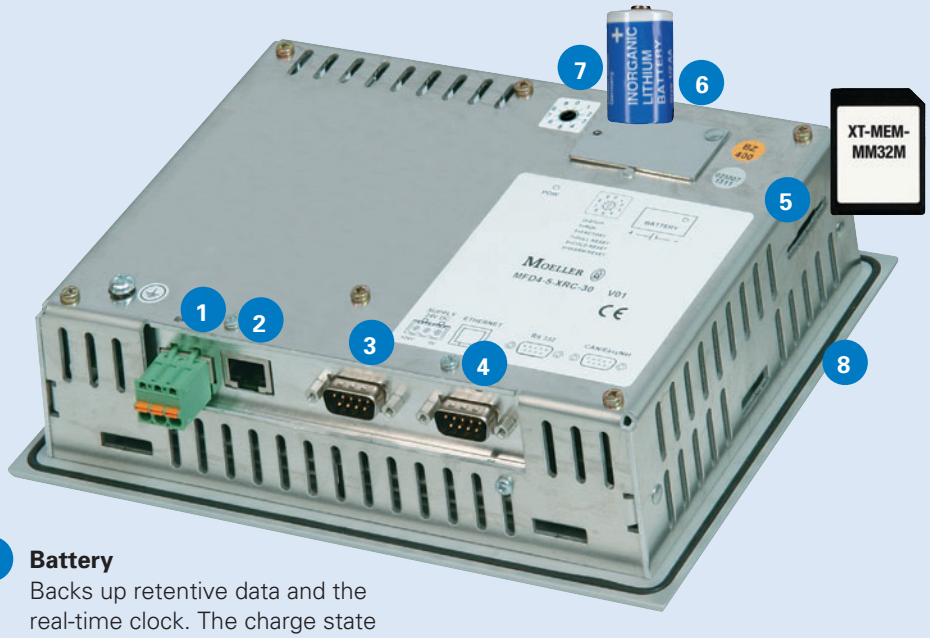
MFD4 as a conventional HMI with a higher-level PLC. The data connection is implemented via the fieldbus or also via the serial interface.



MFD4 as HMI with integrated PLC functionality. Connection to peripheral devices can be implemented via the integrated CANopen fieldbus. The Ethernet interface allows programming and an OPC connection to process control systems.



The wide range of communication options provided by the MFD4 are a major benefit. The Ethernet interface, together with serial and fieldbus interfaces, offer a wide range of options for transferring process data, diagnostics information, office applications and much more.



1 Power supply
24 V DC; protected against reverse polarity and overvoltage.

2 Ethernet
Programming, communication with other devices, OPC Server, web Server.

3 RS232
Programming, data transfer in Transparent mode.Transfer of the operating system

4 CANopen/easyNet
Combined CANopen/ easyNet interface. Complete integration in the Eaton Moeller automation world and remote connection of I/O devices.

5 MMC card
Storage of recipe data, general data and the user program; operating system update.

6 Battery
Backs up retentive data and the real-time clock. The charge state is monitored.

7 Operating mode selector switch
Starting and stopping the program. The device can be restored to the factory setting via the covered Set button.

8 Integrated rubber seal
Rubber seal integrated in the front frame guarantees problem-free mounting.

Technical data of the MFD4-5-XRC30

Display

Diagonals/type	5.7 inch/TFT
Resolution	320 x 240 pixels
Touch technology	Analog resistive
Number of colours	32000
Brightness	500 cd/m^2

Interfaces

Ethernet 10 / 100 Mbit	RJ45, communication, Programming
CANopen/easyNet	9pole Sub D, communication
RS 232	9pole Sub D, communication, Programming, OS update

Memory

for visualization	6 MB
for PLC program	4 MB
Program data	512 kByte
Retain data	32 kByte
Memory card	yes (optional) MMC

Power supply

Rated input voltage	24 V DC
Overvoltage/reverse polarity protection	yes

General

Web server	yes
Real-time clock	yes
Degree of protection, front	IP 65
Explosion protection	Atex Directive 94/9/EC, Devices group II, Zone 22, cat. 3D
Shipping approvals	DNV, GL, ABS, BV, LR

easySoft-CoDeSys – One Software For Programming and Visualization

easySoft-CoDeSys – one software for Programming and visualization

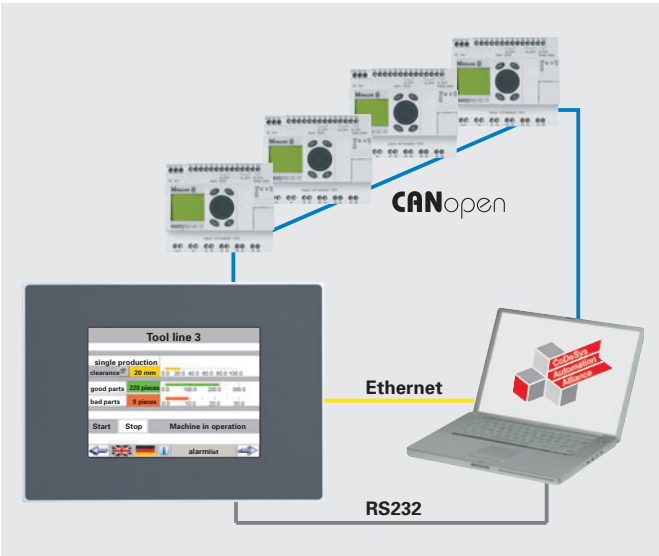
Eaton Moeller follows its philosophy consistently here: one software package both for programming and for creating the visualisation screens. No additional visualisation package is required. PLC program and visualisation are created on one user interface. The designer only has to "play around" with one software package.

easySoft-CoDeSys – programming to IEC 61131-3

easySoft-CoDeSys is an IEC 61131-3 compliant programming system based on CoDeSys from 3S for industrial PLCs. Matured technical features, simple handling and the widespread use of this software in the automation components of different manufacturers make it a guarantee for success.

The benefits of only one software package for programming and visualization are obvious: The direct access to the variables of the PLC (one common database) ensures greater clarity and reduces the project design work required. No separate visualization software is required. The otherwise unavoidable and often error-prone import and export of symbolic variable lists is unnecessary. One software for everything is the principle – and that makes it easy to use!

The benefit of this becomes clear with the MFD4 multi-function display. The user can draw on the renowned visualization functions of easySoft-CoDeSys for implementing his application. As well as process visualization, the user can likewise create a web server application and load it into the MFD4.



Universal communication

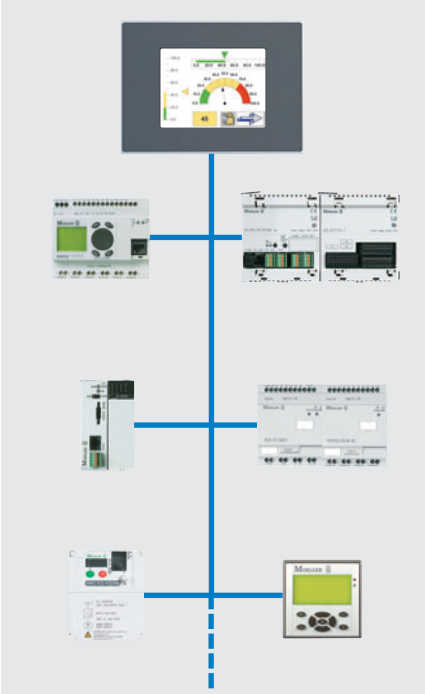
The MFD4 comes with an Ethernet, combined CANopen/easyNet and RS232 interface. The Ethernet interface (10/100 MB) ensures fast program downloads and can also be used for communication to other controllers. An OPC connection, visualisation via WEB browser or file transfer via FTP access complete the range of communication options available.

The RS232 is designed as an alternative programming access and can be also used for communication with peripheral devices such as modems or barcode scanners.

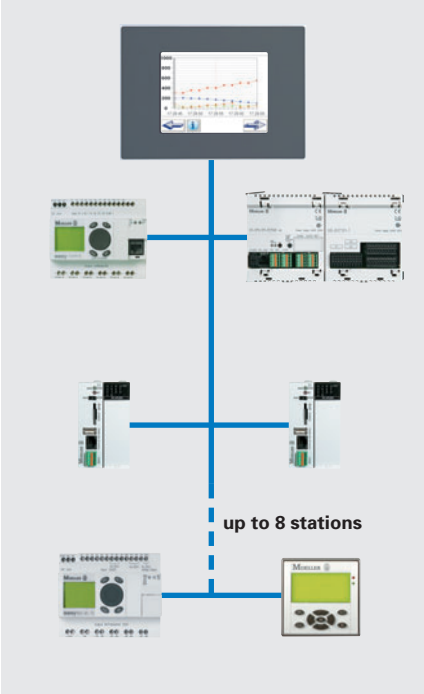
The combined CANopen/easyNet interface fully integrates the MFD4 in the Eaton Moeller automation world. XC100/ XC200, MFD-CP4-CO, EC4P, easy800 or EC4E can be connected without any problem.

MMC enables universal use

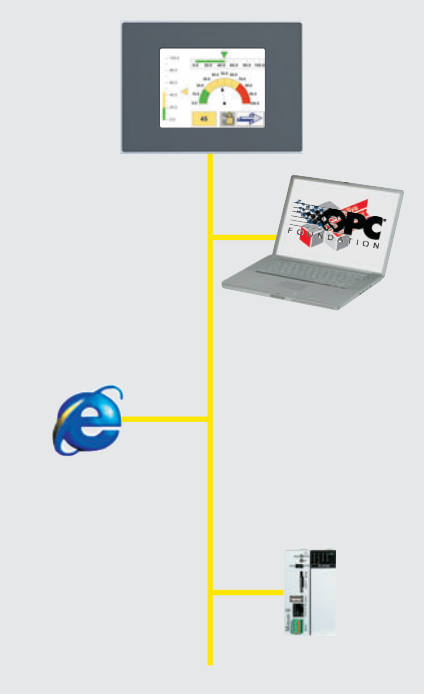
The complete project, recipe data, trend and alarm data, as well as the operating system can be stored on a Multi-Media memory card if required. This important feature enables the simple and reliable exchange of data worldwide without any programming device required.



The MFD4 can be run as network master or also as slave (device) on the CANopen bus.



The easyNET connects the easy world with the easyHMI, easyControl and XC200 controllers. Up to 8 stations can be connected together simply.



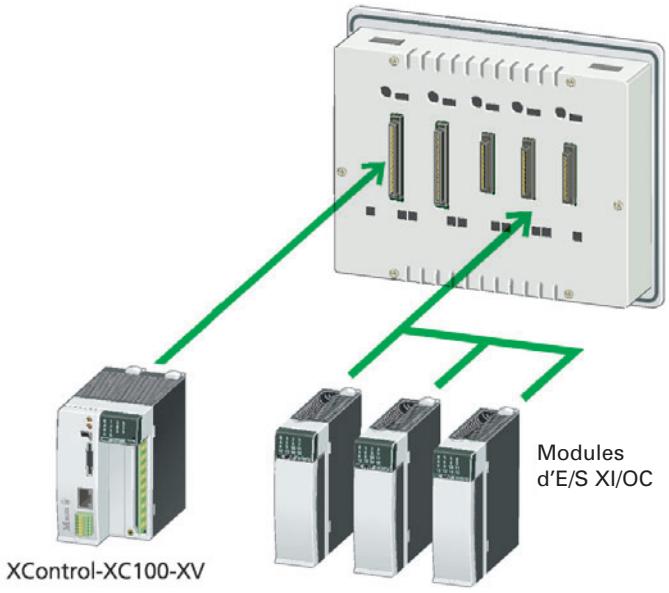
The Ethernet interface of the MFD4 guarantees the perfect connection to the IT world. Whether for fast programming access, data exchange between the PLCs, web server or OPC server. It couldn't be simpler and quicker.

XV101 Modular Text Display PLC with Pluggable I/O Modules

The XV100 text display PLC can be configured in a modular way. Two display types with membrane keyboard, different PLC modules and up to three XI/OC I/O modules can be configured to create a complete automation system. The CPU and the I/O module are fitted here directly on the rear of the display. This is an extremely compact and yet flexible automation unit. Networking options are provided via the integrated CANopen fieldbus interface, as well as other XI/OC communication modules (PROFIBUS, Modbus, Suconet) or OPC.

Programming and visualization together

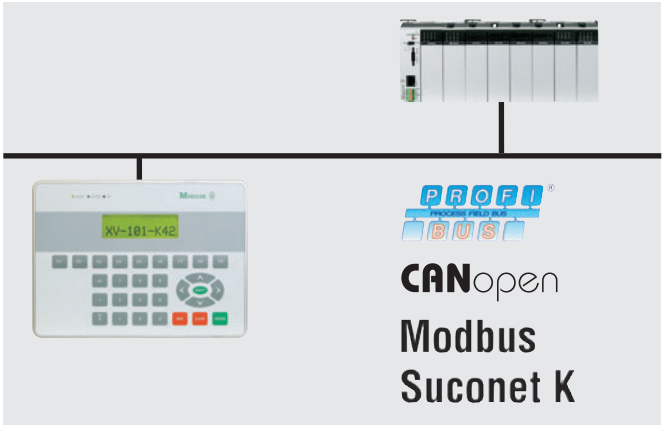
The configuration and programming of the display are carried out in easySoft-CoDeSys. The buttons of the display, as well as the LEDs of the function keys are normal inputs and outputs and can therefore be processed as usual in the PLC program. The output of the texts and the processing of entries is carried out by means of ready-to-use function blocks. Project design with a separate tool is unnecessary.



Modular function block system. Bespoke solution design.

Compact “all in one“ PLC

The XV100 system meets the demand for a PLC system that is compact on the one hand, and yet offers a flexible I/O level. This system offers a wide range of XI/OC signal modules. Digital modules with up to 32 channels or also 8-channel analog modules provide for the high channel density.



Intelligent remote display PLC

The flexible communication options allow use as an intelligent pre-processing display PLC.

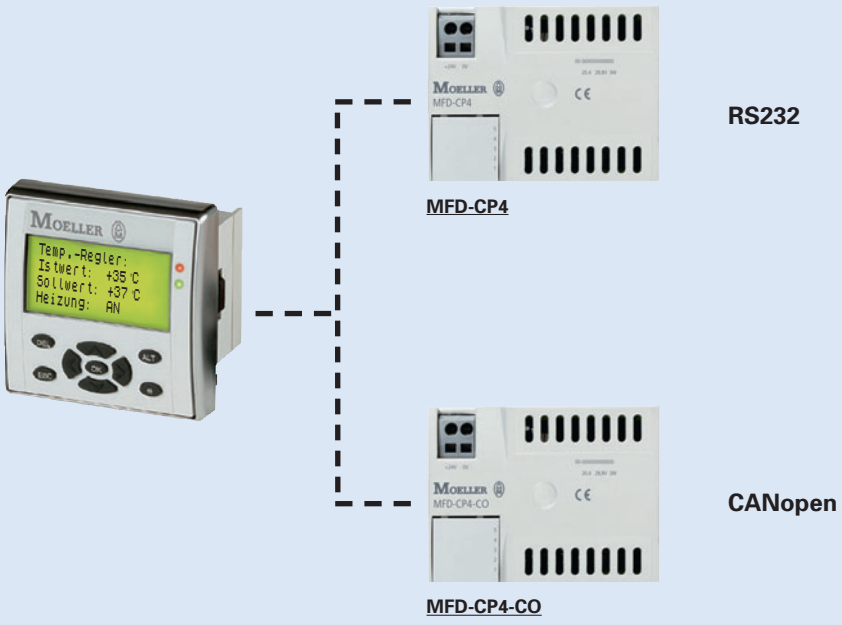
The following connections are possible:
- PROFIBUS DP slave (with XIOC-DP-S)
- CANopen master/slave (integrated on CPU)
- Modbus master/slave (with XIOC-SER)
- Suconet K master/slave (with XIOC-NET-DPM / XIOC-SER)
- Any serial protocols (CPU interface or XIOC-SER)

Display	XV-101-K42	XV-101-K84
Display (lines/characters)	4 x 20	8 x 40
Character height	5 mm / 10 mm	
Total buttons of which function keys Function keys with LED	29 9 6	35 15 -
Backlight	yes	
Slot for XIOC modules	3	

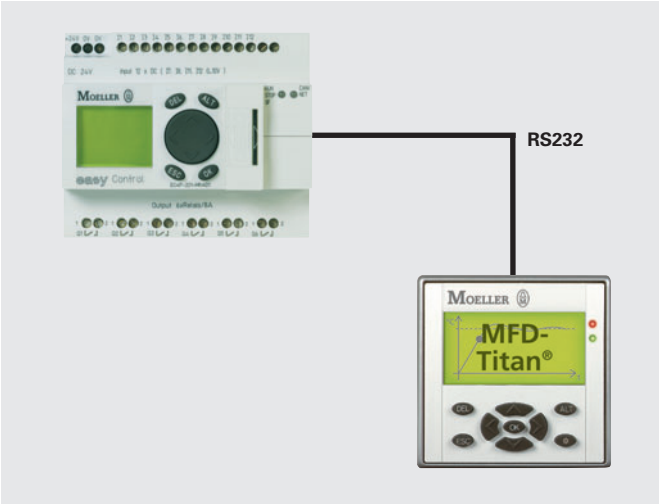
CPU	XC-CPU101-C64K-8DI-6DO-XV	XC-CPU101-C128K-8DI-XV	XC-CPU101-C256K-8DI-XV
Program memory	64 kB	128 kB	256 kB
Data memory	64 kB	128 kB	256 kB
Text / graphic memory	512 kB		
Inputs / outputs	8 (4 Interrupt) / 6		
CANopen fieldbus	yes		
Memory card	MMC, 32 MB		
Programming interface	RS232		
OPC server	yes		

Flexible MFD-80 Text Display for CANopen and RS232

Display systems are being increasingly used in more and more applications. With smaller PLCs, the costs for these devices and the effort required for configuring the data exchange between the PLC and the display unit are often considerable. The MFD text display offers here the ideal solution for many applications. It consists of the MFD-80 display and a communication port either with a serial interface (MFD-CP4) or with a CANopen fieldbus connection (MFD-CP4-CO). The MFD-80 4-line display has IP65 protection at the front, offers customised laser inscription and can be used at temperatures as low as -25 °C. The display is programmed directly from the user program. Ready-to-use function blocks are simply assigned parameters with texts and variables.

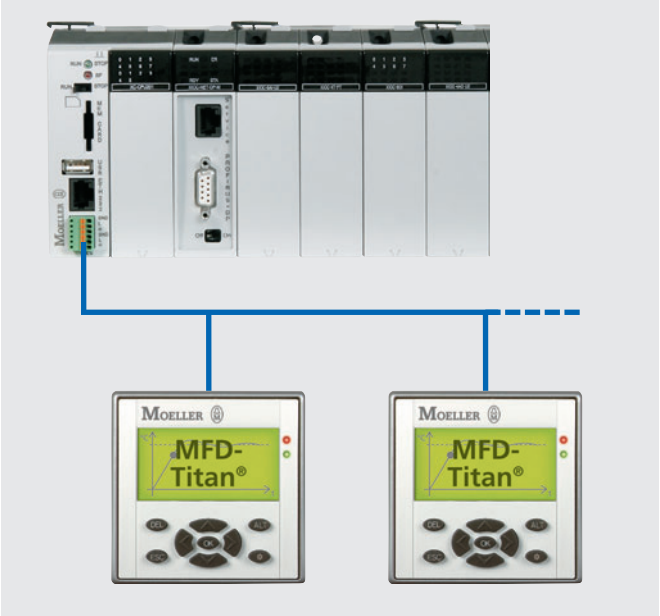


Flexible communication and simple mounting are the outstanding features of the MFD-80 text display.



User-friendly text display

If the display requirements cannot be met with basic control circuit devices, or the use of plain text diagnostics is required, the MFD-80 display with the MFD-CP4 serial interface module is a simple and user-friendly solution. This allows the implementation of applications involving operator guidance and error indication. It can be used as a diagnostic unit (also temporary) during commissioning or maintenance to read out or even modify settings.



Several displays on the CAN network

Compared to the serial interface, the MFD-CP4-CO CANopen interface also allows larger distances to be covered between controller and display device. The use of several display devices is also possible. These can display identical or different contents. For example, a device can be used as a maintenance device in the control cabinet, whilst another one can be used at the machine for displaying and operating the process. This is made easier by the high IP65 degree of protection.

Display	MFD-80
Display	4 x 16 characters
Character height	1, 2, 4-line
Degree of protection	IP65
Customised laser inscription	yes
Temperature range	–25 up to 55 °C

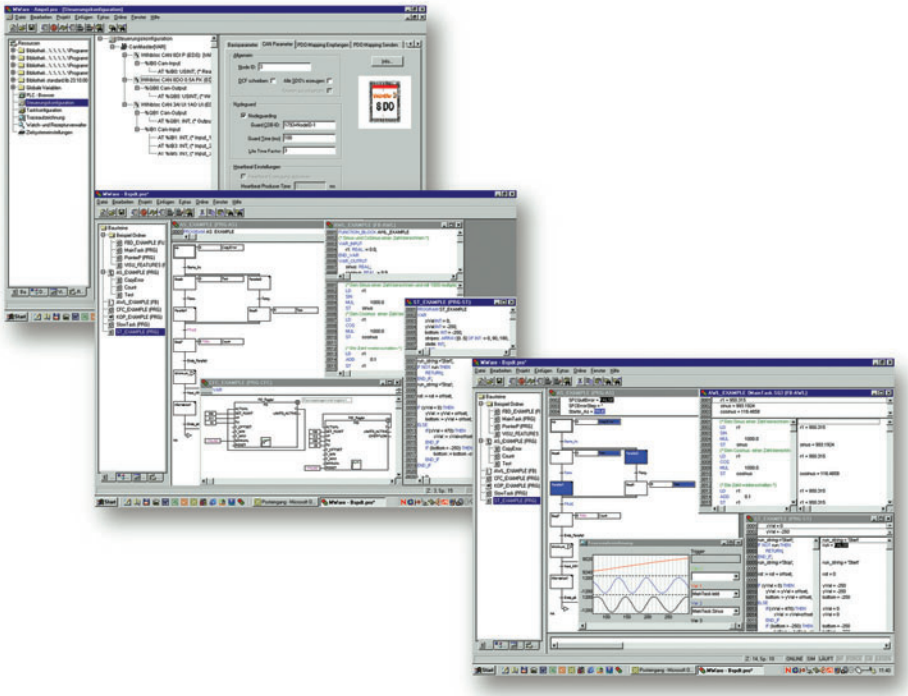
Communication module	MFD-CP4	MFD-CP4-CO
Interface	RS232	RS485
Protocol	easy	CANopen
Baud rate	max. 19,2 kB	max. 1 MB
Address		1–63
Temperature range	–25 up to 55 °C	

Eaton Moeller Automation Software: Programming Compliant with International Standards

All Eaton Moeller xControl controllers are programmed with the IEC 61131-3-compliant easySoft-CoDeSys programming system. Matured technical features, simple handling and the widespread use of this software in the automation components of different manufacturers are guarantees for success.

A number of features simplify the creation of applications and are designed for one purpose: cost saving by reducing project design times. A selection of other features: Global search and replace, generation and use of libraries, context-sensitive help, cross-reference list output, checking of unused variables etc.

Convenient PLC configuration

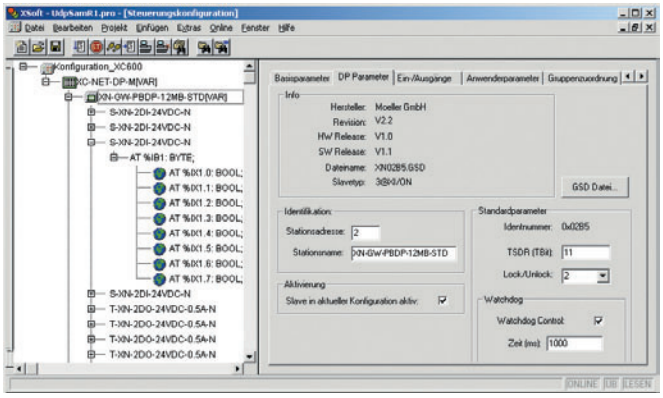


Programming languages

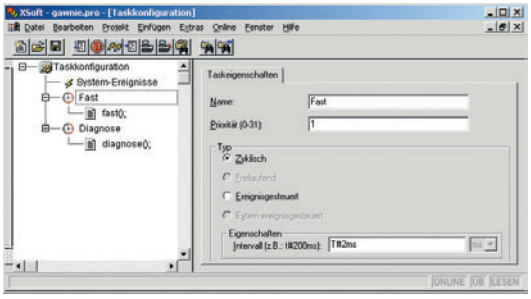
- Instruction list (IL) and structured text (ST)
- Function block diagram (FBD)
- Freely definable function block chart/ continuous function chart (CFC)
- Ladder diagram (LD)
- Sequential function chart (SFC)

Engineering features

- Auto Declare: automatic variable declaration
- Auto format/syntax colouring
- Automatic formatting and colouring of the code/declaration text
- User-friendly project comparison



Fieldbus configurator included
The XSoft hardware configurator shows all local I/Os and the remote periphery (Profibus or CANopen) on one user interface. You can configure and parameterise the inputs and outputs directly and assign them symbolic names. In this way, assignment errors between the periphery and the IEC program are excluded. You can also test the variables during online operation.



Multi-tasking
Structuring the application into several independent runtime programs (multi-tasking) optimises your PLC resources and simplifies the implementation of time-critical tasks. In this way, you can give fast processes priority and slower processes only as much processing time as is necessary.

Simulation
You can even test your application program without a PLC being connected. This is offered by the integrated online simulation function. You don't have to leave your usual operator interface, and handling is the same as online mode with the PLC connected.

Multi-tasking
Up to 16 time and/or event controlled tasks

Visualization
Integrated tool for diagnostics and commissioning

Configuration
Configurator for local I/Os, as well as CANopen and DP stations

Communication
RS232, Ethernet,
in distributed networks via
CANopen, OPC server,
UDP, TCP/IP, FTP client/server,
Modbus Master/Slave,
Email, SMS

Web page creation
Yes

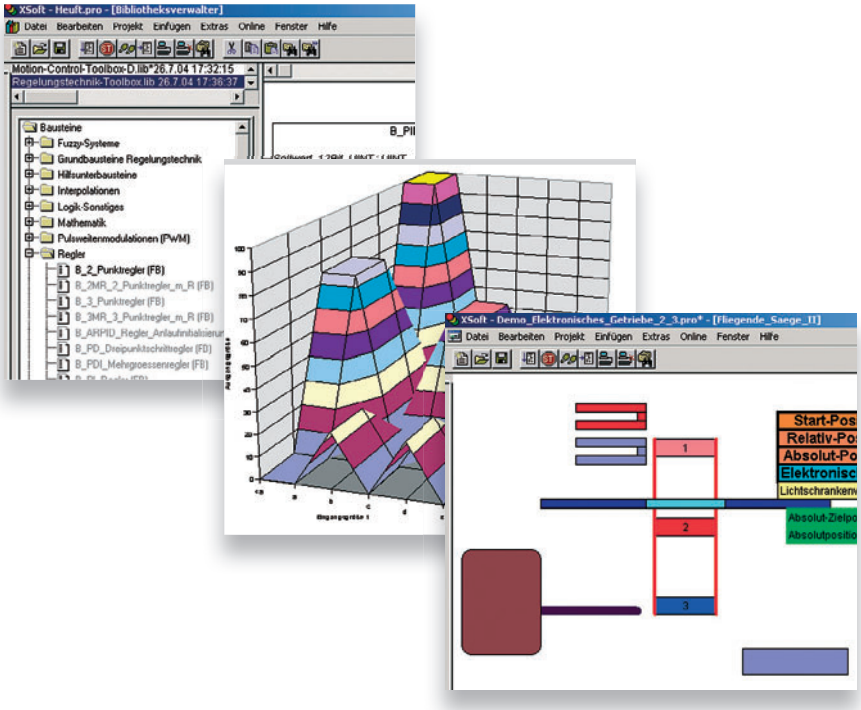
Password protection
8 levels

Languages
D, GB, F, E, PL

Libraries
IEC, MMC access,
closed-loop control,
motion control etc.

Special features
Network variables for cross traffic via CAN and Ethernet

easySoft-CoDeSys Software Libraries



xControl PLCs are suitable for a host of different applications. Communication interfaces allow communication via a serial or Ethernet interface; device features such as the multimedia memory card or the USB interface make it possible to log large data volumes. Powerful CPUs provide adequate CPU performance for closed-loop control and positioning tasks. These device features are supported with several libraries, that relieve the user of programming work. Additional application notes are provided with ready-made example applications that can be used as a basis of user implementations.

Communication libraries

Serial communication The integrated programming interface can be used on all controllers for the application concerned. The XIOC-SER module is also available for providing an additional RS-232C /-422 /-485 interface for the XC100/200 modular system.

The following protocols are possible and are supported by libraries.

- SUCOM-A client/server
- Modbus RTU master/slave (also bus-enabled with the RS485 of the XIOC-SER)
- SMS messaging
- Suconet K master[1)]/slave
- easyCom protocol for MFD80
- User-defined protocols

1) (XIOC-NET-SK-M)

Ethernet

The Ethernet interface of the XC200 can be used in a wide range of applications. As well as standard services such as programming access, OPC server, web server, this interface also provides the basis for a number of other communication options. Ready-to-use libraries and application notes with examples are provided in addition to the basic functions.

- FTP client / server
- TCP client / server
- UDP transmit / receive
- Modbus TCP master / slave
- Email

Data archiving

The logging of operating data, the storage of parameter changes or the use of recipes are only some of the applications made possible by using the MMC memory card of the xControl devices. The large memory capacity also allows the processing of large data volumes. The memory card can be read and written with standard PCs in the normal way. If data is written, for example in CSV format, this file can be further processed in Office programs such as Excel.

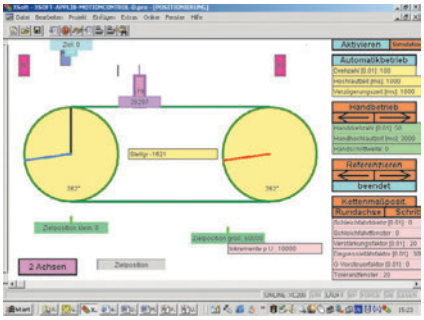
Motion control toolbox

The motion control toolbox contains approximately 40 function blocks that can be individually integrated and adapted to the automation solution in question.

Positioning

Basic positioning function blocks are available for elementary tasks and also more powerful function blocks with the following features:

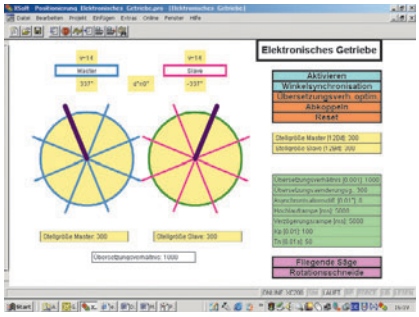
- Asynchronous point-to-point positioning
- Master-slave positioning (e.g. interpolation)
- Incremental coordinate positioning
- Rotary axis positioning (bending, turning) with optimised paths over the zero point
- Automatic referencing, Manual mode with step width limitation,
- Contouring error, wire break and positioning range monitoring
- Crawl speed zone at the end of positioning
- Compensation of the zero point coverage of hydraulic axes



Possible applications include handling tasks in the automobile supplier industry (manufacture of cup springs and spiral springs), winding of spiral springs, cable winding machines, pipe bending, positioning and synchronisation of stages or curtains in theatres.

Electronic gears

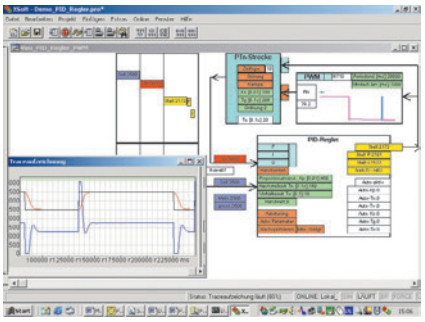
An electronic gear system can be implemented with the synchronisation function blocks. Different speeds can be synchronised with any transmission ratio.
Angle synchronisation with online configurable offset between master and slave axes is also possible. Three master axis variants are provided. The internal master is controlled in the



same program. The external master is controlled by an external device. An incremental encoder records the motion of the master axis. With the virtual master, the slave axes follow a simulated axis.
Applications include: press synchronisation control with virtual master; angle and speed synchronisation of belts; drawing of weaving materials with 5 slave axes and increasing transmission ratio per axis.

Closed-loop control toolbox

The closed-loop control toolbox contains around 120 function blocks. The standard function blocks allow full utilisation of the closed-loop control know-how implemented, and it is also possible to create special application solutions by combining and cascading function blocks.



- **PID controllers:** The right controller can be selected for any control task. For example, typical heating/cooling temperature controls can be implemented using the split range PID controller. The autotuning controller can be used for the automatic setting of parameters at the beginning of the control process.
- **Three-point step controller:** In addition to the standard PID three point step controller, other robust and easy-to-use versions are available, for which the valve opening time is not important. The scan times of differentiation and integration elements are optimised automatically.
- **Pulse width modulation (PWM):** If the control system does not have an analog actuator, the pulse width modulation function blocks are incorporated behind the PID or fuzzy controllers. Conventional PWM algorithms are available and the noise-shape process with a highly dynamic switching frequency.
- **Fuzzy control:** The fuzzy function blocks enable even inexperienced users to integrate fuzzy systems/ controllers in a control concept. Even the gain factor or setpoint of a PID controller can be programmed effortlessly with fuzzy logic.
- **Signal processing and simulations:** Ramp delay function blocks and PT1 filters can be used to improve signal quality. First to tenth order PTn control systems can be simulated with the toolbox function blocks without an additional software package.

Switched-Mode Power Supplies – The Ideal Power Source For Your 24 V DC PLCs

The switched-mode power supply unit is indispensable in the fields of power engineering and automation. The technology features a high efficiency and the development of heat and power losses are thus kept to a minimum. The wide input voltage range which accepts both AC and DC power supplies guarantees world-wide use, even with fluctuating power networks and battery operated systems. The new devices feature integrated performance reserves of up to 50%; which avoid the necessity for over-dimensioning with high starting loads. They are also no-load and overload protected and feature permanent short-circuit proofing. Devices with adjustable output voltage, e.g. for compensation of voltage drops on long cable lengths enable matching to the demands of different applications. An additional annunciation module which can be retrofitted with a remote function for external switch on and off, as well as a relay output for indicating that the input/output is ok, optimise the monitoring features of the control.

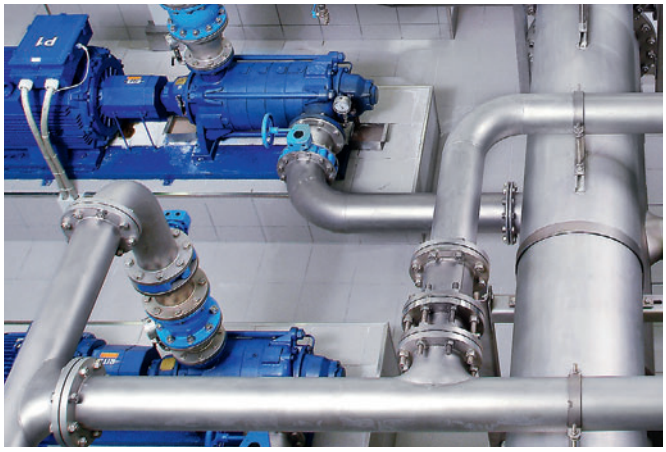

1)

Part no.	SN3-050-BU8	SN3-100-BV8	SN3-200-BV8	SN3-050-EU8	SN3-100-EU8	SN3-200-EU8
Rated input voltage						
110...120 V AC		•	•			
110...240 V AC	•					
220...240 V AC		•	•			
110...240 V AC/DC				•	•	•
Input voltage range						
85...264 V AC	•			•	•	•
85...132 V AC		•	•			
110...240 V AC						
184...264 V AC		•	•			
100...350 V DC	•			•	•	•
220...350 V DC		•	•			
Rated frequency						
47...64 Hz	•	•	•	•	•	•
Rated output voltage						
24 V DC	•	•	•	•	•	•
Setting range						
22-28 V DC				•	•	•
Tolerance of the						
rated output voltage in %	-1...+5	-1...+5	-1...+5	-1...+5	-1...+5	-1...+5
Rated output current $T_u < 60°C$						
5 A	•			•		
10 A		•			•	
20 A			•			•
Rated output current $T_u < 40°C$						
7 A	•			•		
15 A		•			•	
22 A			•			•
Current limitation in A						
At short-circuit	11	19	25	11	19	25
Short-circuit and overload protect	Permanent short-circuit proof, thermal protection					
Power failure bridging						
At rated load	>100 ms	> 50 ms	> 50 ms	> 100 ms	> 40 ms	> 40 ms
Degree of protection						
Housing	IP20	IP20	IP20	IP20	IP20	IP20
Terminals	IP20	IP20	IP20	IP20	IP20	IP20
Dimensions size/weight						
Width in mm	57	90	200	57	90	200
Height in mm	130	130	130	130	130	130
Depth in mm	130	130	130	130	130	130
kg	1	1.1	2.9	1	1.4	3.2
Mounting						
DIN rail EN50022	•	•	•	•	•	•
Function module can be retrofitted[1)]						
Annunciation module SN3-000-MMEU8				•	•	•
Internal input fuse	4 AT	6.3 AT	12 AF	4 AT	6.3 AT	12 AF
Heat dissipation *in W*	< 15	< 29	< 56	< 15	< 29	< 56
Efficiency in %	> 88	> 88	> 88	> 88	> 88	> 88
Parallel connection ability	up to 5 devices	up to 5 devices	up to 5 devices	up to 5 devices	up to 5 devices	up to 5 devices
Product standard	EN61204					
Approvals	UL (file no. E190715/E300273)					

An Eaton Green Product

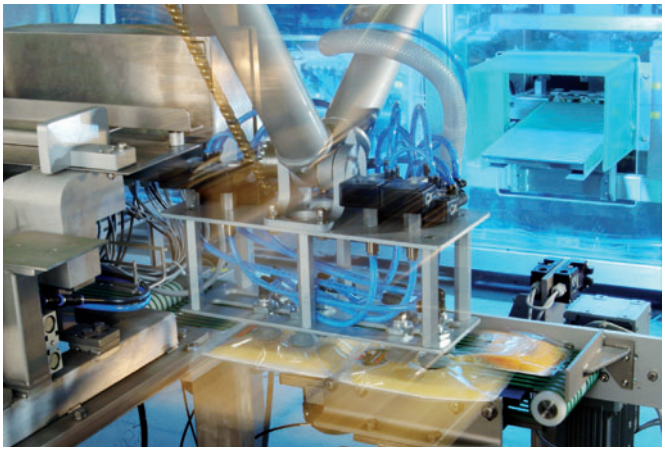
M-Max™ Frequency Inverter System Features

The M-Max series frequency inverters allow drives to be adapted easily to customer requirements. With a compact design for assigned motor ratings from 0.25 kW to 7.5 kW, M-Max can offer maximum flexibility. M-Max also demonstrates how a high level of functionality can be implemented in a simple and user-friendly design. The small and compact book format design also allows a space saving installation. M-Max is provided with an integrated RFI filter (EMC) and a flexible interface for solving important machine building requirements, for example, the optimization of production and manufacturing processes. It reliably ensures the required motion sequences of the drive motor and thus contributes to operational safety.



M-Max – the "energy optimizer"

M-Max frequency inverters provide an economical solution for several processes in pumping applications. The integrated PI controller and extensive motor-protective functions ensure a high level of operational reliability and allow significant energy savings in the connected process. The lacquered control boards also allow use in highly humid and aggressive environments, such as in a sewage treatment plant. The optional MMX-IP21-FS... accessory enables the degree of protection of the M-Max to be increased to IP21.



M-Max – for "dynamic precision"

The compact design of the M-Max saves valuable mounting space in machine building since the RFI filter and the brake chopper are already integrated. Shielded control and motor cable can also be connected with EMC compliance directly to the frequency inverter. The maximum permissible ambient temperature of +50 °C during operation with continuous current and with full overload withstand capability also meets machine building requirements. The performance of the sensorless vector control ensures also a high speed accuracy; even with load deviations and low motor speeds.

M-Max – the fieldbus flexibility

The frequency inverters of the M-Max series can be integrated into different fieldbus systems with the plug-in modules inserted into the side of the device.

The following fieldbus modules are available:
- CANOpen (XMX-NET-CO-A)
- Profibus DP (XMX-NET-PD-A)
- DeviceNet (XMX-NET-DN-A

The attachment of the modules to the frequency inverter is undertaken with a special mounting frame (MMX-NET-XA).

MMX-COM-PC – the "in-line communicator"

The MMX-COM-PC communication module that can be plugged onto the front provides the following without a mains voltage on the frequency inverter (internal battery):

- Upload and download of all parameters,
- Direct link to a PC via USB interface (parameter assignment),
- Copying of parameters for series machines or when exchanging devices.

This communication module considerably increases data security and reduces the time required for commissioning and maintenance.

Frequency inverters - simple and straightforward

Display unit

Backlit liquid crystal display (LCD)

Status symbols (▲):
READY = Ready to start
RUN = Operational
STOP = Stop, Stop command active
ALARM = Alarm message active
FAULT = Drive was stopped due to an error message

Menu level (◀):
REF = Reference value entry
MON = Monitor operating data
PAR = Parameters
FLT = Fault memory (Fault)

Control commands (▼):
FWD = Forward run
REV = Reverse run
I/O = Via control terminals (Input/Output)
KEYPAD = Via the keypad
BUS = Via fieldbus (interface)

Function keys

START
Motor start via keypad
(function must be activated)

STOP
- Motor stop via keypad
- Activates the Startup Wizard (press for 5 s)

OK
- Activates the selected parameter
- Confirm and save the set value
- Parameter group selection (submenu)

BACK/RESET
Back in menu. Exit edit mode and acknowledge error messages (reset).

LOC/REM
Move between different control levels (keypad – control terminals – fieldbus)

UP/DOWN
- Menu level selection in the display unit
- Change in the parameter groups and parameter lists
- Increase and reduce parameter values
- Increase and reduce reference value (electronic motor potentiometer)

LEFT/RIGHT
- Change the parameter group
- Change the position with value input

Features

- Integrated RFI filter (EMC: C2 and C3 to/EN61800-3)
- Dynamic motor control with sensorless vector control or V/f control (selectable)
- Integrated keypad and display unit
- Electronic reference value potentiometer
- Fixed frequencies
- PID controller
- Integrated brake unit (with MMX34 in sizes FS2 and FS3)
- 6 digital control inputs (24 V DC) (logic can be set)
- 1 digital output (transistor, 24 V DC, 50 mA)
- 2 analog inputs (0…10V / 0/4…20 mA can be set)
- 1 output analog (0...10V)
- 2 relays (1x NO, 1x changeover, 230 V AC, 2 A)
- Serial interface (RS485 / Modbus RTU)
- Optional fieldbus
- International standards (CE, UL, cUL, c-Tick)

Application examples

- Speed control of asynchronous three-phase motors up to 14 A for assigned motor outputs up to 7.5 kW (400 V))
- Pump and fan applications in buildings and industrial areas with quadratic and linear load characteristics.
- The high speed accuracy allows a whole range of possible applications in the textile, paper and printing industry, as well as with finishing machines in the metal industry.
- The compact design with integrated EMC filter offers maximum flexibility in machine building and saves valuable mounting space.
- The twofold startup torque and 1.5 overload torque allows the implementation of applications with demanding speed and torque requirements.

Technical data (extract)

Type designation and Assigned motor rating

Motor rating *P* [kW]	[A]*)	Motor rating *P* [HP]	[A]*)	Rated current *Ie* [A]	Part no.	Size W [mm]	H [mm]	D [mm]
Mains supply voltage: 1 AC 230 V, 50/60 Hz (177…264 V ±0 %, 45…66 Hz ±0 %)								
0.25	1.4			1.7	**MMX12AA1D7F0-0**	66	157	99
0.37	2	1/2	2.2	2.4	**MMX12AA2D4F0-0**			
0.55	2.7			2.8	**MMX12AA2D8F0-0**			
0.75	3.2	3/4	3.2	3.7	**MMX12AA3D7F0-0**	90	195	102
1.1	4.6	1	4.2	4.8	**MMX12AA4D8F0-0**			
1.5	6.3	2	6.8	7	**MMX12AA7D0F0-0**			
2.2	8.7	3	9.6	9.6	**MMX12AA9D6F0-0**	100	263	109
Mains supply voltage: 3 AC 400 V, 50/60 Hz (323…528 V ±0 %, 45…66 Hz ±0 %)								
0.37	1.1	1/2	1.1	1.3	**MMX34AA1D3F0-0**	66	157	99
0.55	1.5	3/4	1.6	1.9	**MMX34AA1D9F0-0**			
0.75	1.9	1	2.1	2.4	**MMX34AA2D4F0-0**			
1.1	2.6	1-1/2	3	3.3	**MMX34AA3D3F0-0**	90	195	102
1.5	3.6	2	3.4	4.3	**MMX34AA4D3F0-0**			
2.2	5	3	4.8	5.6	**MMX34AA5D6F0-0**			
3	6.6			7.6	**MMX34AA7D6F0-0**	100	263	109
4	8.5	5	7.6	9	**MMX34AA9D0F0-0**			
5.5	11.3	7-1/2	11	12	**MMX34AA012F0-0**			
7.5**	15.2	10	14	14	**MMX34AA014F0-0**			

*) Rated motor current for normal four-pole internal and surface cooled asynchronous three-phase motors (1500 rpm).
**) Allocated motor output at a maximum ambient temperature of +40 °C and a maximum pulse frequency of 4 kHz

Operating data

Mode	Sensorless vector control / V/f control (selectable)
Output current	Rated current at max. +50 °C; Overload withstand capability 150 % for 60 s every 600 s; Startup current 200 % for 2 s every 20 s
Output frequency	0...320 Hz; Preset 50 Hz; Resolution 0.01 Hz
Operating frequency	1... 16 kHz; Preset 6 kHz; Resolution 0.1 kHz
Ambient temperature in operation	-10 °C (without icing) ...+50 °C at rated current
Humidity	0...95 % relative humidity, non-condensing
Installation height	Up to 1,000 m above sea level at 100 % rated current, up to 2,000 m with approx. 1 % reduction per 100 m.
Degree of protection	IP 20, IP21 (NEMA1) MMX-IP21-FS... option
Protective functions	Overvoltage, undervoltage, ground fault detection in motor and motor cable at start, overtemperature, overcurrent, motor overload, motor underload, motor blocking.
EMC measures	Internal RFI filter (use in accordance with IEC 61800-3 in public, commercial and industrial networks).

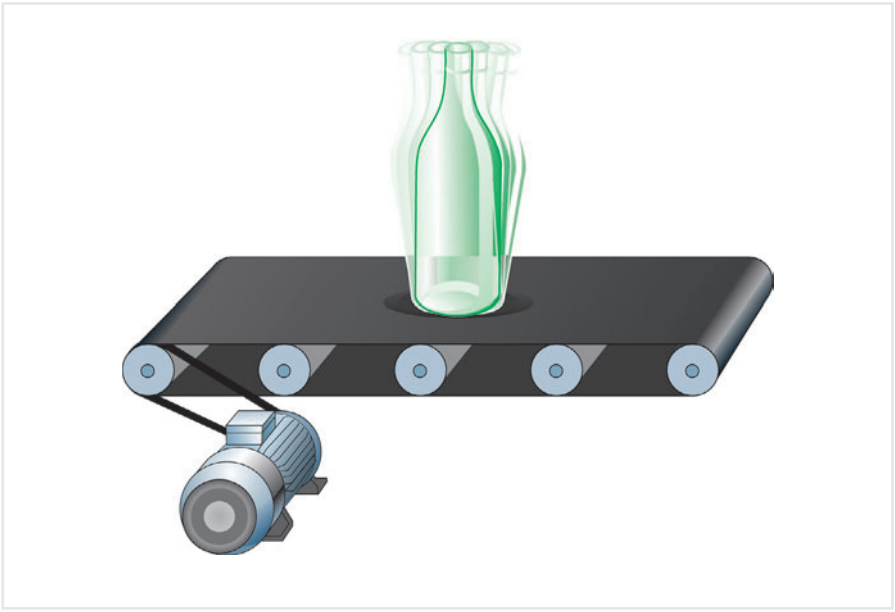
Accessories

Designation	Part no,
Communication module for PC link and parameter transfer	**MMX-COM-PC**
Housing accessories (66 x 157 x 99) for degree of protection IP21/NEMA1	**MMX-IP21-FS1**
Housing accessories (90 x 195 x 102) for degree of protection IP21/NEMA1	**MMX-IP21-FS2**
Housing accessories (100 x 263 x 109) for degree of protection IP21/NEMA1	**MMX-IP21-FS3**
Adater for fieldbus modules	**MMX-NET-XA**
CANopen fieldbus module	**XMX-NET-CO-A**
PROFIBUS DP, Fieldbus module with plug-in bus terminals	**XMC-NET-PS-A**
PROFIBUS DP, Fieldbus module with 9-pole D-Sub connector	**XMC-NET-PD-A**
DeviceNet, Fieldbus module	**XMC-NET-DN-A**
Manual M-Max™ Hardware and Engineering	**AWB8230-1603en**
Handbuch M-Max™ Hardware und Projektierung	**AWB8230-1603de**

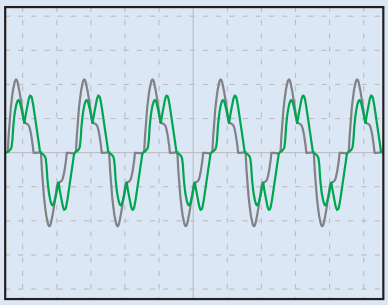
Compact soft starters: System features of DS4, DS6

The three-phase motor is currently the optimum drive for simple and economic implementation of machine and system concepts. Nevertheless, a DOL start or a star-delta start is not always the best solution in many cases. If you want to avoid pressure hammers in pump systems, reduce starting currents with high inertia's or judder free starting in conveyor systems, soft starters offer the gentle alternative for almost every application for judder free and power network protected motor starts. And they reduce the operating costs in the company in more ways than just one.

Both the DS4 and DM4 series offer a complete product spectrum in the power range from 6 - 200 A (2.2 kW to 110 kW) at 400 V. The approvals with global standards make them devices suitable for world markets.



Current characteristic in the uncontrolled phase

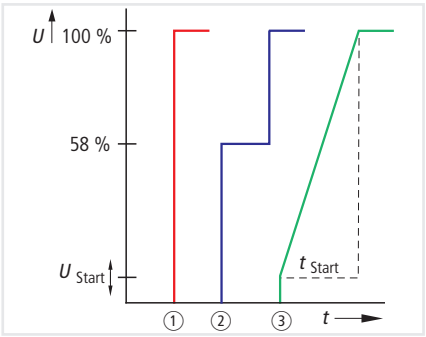


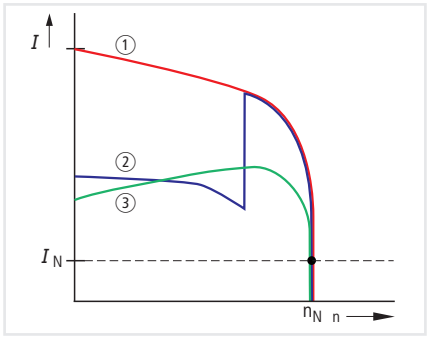
Conventional methods:
Symmetrical control
with high level of DC components

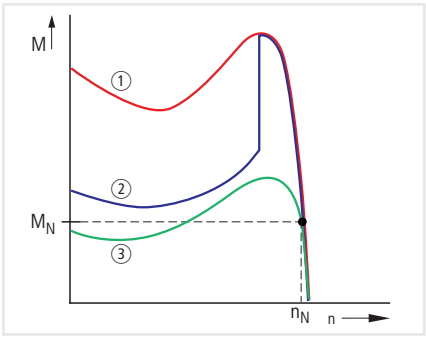
New process from Eaton Moeller:
Asymmetric control
without DC components

Staying steadfast through patented asymmetry

The conveyor belt starts without vibrations and operates smoothly using both the DS4 and DS6 soft starters. The asymmetrical trigger control developed and patented (PCT/EP00/12938, 19.12.2000) by Eaton Moeller makes it possible. It avoids DC components which normally result on a two-phase controlled soft starter (see diagram). They suppress the formation of an elliptical rotating field, which leads to an irregular acceleration of the motor and which unnecessarily extends acceleration times. With the devices of the DS4 and DS6 series the start with asymmetrical trigger control is active in the start phase, with DS4-340-...-M(R) in uninterrupted operation also.







Motor voltage – softer start

① DOL start
② Star-delta start
③ Soft start

With a soft starter the motor voltage is reduced by phase angle variation and increased to the value of the mains voltage from an adjustable start voltage (U_{START}) within a preselected ramp time t_{START}. The soft run up and run down protects the coupled mechanical parts from abrupt loading, and avoids current peaks and voltage dips on the electrical power network.

Motor current – dampened peaks

① DOL start
② Start-delta start
③ Soft start

More and more electrical power supply companies demand conformity to defined current limit values. The loading of networks caused by high inrush currents should be avoided with DOL starting, or current peaks should be avoided with star-delta start, in order to prevent unwanted side-effects such as voltage dips. The adjustable current limitation of the soft starter is the ideal solution here.

Motor torque – reduced loading

① DOL start
② Star-delta start
③ Soft start

During switch on, fluctuations in the current and voltage cause problems on the power network. The resulting abrupt divergence's in torque cause stress for your machines. It leads to higher maintenance costs and effort and influences the quality of production. These disadvantages can be minimised by using a soft starter. It guarantees a more gentle torque progression and reduces your operating cost expenditure.

Soft starter DS4

Soft starter DS4-340

Application examples
- Three-phase resistive and inductive loads
- Soft switching of motor starters in transport and conveyor belts
- High switching cycles of motors in packaging machines
- Silent switching of light and heating in buildings
- Soft starting of pumps reduces the load on the entire installation (water impact)
- Solid-state switching of pumps in the extreme environments of chemical plants and filling stations
- Fast and silent control in the buildings field with reversing function with lift doors, garage gates and conveyor belts in the cooling and check-out area
- Smooth start that reduces wear on V-belts in fan drives

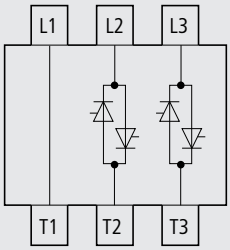
Power supply
110 – 500 V ±10 %, 50/60 Hz
Control voltage
24 VDC / 110 – 240 VAC, ± 15 %
Power range
6 – 23 A (AC53, inductive load)
2.2 – 11 kW (motors)[1)]
16 - 30 A (AC53, inductive load)
7.5 – 15 kW (with internal bypass)[1)]
[1)] assigned motor rating at 400 V

Performance characteristic
DS4-340-...-M(R)
- AC53b, 600 starts per hour with 6-times starting current for 0.5 seconds
- AC53b, 20 starts per hour with 6-times starting current for 5 seconds

DS4-340-...-MX(R)
- AC53a, 10 starts per hour with 3-times starting current for 5 seconds

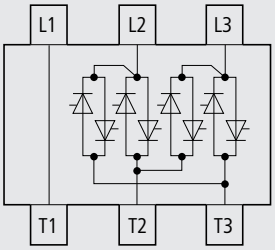
The two-phase controlled compact starter DS4 in various versions for standard applications up to 30 A, 15 kW (400 V).

DS4-340-...-M



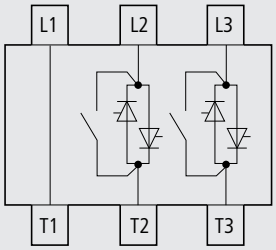
DOL starter 6 - 23 A

DS4-340-...-MR



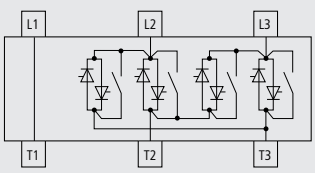
Reversing starter 6 - 23 A

DS4-340-...-MX



Motor starter with internal bypass contacts 16 - 30 A

DS4-340-...-MXR



Reversing starter with internal bypass contacts 16 - 30 A

**DS4 –
controlled switching and starting**

Common features
- Simple handling
- Connection similar to the contactor
- Mounting on top hat or DIN rails or fixing with screws
- Can be grouped side-by-side
- Degree of protection IP 20
- Heat sink integrated into enclosure
- Selective multi-voltage input for the control signals
- Status indication via LED
- CE conformity
- UL approval (File No. E236856)

Motor starters in combination

3

3

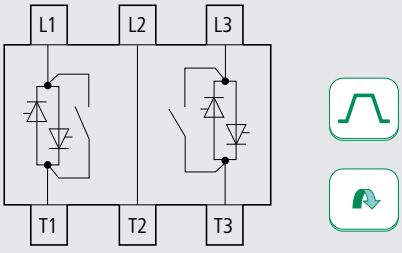
Softer escalator start

Soft starter DS6 – the compact "in-line"-starter up to 200 A

Soft starter DS6-340-...-MX

With its compact design, the DS6 provides a two phase controlled motor start for assigned ratings from 41 - 200 A, 18.5 to 110 kW (400 V), with the same simple handling features as the DS4.
The performance spectrum is spread across just two sizes. The dimensions and the terminals correspond with the tried and tested Eaton Moeller standard from the circuit-breakers NZM1 (up to 99 A) and NZM2 (up to 200 A).

DS6-340-...-MX



Motor starter with internal bypass contacts 41 to 200 A

DOL-start, without delay (t_{START})

Operation with acceleration and delay time (t_{START}, t_{STOP})

Operation with direction or rotation

Reversing starter, two directions of rotation

Application examples
- Three-phase inductive loads
- Noiseless and soft switching of motor starters in transport and conveyor belts
- Soft starting of pumps reduces the load on the entire installation (water impact)
- Solid-state switching of pumps in the extreme environments of chemical plants and filling stations
- Smooth start that reduces wear on V-belts in fan drives

Power supply
230 – 480 V ±10 %, 50/60 Hz
Control voltage
24 VDC, ±15 %
Performance range
41…200 A (AC 53a, inductive load)
41 - 200 A, 18.5 – 110 kW
(with internal bypass)
assigned motor rating at 400 V

Performance characteristic DS6-340-...-MX
- AC53a, 10 starts per hour with 3-times starting current for 5 seconds
- 41…200 A (AC 53a, inductive load)

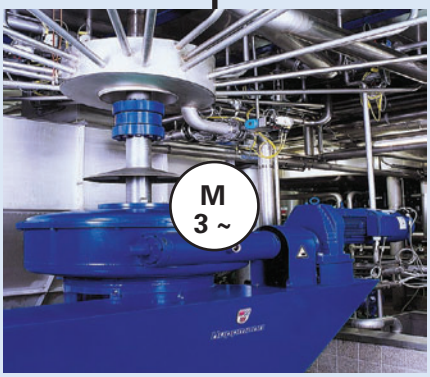
DS6 – controlled switching and starting

Common features
- Simple handling
- Connection terminals suitable for circuit-breakers (NZM1, NZM2)
- Can be grouped side-by-side
- Degree of protection IP 20
- Status indication via LED
- CE conformity
- UL, CSA and CCC approvals

Motor starters in combination

3

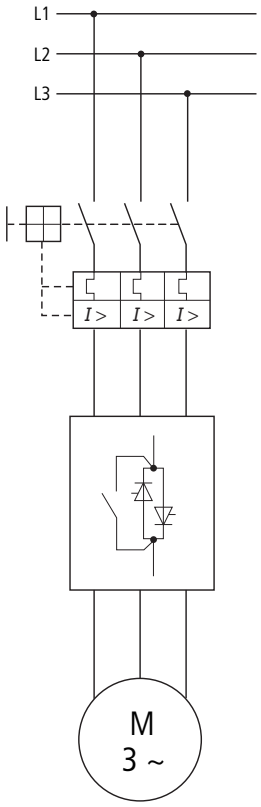
3



DS6 – Technical data

Soft starters for three-phase power supply, low operating frequency (5 s, 3x I_e, 10 starts)						
	Assigned motor rating at 400 V	Rated operational current [1]		**Soft starter function**		
		Device	Motor	**Contactor and motor protection** [2]	**Mains contactor (optional)** [3]	**Overload relay** [4] **(optional)**
Part no.	**kW**	**A**	**I_e A**	**Part no.**	**Part no.**	**Part no.**
DS6-340-22K-MX	18.5	41	36	**NZMN1-M40 / PKZM4-40**	**DILM40**	**ZB65-40(+ZB65-XEZ)**
DS6-340-22K-MX	22	41	41	**NZMN1-M50 / PKZM4-50**	**DILM50**	**ZB65-40(+ZB65-XEZ)**
DS6-340-30K-MX	30	55	55	**NZMN1-M63 / PKZM4-58**	**DILM65**	**ZB65-57(+ZB65-XEZ)**
DS6-340-37K-MX	37	68	68	**NZMN1-M80**	**DILM80**	**ZB150-70/KK**
DS6-340-45K-MX	45	81	81	**NZMN1-M100**	**DILM95**	**ZB150-100/KK**
DS6-340-55K-MX	55	99	99	**NZMN1-M100**	**DILM115**	**ZB150-100/KK**
DS6-340-75K-MX	75	135	134	**NZMN2-M160**	**DILM150**	**ZB150-150/KK**
DS6-340-90K-MX	90	160	160	**NZMN2-M200**	**DILM185**	**Z5-160/FF250**
DS6-340-110K-MX	110	200	196	**NZMN2-M200**	**DILM225**	**Z5-220/FF250**

Notes:
[1] Rated operational current related to the stated load cycle.
[2] States the required circuit-breaker for the defined load cycle. With other switching operations (operating frequency, overcurrent, overcurrent time, duty factor) this value changes and must be matched accordingly. The same applies with higher motor currents.
[3] A mains contactor is not necessary. Isolating characteristics to VDE can only be assured via the stated circuit-breaker.
[4] An external overload relay is necessary, if the main circuit is not to be disconnected with an overload but rather a controlled soft stop is required.



Compact „in-line“ starter – Soft starter DS6 in a system

In conjunction with the mounting and connection accessories of the circuit-breaker series NZM, the devices of the DS6 series provide the opportunity for compact electronic motor starters up to 200 A.
The terminals on the NZM can be optimally matched to those of the DS6 with the spacers NZM1/2-XAB.

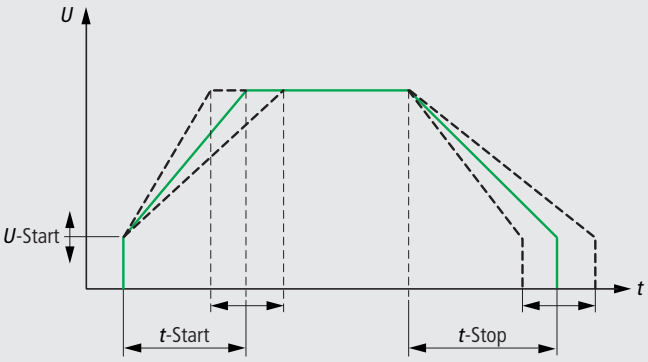
Soft starting:
Improved operating comfort, simple handling

Soft starting: the modern alternative to star-delta starters

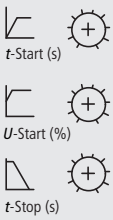
Electronic soft starter fulfil the customer demand for an impact free rise in torque and a determined reduction in current during the start phase. You control the power supply of the three-phase motor in the start phase so that the motor matches the load behaviour of the load machine. The mechanical equipment is accelerated with the minimum of stress as a result. The operating behaviour and the work processes are influenced positively which means that negative influences are avoided such as:

- Impacting of cog edges in the gearbox,
- Reduction of the water hammers in pipe systems,
- Slipping of V-belts,
- Jitter with conveyor systems.

The product standard for the area of soft starters is the IEC / EN 60 947-4-2.



The soft starters DS4 and DS6 provide you with the opportunity to optimally match the drive to your application. You can set the start and stop functions and the start voltage using just three potentiometers.



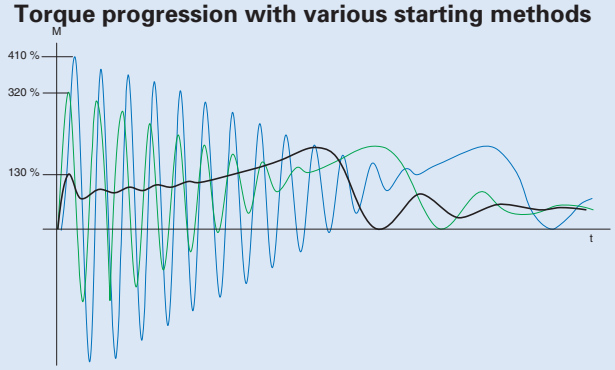
Design versions

Generally a distinction is made between two design versions:

- For simple tasks:
  - Use with small ratings.
  - These devices prove their value with simple applications where smooth, judder free operation is desired in the start phase.
  - Simple handling.
  - Compact construction type
  - Simple power components, mainly two-phase controlled.
- For complex tasks:
  - Performance range up to approx. 900 kW (compact devices), for system engineering up to the MW range.
  - Monitoring devices (mains, device)
  - Motor protection devices
  - Parametric programming for optimised matching to the starter machine function
  - Control commands
  - Signal contacts
  - Optional communication via fieldbus connection

The Eaton Moeller soft starters fulfils the demands placed by the ZVEI: for "Switchgear, switchgear systems, industrial controls". DS4 and DS6 for simple tasks and DM4 for complex tasks.

Torque progression with various starting methods



Conventional methods:

■ : Switching at the zero point
■ : Switching on the phase

New process with direct-on-line starter (DOL) from Eaton Moeller:

■ : DS4-340-M(R)

*) DOL= direct-on-Line

DOL method avoids premature fatigue of the mechanical components

Conventional mechanical contactors and semiconductor contactors cause transient currents with direct switch on (without start time ramp). These lead to a high level of torque oscillation in the motor (see the diagram). These oscillations have two effects:

- Premature mechanical fatigue (couplings, shafts, bearings) and can even lead to a rupture of the coupling,
- Braking torque's during acceleration which can lead to unwanted delays during run up.

The DOL-method (Direct-On-Line) developed by Eaton Moeller avoids these oscillations. Motor and mechanical components are treated with care. The drive starts more smoothly and faster than with other start methods.
This direct motor start without a start ramp is possible with the devices of the DS4-340-...-M(R) series.

Soft starter DM4: Communication-capable motor starter with internal motor protection function

The high-value soft starter of the DM4 series can be individually matched to the demands of the respective application and provides soft starting in its most comfortable form. A determined reduction of the motor current in the start phase and an application specific parameterization guarantees optimum matching to the properties of the motor. The DM4 can be used with the "inline" connection method up to 500 kW or the "in-delta" connection method up to 900 kW.
The integrated motor protection functions guarantee safe operation of your three-phase motor.

Simple handling is guaranteed by the application selector switch with presettings for the 10 most frequent standard applications. The highest level of operating comfort is provided by the optional communication modules such as the keypad or the fieldbus connection to PROFIBUS DP.

Soft starter DM4-340

Application examples

- Internal current limitation limits the current peaks with circular saws, ribbon saws, agitators, mills and crushers at motor start
- High lifespan and low wear with fans and pump drives
- Controlled start and stop with conveyor drives prevents damage to the transported goods and premature wear in frequently spacious and extensive systems
- As a three-phase regulator for control of heating and lighting systems as well as for inrush current limitation with transformers
- With remote diagnostics and field-bus interfacing in chemical plants

Power supply

230 – 480 V ±10 %, 50/60 Hz

Control voltage

24 VDC/110 – 240 VAC, ± 15 %

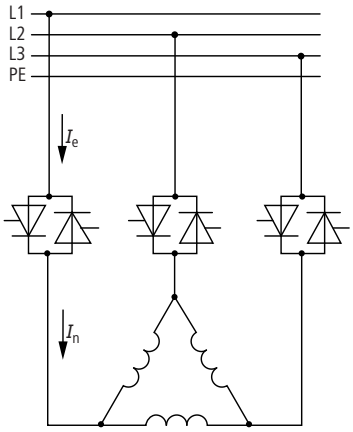
Performance range

16 – 900 A (AC 53a, inductive load)
7.5 – 500 kW (in-line configuration)[1)]
11 – 900 kW (in-delta configuration)[1)]

[1)] assigned motor rating at 400 V

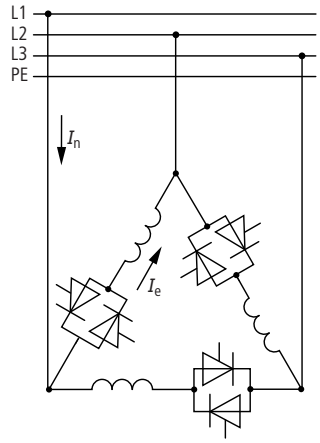
Product feature

- Application selector switch with 10 standard applications
- Programmable relays and analogue outputs
- Internal motor protection function (I^2t monitoring)
- Motor protection (Thermistor input)
- Function expansion with communication cards
- Analog setpoint setting



In-line configuration

- Rated current I_e of the DM4 corresponds to the motor current I_N
- 3 cables to the motor



In-delta configuration

- Rated current I_e of the DM4 corresponds to 58 % of the motor current I_N
- 6 cables to the motor (as with a star-delta starter)

Advantages of the "In-delta configuration"

In this circuit configuration the individual phases of the DM4 are connected in series with the individual motor windings (6 conductor connections as with the star-delta starter). The soft starter must only conduct about 58 % of the rated motor current. This ensures the use of a significantly smaller device.

Optional communication

Soft starters DM4 provide intelligent communication features by the insertion of optional keypads, serial interfaces or PROFIBUS DP interfacing.

Keypad DE4-KEY-2 with plain text display

Serial interface DE4-COM-2X with RS232 and RS485 connection

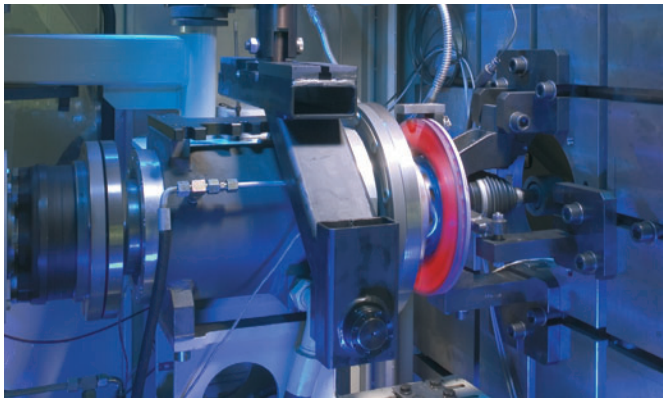
Fieldbus connection DE4-NET-DP2 for direct connection to PROFIBUS DP (DIN 19245 part 1 and 3)

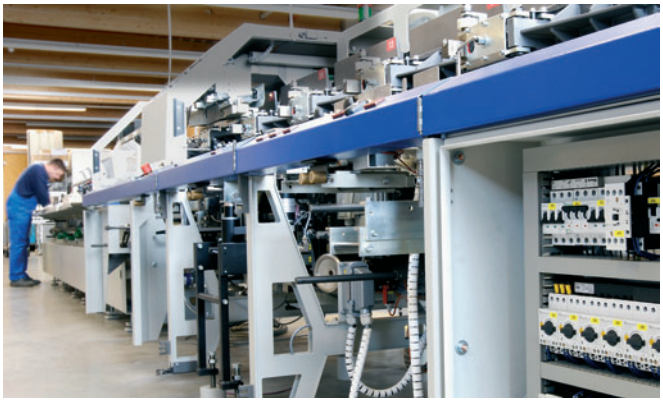
PROFI® PROCESS FIELD BUS BUS

Contactors DIL: Efficient Solutions for the Motor Feeder

The identifier for the new contactor generation is the green print. The innovations are already partly known as they have been integrated into the series on an ongoing basis over the last few years. The contactors up to 15.5 A have been extended with plug-in accessories such as motor filters and solder pin adapters. Motor starters in the size range can also be plugged-in. The necessary openings have been perfectly enclosed just as the entire contactor to assure perfect operation. An even higher level of operational safety is now guaranteed by the new knurled contacts for the auxiliary contacts.

The contactors are becoming more efficient, particularly due to the new Eco types for 15.5, 38, 72 and 170 A, as well as through the many innovations with the motor starters, for example, such as SmartWire.





Safety

Continuous operation requires the components used to have a high level of operational reliability. That's why contactors DIL M offer not only offer high lifespan values for standard AC-3 operation, but are also ideally suited for demanding AC-4 motor inching applications. This increases safety even when machines and plants are being reset or refitted. Active safety features are inherent in these devices: interlocked opposing contacts, isolation and protection against direct contact are standard.

Economy worldwide

Machine and panel builders alike are looking for economical solutions for low-voltage switchgear assemblies.
The contactors DIL M and overload relays ZB are ideal for integrating in complete systems, thus enabling considerable cost savings. In many places, coupling levels are completely unnecessary since intelligent electronics take over this task. The low pick-up and sealing power means that smaller transformers can be used.

Contactors DIL M

With the same dimensions for AC and DC contactors, planning and engineering can be carried out with even greater efficiency. With only four component sizes covering the rating range up to 170 A, engineering is made even simpler.
A key benefit with contactors up to 38 A is that the auxiliary contact is already built in, and the DC contactors include a suppressor circuit up to 170 A. From 15 A, the DC contactors have an electronic drive that removes the need for coupling relays. With all these extras already included in the contactors, your costs are clearly reduced.

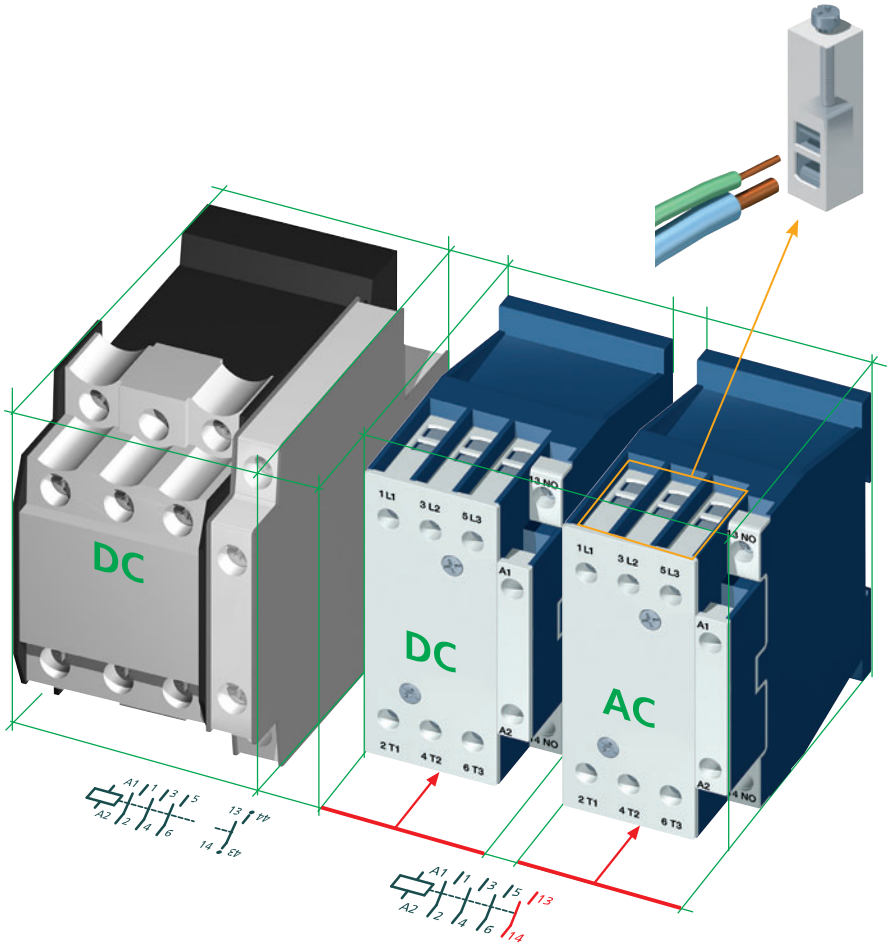
Contactor relays DIL A

The new auxiliary contacts DIL A perfectly complement the new motor contactors DIL M. A wide range of auxiliary contacts specially designed for the contactor relays ensures optimum solutions and reliable identification.

ZB overload relays

Overloads relays ZB protect the motor against phase failure or overload. Their auxiliary contacts switch the motor contactor off, and signal the fault. These relays are suitable for protecting EEx e-motors according to the ATEX 100 a guideline.

AC and DC Contactors:
With Same Frame Size –For Simpler Engineering



The new contactors DIL M are significantly more compact than their predecessors, even though, up to 32 A, the auxiliary contact is included. The advantage of this is particularly striking with the DC contactors that now are the same size as their AC counterparts. This makes everything easier, i.e. planning, engineering and fitting, without having to alter the control system, even if the control current has to change for another customer.
The same range of accessories are used both for AC and DC actuators contactors.

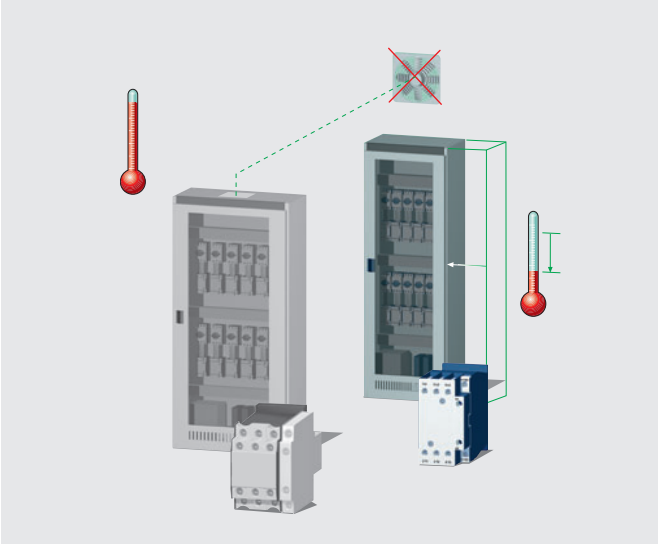
No compromise where termination reliability is concerned

DIL contactors up to 170 A have box terminals with two clamping chambers, allowing unequal cable cross-sections to be terminated absolutely securely. This makes wiring easier and cuts down on associated errors.

Speedier wiring using spring-loaded terminations

Eaton Moeller provides proven quality with tension clamp terminals. Numerous tests have proved that contactors and motor-protective circuit-breakers are just as securely wired in this way as by screw connection – even in strongly vibrating machines. But wiring work using tension clamp terminals is very much quicker to do. The main current paths on PKZM 0 and motor contactors up to 15.5 A all use spring-loaded terminals. The sundries for termination are always available for both screw and tension clamp connection.

The new electronic timer modules DIL M32-XTE are connected to the front of the new contactors DIL M7 to DIL M38, DIL MP20 and DIL A. Thus a simple contactor control with a timer function can be created which does not require a higher level PLC, or for cases where a PLC would be uneconomical. The on-delayed, off-delayed and star-delta functions allow a large range of applications.

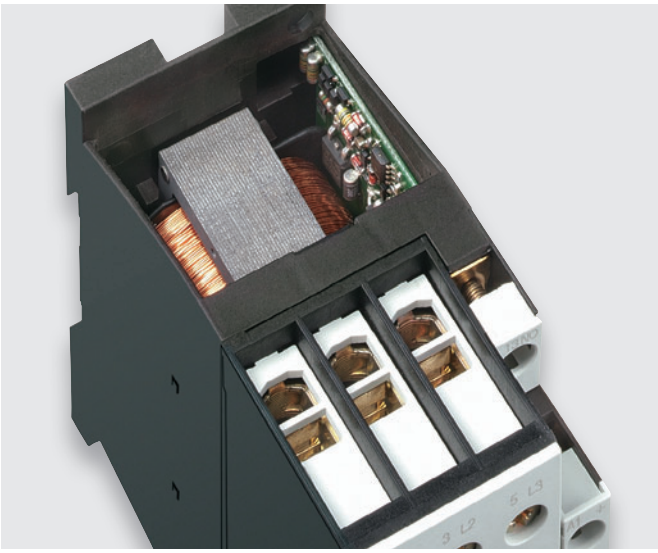


This reduces the cost of your control panel

The space-saving is achieved not just by the reduced component dimensions, but also due to the lower heat dissipation that, particularly with the DC contactors, helps keep the cabinet size down and saves the cost of a fan. The significantly reduced sealing consumption achieved by innovative, electronic drives makes this possible. The Eaton Moeller DC contactors from 17 up to 65 A have a sealing consumption of only 0.5 Watt, even those at 170 A only use 2.1 Watt. This also results in lower power consumption for the whole installation.

Electronic-compatible auxiliary contact

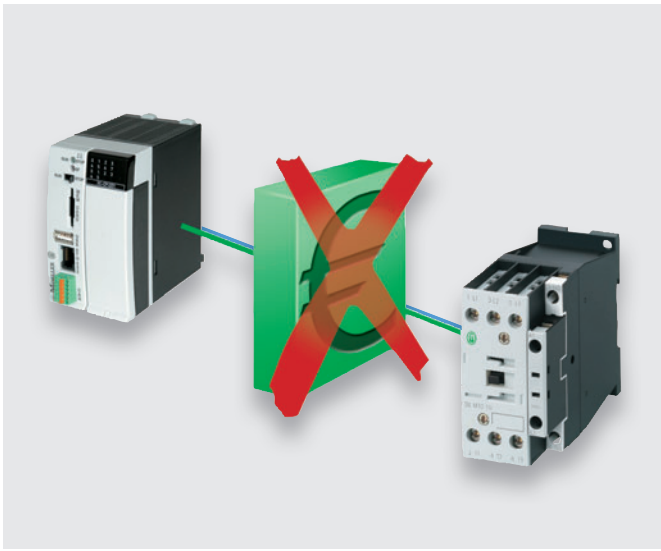
Often very small signals have to be switched for indicating the state of the contactor to the PLC. In order to increase the of the feedback signal Eaton Moeller has developed a new auxiliary contact with a make and break contact which is suitable for switching small currents with low voltages. The DILA-XHIR11 auxiliary contact is tested for contact reliability at 1mA and 17VDC. The failure rate is less than 1 failure in 100 million switching operations.
The auxiliary break contact is designed as a mirror contact so that it can be used in safety applications as feedback signal.



The benefits of the electronically controlled drive

All DC motor contactors with DC actuation from DIL M17 have an electronically controlled drive that offers the following advantages:

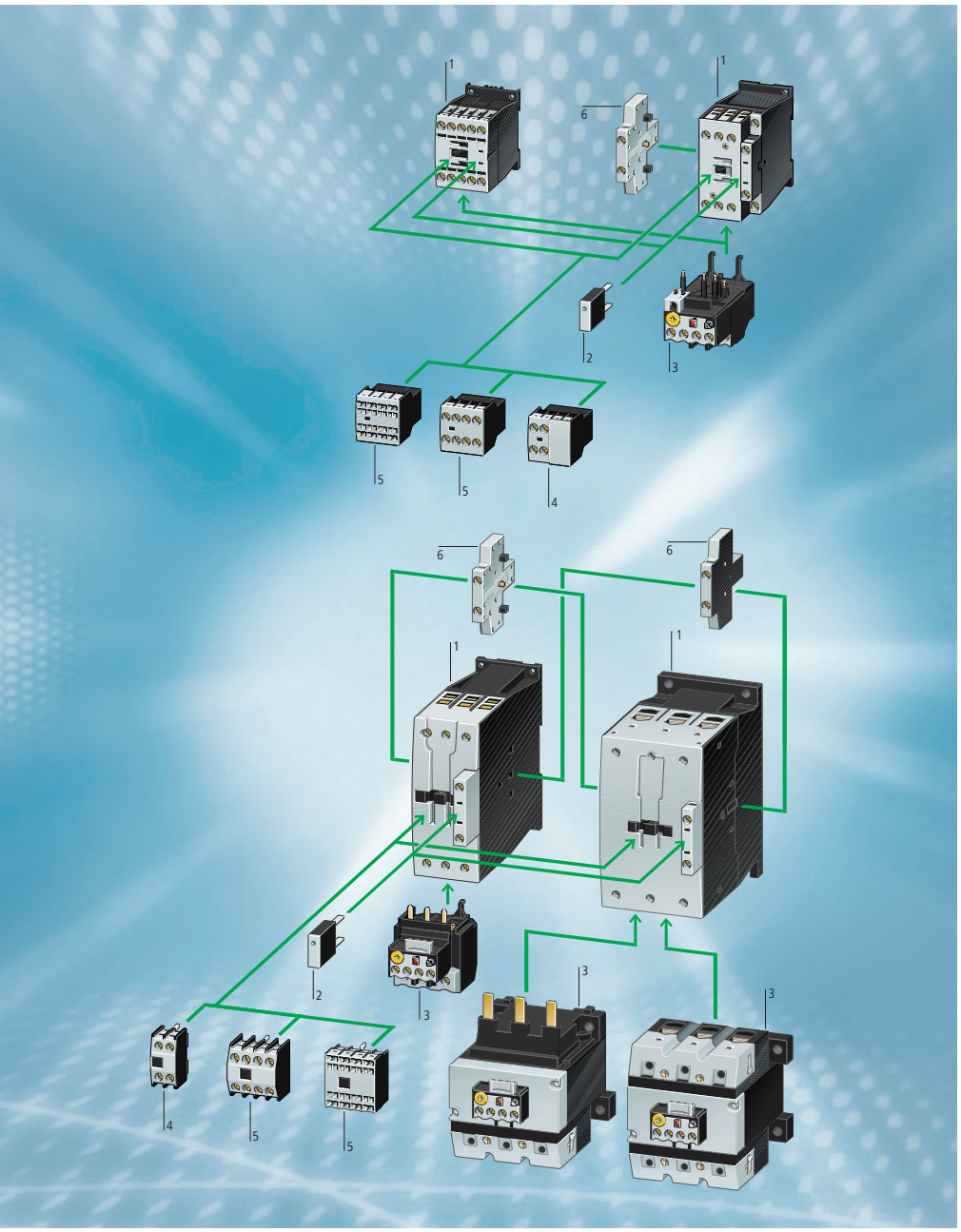
- Significantly less heat dissipation due to reduced sealing consumption
- Smaller control transformers because of lower pick-up consumption
- Direct actuation from the PLC without coupling contactors up to 38 A



Switching contactors directly from the PLC

This is a feature that is becoming increasingly more popular and is primarily made possible by the limitation of the DC pick-up power. Eaton Moeller's new contactors DIL M up to 38 A can be switched directly from the PLC using 0.5 A DC outputs. An additional coupling relay thus becomes unnecessary, and this also applies to expensive and cumbersome relay outputs. The new contactors DIL M thus enable the use of more compact switching cabinets and inexpensive solutions.

Simply Select:
Contactors DIL M:



1. **Contactors up to 90 kW**
2. **Suppressor**[1]
3. **Overload relays**
4. **Auxiliary contact modules, 2-pole**
5. **Auxiliary contact modules, 4-pole**
6. **Side-mounted auxiliary contact modules, 2-pole**

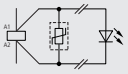
http://www.moeller.net/xstart

Contactor, 3-pole			
AC-3 380 V/ 400 V		**AC** 230 V 50 HZ 240 V 60 Hz, 110 V 50 HZ 120 V 60 Hz, 24 V 50/60 HZ, **DC** 24 V	
***I*e** A	***P*** kW	**Contacts**	**Part no.** Add voltages from above
7 7 9 9 12 12 15.5 15.5	3 3 4 4 5.5 5.5 7.5 7.5	1N/O 1N/C 1N/O 1N/C 1N/O 1N/C 1N/O 1N/C	**DILM7-10 (...)** **DILM7-01(...)** **DILM9-10 (...)** **DILM9-01 (...)** **DILM12-10 (...)** **DILM12-01 (...)** **DILM15-10 (...)** **DILM15-01 (...)**
18 18 25 25 32 32 38 38	7.5 7.5 11 11 15 15 18.5 18.5	1N/O 1N/C 1N/O 1N/C 1N/O 1N/C 1N/O 1N/C	**DILM17-10 (...)** **DILM17-01(...)** **DILM25-10 (...)** **DILM25-01 (...)** **DILM32-10 (...)** **DILM32-01 (...)** **DILM38-10 (...)** **DILM38-01 (...)**
40 50 65 72	18.5 22 30 37	– – – –	**DILM40 (...)** **DILM50 (...)** **DILM65 (...)** **DILM72 (...)**
80 95 115 150 170	37 45 55 75 90	– – – – –	**DILM80 (...)** **DILM95 (...)** **DILM115 (...)**[1] **DILM150 (...)**[1] **DILM170 (...)**[1]

[1] DILM 115, DILM 150, DILM 170
suppressor circuit also not required with the AC version
[2] can only be combined with DILM7(...) to DILM15(...)





Auxiliary contact		Overload relay		Suppressor[1]			Electronic timer modules	
AC 15, 380 V 400 V 415 V		Setting range, Overload release			Varistor suppressor * with LED	RC suppressor	RAC240 = 200-240V AC RAC130 = 100-130V AC RA24 = 24V AC/DC	
Contacts	**Part no.**	I_r A	**Part no.**	U_s V AC	**Part no.** 	**Part no.** 	**Time ranges**	**Supplement part no. DILM32-XTE...**
– 1N/C	**DILA-XHI01-S**[2]	0.1-0.16	**ZB12-0,16**	24-48	**DILM12-XSPV48**	**DILM12-XSPR48**	**on-delayed**	
1N/O –	**DILA-XHI10-S**[2]	0.16-0.24	**ZB12-0,24**		**DILM12-XSPVL48***		0.05 s - 100 s	**E11-100 (RA24)**
– 1N/C	**DILA-XHIC01-S**[2]	0.24-0.4	**ZB12-0,4**	48-130	**DILM12-XSPV130**		0.05 s - 100 s	**E11-100 (RAC130)**
1N/O –	**DILA-XHIC10-S**[2]	0.4-0.6	**ZB12-0,6**	130-240	**DILM12-XSPV240**	**DILM12-XSPR240**	0.05 s - 100 s	**E11-100 (RAC240)**
1N/O 1N/C	**DILM 32-XHI11**[3]	0.6-1	**ZB12-1,0**		**DILM12-XSPVL240***			
– 2N/C	**DILM 32-XHI02**[3]	1-1.6	**ZB12-1,6**	240-500	**DILM12-XSPV500**	**DILM12-XSPR500**	**off-delayed**	
2N/O 2N/C	**DILM 32-XHI22**[3]	1.6-2.4	**ZB12-2,4**				0.05 s - 1 s	**D11-1 (RA24)**
2N/O –	**DILA-XHI20**	2.4-4	**ZB12-4**				0.5 s - 10 s	**D11-10 (RA24)**
1N/O 1N/C	**DILA-XHI11**	4-6	**ZB12-6**				5 s - 100 s	**D11-100 (RA24)**
– 2N/C	**DILA-XHI02**	6-10	**ZB12-10**					
1N/O 1N/C	**DILA-XHIV11**	9-12	**ZB12-12**				0.05 s - 1 s	**D11-1 (RAC130)**
4N/O –	**DILA-XHI40**	12-16	**ZB12-16**				0.5 s - 10 s	**D11-10 (RAC130)**
3N/O 1N/C	**DILA-XHI31**	0.1-0.16	**ZB32-0,16**	24-48	**DILM32-XSPV48**	**DILM32-XSPR48**	5 s - 100 s	**D11-100 (RAC130)**
2N/O 2N/C	**DILA-XHI22**	0.16-0.24	**ZB32-0,24**		**DILM32-XSPVL48***			
1N/O 3N/C	**DILA-XHI13**	0.24-0.4	**ZB32-0,4**	48-130	**DILM32-XSPV130**		0.05 s - 1 s	**D11-1 (RAC240)**
– 4N/C	**DILA-XHI04**	0.4-0.6	**ZB32-0,6**	130-240	**DILM32-XSPV240**	**DILM32-XSPR240**	0.5 s - 10 s	**D11-10 (RAC240)**
2N/O 2N/C	**DILA-XHIV22**	0.6-1	**ZB32-1,0**		**DILM32-XSPVL240***		5 s - 100 s	**D11-100 (RAC240)**
2N/O –	**DILA-XHIT20**[4]	1-1.6	**ZB32-1,6**	240-500	**DILM32-XSPV500**	**DILM32-XSPR500**		
1N/O 1N/C	**DILA-XHIT11**[4]	1.6-2.4	**ZB32-2,4**				**star-delta**	
– 2N/C	**DILA-XHIT02**[4]	2.4-4	**ZB32-4**				1 s - 30 s	**Y20 (RA24)**
2N/O 2N/C	**DILA-XHIT22**[4]	4-6	**ZB32-6**				switch-over delay	**Y20 (RAC130)**
1N/O 1N/C	**DILA-XHIR11**[5]	6-10	**ZB32-10**				50 ms	**Y20 (RAC240)**
1N/O 1N/C	**DILM32-XHI11-S**[6]	10-16	**ZB32-16**					
		16-24	**ZB32-24**					
		24-32	**ZB32-32**					
		32-38	**ZB32-38**					
2N/O –	**DILM150-XHI20**	6-10	**ZB65-10**	24-48	**DILM95-XSPV48**	**DILM95-XSPR48**	**IP2X Cover**	
1N/O 1N/C	**DILM150-XHI11**	10-16	**ZB65-16**		**DILM95-XSPVL48***		For use with	**Part no.**
– 2N/C	**DILM150-XHI02**	16-24	**ZB65-24**	48-130	**DILM95-XSPV130**			
4N/O –	**DILM150-XHI40**	24-40	**ZB65-40**	130-240	**DILM95-XSPV240**	**DILM95-XSPR24**		
3N/O 1N/C	**DILM150-XHI31**	40-57	**ZB65-57**		**DILM95-XSPVL240***			
2N/O 2N/C	**DILM150-XHI22**	57-65	**ZB65-65**	240-500	**DILM95-XSPV500**	**DILM95-XSPR50**		
1N/O 3N/C	**DILM150-XHI13**	65-75	**ZB65-75**					
– 4N/C	**DILM150-XHI04**							
2N/O 2N/C	**DILM150-XHIV22**	25-35	**ZB150-35**	24-48	**DILM95-XSPV48**	**DILM95-XSPR48**	DILM 17 to DILM38	DILM32-XIP2X
1N/O 1N/C	**DILM150-XHI11-SI**	35-50	**ZB150-50**		**DILM95-XSPVL48***			
1N/O 1N/C	**DILM150-XHIA11**	50-70	**ZB150-70**	48-130	**DILM95-XSPV130**		DILM40 to DILM72	DILM65-XIP2X
		70-100	**ZB150-100**	130-240	**DILM95-XSPV240**	**DILM95-XSPR240**		
		95-125	**ZB150-125**		**DILM95-XSPVL240***		DILM80 to DILM170	DILM150-XIP2X
		120-142	**ZB150-150**	240-500	**DILM95-XSPV500**	**DILM95-XSPR500**		
		145-175	**ZB150-175**					

[3] cannot be combined with DIL M ....-01 [4] high version [5] suitable for electronic applications
[6] side-mounted auxiliary contact modules only for DILM 17, 25, 32, can only be installed on left, cannot be combined with top mounting auxiliary contacts or mechanical interlocks

UL/CSA see page 174

Simply Select:
Contactor Relays DIL A, Mini Contactor Relays DIL E

Contactor relays DIL A		Auxiliary contact modules DIL A		Note
AC 15, 380 V 415 V I_e 4 A	**AC** 230 V 50 HZ 240 V 60 Hz, 110 V 50 HZ 120 V 60 Hz, **DC** 24 V	AC 15, 380 V / 400 V / 415 V I_e 4 A		The listed auxiliary contacts are available with springloaded terminals. The auxiliary contact modules listed for the contactor relay DIL A can also be used for the contactors DIL M up to 32 A. Auxiliary contact members: DILA-XHI to EN 50005, DILM32-XHI to DIN 50012 The contactor relay DILA-22 can not be combined with the 4-pole auxiliary contact module. For use with tool-less plug connection we recommend the auxiliary contact DILA-XHIT... in the high version.
Contacts	**Part no.** Add voltages from above	**Contacts**	**Part no.**	
4N/O	**DILA40(...)**	- 2N/C	**DILA-XHI02**	
3N/O 1N/C	**DILA31(...)**	1N/O 1N/C	**DILA-XHI11**	
2N/O 2N/C	**DILA22(...)**	2N/O -	**DILA-XHI20**	
		1N/O 1N/C	**DILA-XHIV11**	
		- 4N/C	**DILA-XHI04**	
		1N/O 3N/C	**DILA-XHI13**	
		2N/O 2N/C	**DILA-XHI22**	
		3N/O 1N/C	**DILA-XHI31**	
		4N/O -	**DILA-XHI40**	
		2N/O 2N/C	**DILA-XHIV22**	
		2N/O -	**DILA-XHIT20**	
		1N/O 1N/C	**DILA-XHIT11**	
		- 2N/C	**DILA-XHIT02**	
		2N/O 2N/C	**DILA-XHIT22**	

Thermistor overload relay EMT6
Remarkable functional versatility in the smallest possible space the EMT 6 thermistor overload relay protects machines against overtemperatures during severe starting duty, braking duty, undervotage and overvoltage, and high switching frequency. The temperature is monitored by means of a thermistor, directly on the motor winding. In the event of overtemperature, the appropriate signal is passed to the EMT 6. It trips, and the fault is clearly displayed in the control panel. Another field of application for the EMT 6 is the monitoring of temperatures in bearings, gearboxes, oils and coolants.

Universal and economical
Three types with differing functions are available: EMT6, EMT6-DB, EMT6-DBK. The EMT 6-DBK is the most versatile with functions such as automatic or manual operation, recognition of short circuits in the sensor circuit and zero-voltage safety.

Zero-voltage safety ensures reliable fault signalling even in the event of supply voltage failure; signalling which helps prevent expensive downtimes. The multivoltage module automatically adapts to all conventional control voltages from 24 V DC to 240 V AC.



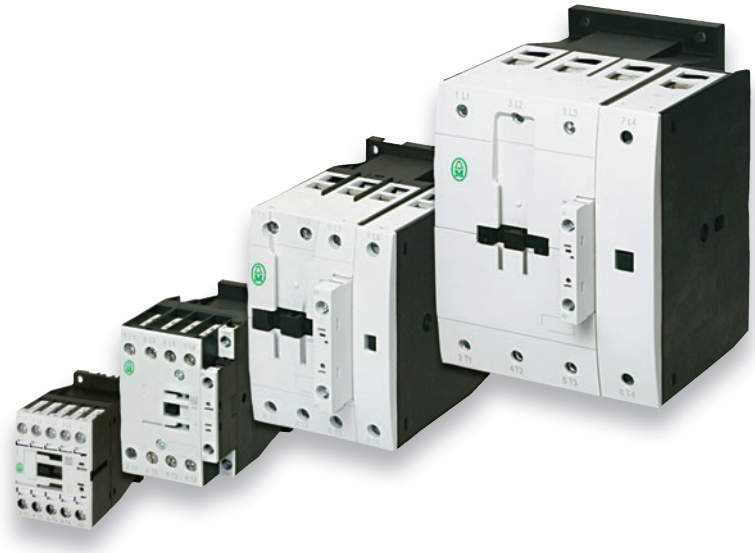

Mini contactor relays DIL EM[1]				Mini contactor relays DIL ER[1]		Auxiliary contact modules[1]		Overload relays ZE	
AC-3 380 V/ 400 V		**AC** 230 V 50 Hz 240 V 60 Hz,		AC 15, 380 V / 400 V / 415 V I_e 3A		AC 15, 380 V / 400 V / 415 V I_e 2A		Setting range, overload release	
I_e A	P kW	**Contacts**	**Part no.** Add voltages from above	**Contacts**	**Part no.**	**Contacts**	**Part no.**	I_r A	**Part no.**
6.6	3	1N/O -	**DILEEM-10(...)**	4N/O -	**DILER-40(...)**	- 2N/C	**02DILEM**	0.1 - 0.16	**ZE-0,16**
6.6	3	- 1N/C	**DILEEM-01(...)**	3N/O 1N/C	**DILER-31(...)**	1N/O 1N/C	**11DILEM**	0.16 - 0.24	**ZE-0,24**
8.8	4	1N/O -	**DILEM-10(...)**	2N/O 2N/C	**DILER-22(...)**	2N/O 2N/C	**22DILEM**	0.24 - 0.4	**ZE-0,4**
8.8	4	- 1N/C	**DILEM-01(...)**			- 2N/C	**02DILE**	0.4 - 0.6	**ZE-0,6**
						1N/O 1N/C	**11DILE**	0.6 - 1	**ZE-1,0**
						2N/O -	**20DILE**	1.6 - 2.4	**ZE-2,4**
						1N/O 1N/C	**11DDILE**	2.4 - 4	**ZE-4**
						- 4N/C	**04DILE**	4 - 6	**ZE-6**
						1N/O 3N/C	**13DILE**	6 - 9	**ZE-9**
						2N/O 2N/C	**22DILE**		
						3N/O 1N/C	**31DILE**		
						4N/O -	**40DILE**		
						2N/O 2N/C	**22DDILE**		

[1] The auxiliary and main contacts listed are available with spring-loaded terminals.

UL/CSA see page 174

Thermistor relay for machine protection EMT6		
Basic functions: thermistor protection, autoreset, diagnostics LEDs		
Functions		**Part no.**
Basic functions	24-240V DC/AC 230 V AC	**EMT6** **EMT6 (230V)**
Basic functions + short-circuit recognition in the sensor circuit	230V AC	**EMT6-K**
Basic functions + manual/autoreset + remote reset + test function + error memory	24-240V DC/AC 230V AC	**EMT6-DB** **EMT6-DB (230V)**
Basic functions + manual/autoreset + remote reset + test function + error memory + short-circuit recognition in the sensor circuit	24-240V DC/AC	**EMT6-KDB**
Basic functions + manual/autoreset + remote reset + test function + error memory + short-circuit recognition in the sensor circuit (disconnectable) + zero-voltage safety (disconnectable)	24-240V DC/AC	**EMT6-DBK**

DILMP Four-Pole Contactors



4-pole contactor		
AC-1 Conventional free air thermal current Open		**AC** 230 V 50 HZ 240 V 60 Hz, o.RAC240[1], 110 V 50 HZ 120 V 60 Hz, 24 V 50/60 Hz, **DC** 24 VDC or RDC24[2]
$I_{th}=I_e$ A	N/O N/C	**Part No.** Add voltage from above
20	–	**DILMP20 (...)**
32 45	1N/O 1N/O	**DILMP32-10 (...)** **DILMP45-10 (...)**
63 80	– –	**DILMP63 (...)** **DILMP80 (...)**
125 160 200	– – –	**DILMP125 (...)** **DILMP160 (...)** **DILMP200 (...)**

[1] For DILMP20 to DILMP80 *230 V 50 HZ 240 V 60 HZ*, for DILMP125, DILMP160 and DILMP200 RAC240
[2] For DILMP20 *24 VDC*, for DILMP32 to DILMP200 *RDC24*

New 4-pole contactors from the xStart series

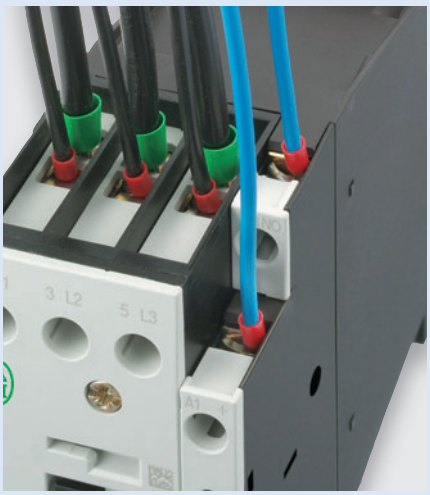
The new 4-pole contactor from Eaton Moeller optimized for AC-1 switched loads. They are the specialists for applications where the mains is switched off or over, heating systems are switched and 4-pole loads are switched.

Four compact contactors cover the performance range up to 200 A. The identical size for AC and DC operated contactors as well as a common range of accessories for 3 and 4-pole contactors guarantee efficient and simple planning and engineering.

Combination plug connections

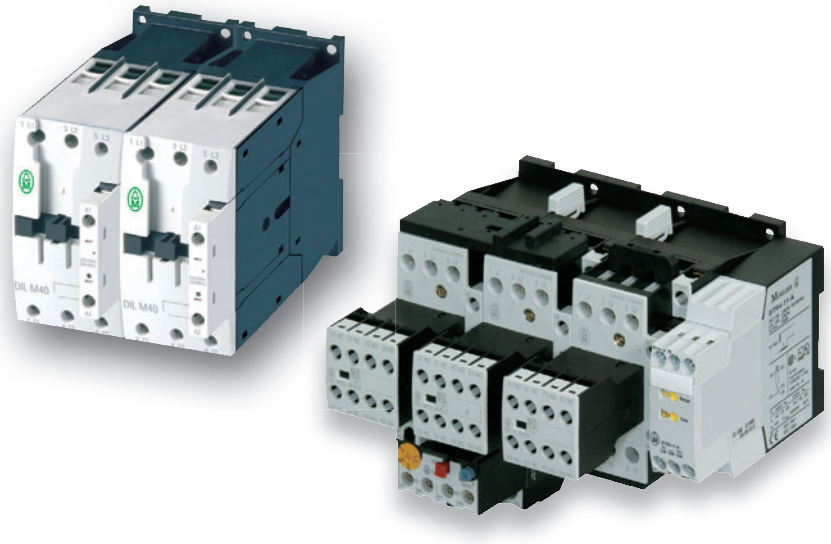
These combinations always consist of universal standard components which offer a constantly high level of quality at an attractive price due to the large production volumes involved. With contactors < 16 A DIL M12-XSL or DIL M12-XRL star-delta and reversing starter wiring kits can be fitted in the plug connectors rapidly and with optimum space saving.

Wiring



The coil terminals are now arranged at the front of the contactors. As they are no longer covered by main current wiring that is often rigid, this simplifies and reduces the time required for wiring work and voltage testing. The terminals of the integrated auxiliary contact are arranged on the second level.

Reversing Starter Combination and Star-Delta Combination

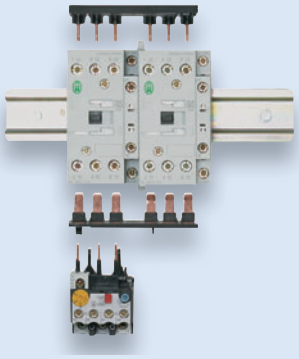


Reversing combinations				
AC-3 380 V/400 V		**AC** 230 V 50 HZ 240 V 60 HZ 24 V 50/60 HZ **DC** 24 V[1]	Reversing starter wiring set	Wiring set
I_e A	**P** kW	**Part no.** Add voltages from above	Coordination type "1"	Coordination type "2"
7 9 12	3 4 5.5	**DIULM7/21 (...)** **DIULM9/21 (...)** **DIULM12/21 (...)**	DILM12-XRL	PKZM0-XRM12
18 25 32	7.5 11 15	**DIULM17/21 (...)** **DIULM25/21 (...)** **DIULM32/21 (...)**	DILM32-XRL	PKZM0-XRM32
40 50 65	18.5 22 30	**DIULM40/11 (...)** **DIULM50/11 (...)** **DIULM65/11 (...)**	DILM65-XRL	–
80 95 115 150	37 45 55 75	**DIULM80/11 (...)** **DIULM95/11 (...)** **DIULM115/11 (...)** **DIULM150/11 (...)**	DILM150-XRL	–

Star-delta combinations				
AC-3 380 V/400 V		**AC** 230 V 50 HZ 240 V 60 HZ **DC** 24 V[1]	Reversing starter wiring set	Wiring set
I_e A	**P** kW	**Part no.** Add voltages from above	Coordination type "1"	Coordination type "2"
12 16 22	5.5 7.5 11	**SDAINLM12 (...)** **SDAINLM16 (...)** **SDAINLM22 (...)**	DILM12-XSL	PKZM0-XSM12
30 45 55	15 22 30	**SDAINLM30 (...)** **SDAINLM45 (...)** **SDAINLM55 (...)**	DILM32-XSL	PKZM0-XSM32
70 90 115	37 45 55	**SDAINLM70 (...)** **SDAINLM90 (...)** **SDAINLM115 (...)**	DILM65-XSL	–
140 165	75 90	**SDAINLM140 (...)** **SDAINLM165 (...)**	DILM95-XSL	–
200 260	110 132	**SDAINLM200 (...)** **SDAINLM260 (...)**	DILM150-XSL	–

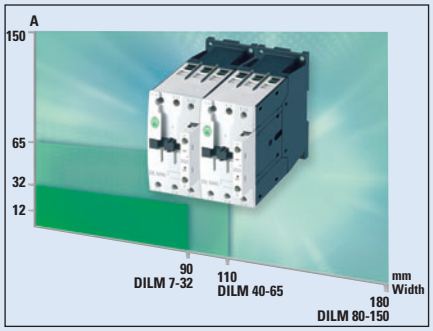
[1] for SDAINLM12 - SDAINLM55

Wiring kits



The new reversing and star-delta wiring kits (DIL M32-XRL and DIL M32-XSL) for contactors from 12 A to 32 A come with a considerably more compact design. They now also fit between contactor and overload relay. The finished wiring kits considerably reduce the time required for mounting.

Reversing starter combinations come with a particularly slimline design



Eaton Moeller is also once more setting new standards with a more economical product system for the drive systems of its new contactor generation. New contactors DIL M have a considerably more compact design than their predecessors. The reversing starter combination is particularly slimline: The mounting width up to 32 A versions is 90 mm, 110 mm for versions between 32 A and 65 A, and just 180 mm for 65 A to 150 A versions.

Simple to select: DIL L – safe switching of lamp loads in the xStart system

Base units 3-pole				
AC 24 V 50 Hz, 230 V 50 Hz 240 V 60 Hz, 400 V 50 Hz 440 V 60 Hz				
Part no. Complement with above voltages		**DILL12(...)**	**DILL18(...)**	**DILL20(...)**
Rated operational current I_e AC1, conventional free air thermal current at 40° C 380 V, 400 V	A	27	40	45
Lighting load				
Filament lamp	A	14	21	27
Hybrid lamps	A	12	16	23
Fluorescent lamps				
Conventional choke-starter circuit	A	20	26	35
Duo circuit (series compensation)	A	20	26	35
Electronic upstream device	A	12	18	20
High-pressure mercury-arc lamps	A	12	18	20
Halogen metal vapour lamp	A	12	18	20
Sodium metal vapour arc lamps	A	12	18	20
Low-pressure sodium lamps	A	7.5	10	12
Maximum permissible compensation capacity	µF	470	470	470

The xStart series has been extended by an additional device the contactor DILL for lighting loads.
The DILL has been developed on the basis of the contactor DILM and has been optimised for switching lamps.
The high switching capacity masters the inrush currents associated with all kinds of lamps.
The box terminal enables the connection of larger conductor cross-sections in order to facilitate long distances.

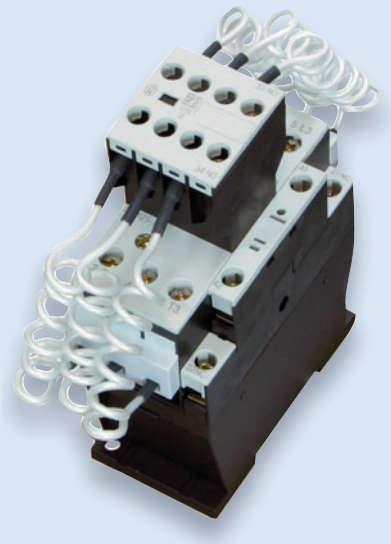
Simple to select: DIL K – contactor for reactive current compensation systems

Base units for group compensation				
Three-phase capacitor 50 – 60 Hz open				
230 V	400 V 420 V 440 V	525 V	690 V	**AC** 230 V 50 Hz 240 V 60 Hz
kvar	kvar	kvar	kvar	
				Part no. Complement with above voltages
7.5	12.5	16.7	20	**DILK12-11(...)**
11	20	25	33.3	**DILK20-11(...)**
15	25	33.3	40	**DILK25-11(...)**
20	33.3	40	55	**DILK33-10(...)**
25	50	65	85	**DILK50-10(...)**

Online catalogue Quicklink
to www.moeller.net

OC44EN

The contactors for capacitor have been developed on the basis of the DILM contactors and thus fit perfectly into the xStart system range. The installation and connection as well as the handling are identical with the xStart standard contactors. In addition to a special anti-weld contact material, this contactor also contains series resistors. The capacitors are pre-charged via a special early-make auxiliary switch and only them do the main contacts then close and conduct continuous current.



High Rated Contactors DIL: Switching High Currents Reliably

Contactors DIL M from 580 A and contactors DIL H from 1400 A are vacuum contactors with significant advantages over air-break contactors:

- The electrical lifespan is considerably higher than air-break contactors.
- A higher packing density and cleaner distribution compartment are possible since there are no open arcs and therefore no escaping gases.

Highly efficient switching

The benefits of vacuum technology arise from the closed system of vacuum switching tubes that excludes any external influences on the switching operations inside the tubes and at the same time prevents switch gases from entering the environment. The most important feature of the vacuum tubes is the long lifespan when switching high currents.

This is due to the reduction of contact erosion since no switching arcs can be produced in a vacuum. The vacuum technology means the small device dimensions are possible compared to conventional contactors which switch in air. Even higher currents can be switched with switching tubes connected in parallel for switching resistive loads (AC-1).

Use with large motors – utilisation category AC-3/AC-4

Whether for bow thrusters in ships, crusher for material recycling and hardboard production, mining machines, water treatment equipment or cement production, contactors DIL M can switch motors up to 1600 A reliably and safely. Circuit-breakers NZM and the motor protective relay ZEV ensure reliable motor protection. The extensive product range of circuit-breakers and accessories enable them to be adapted for a wide range of protection tasks with selectable tripping characteristics.

Use with utilisation category AC-1

Contactors DIL M and DIL H are used in several applications for isolating circuits when contactors are used for utilisation category AC-1applications. For example, as mains connection devices for wind generators, for large heating outputs in plastics processing, induction welding in the steel and aluminium industry or for isolating in conjunction with power electronics.

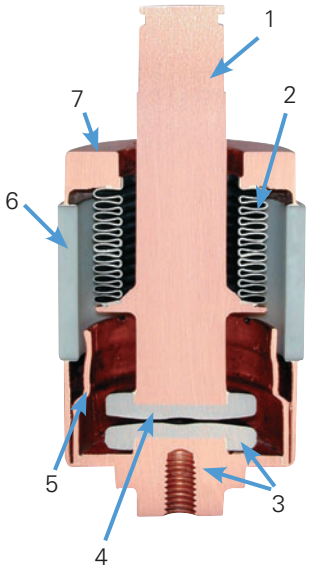
All contactors DIL M and DIL H from 185 A to 2200 A are available with electronically-controlled drives. This provides outstanding benefits for your application:

- Flexible actuation
- Considerably lower switch cabinet temperatures due to reduced sealing power
- Design of smaller control transformers due to reduced pick-up power
- Considerably greater control voltage tolerance than required by the standard, ensuring greater reliability with voltage deviations
- Long lifespan of switching contacts, due to optimised contact forces
- Integrated suppressor
- Auxiliary contact equipped with 2 make contacts, 2 break contacts

Motor protective relay ZEV

The innovative motor protective relay ZEV is designed to protect motors up to 820 A against phase failure, overload and current imbalance. An earth fault is detected quickly by the external core-balance transformers. The integrated thermistor connection enables the relay to be upgraded to provide a full motor protective system. With eight preselectable tripping classes you can even control the most difficult starting conditions for motors with long starting times.

High Rated Contactors – Compact and Powerful



1. **Moving conductor**
2. **Metal expansion bellows**
3. **Fixed contact with fixed conductor**
4. **Moving contact**
5. **Arc protection shield**
6. **Ceramic insulation tube**
7. **Tube cover**

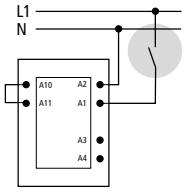
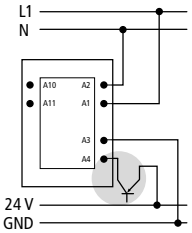
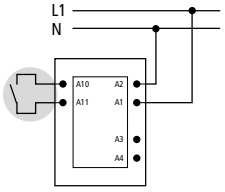
A look inside the vacuum

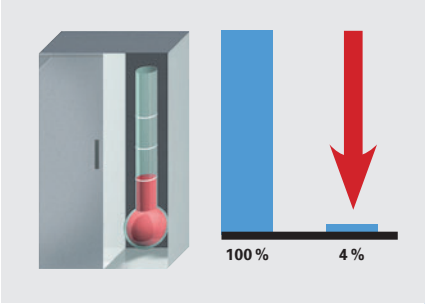
The section drawing of the vacuum tubes shows the fixed and moving contact. The thin metal bellows expand and contract with the moving contact and ensure that the system is sealed during the frequent movements of the contact. All copper coloured parts in the drawing are energized.
The ceramic insulation tube isolates the incoming and outgoing sides of the switching tube. The vacuum switching tube technology used has been tried and tested since the 1980s.

Compact dimensions

The vacuum switching tubes with the electromechanical drive system have a very compact design. Vacuum contactors therefore also offer outstandingly small dimensions.

It's your choice: standard or premium version
All contactors from 185 to 570 A are available as standard or premium versions. All contactors over 570 A are premium version devices in all cases.

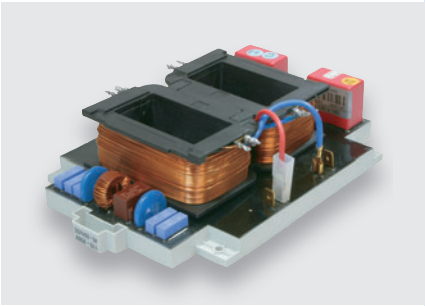
Contactor actuation			Standard	Premium
	**Conventional:** A1/A2 are energized in the usual manner.		+	+
	**Directly from the PLC:** A 24 V PLC output can be connected at terminals A3/A4 without the need of a coupling relay.		–	+
	**From low power command devices:** Low-power command devices such as board relays, control circuit devices or position switches can be connected directly to A10/A11.		–	+



Cool contactors reduce the costs for the switching cabinet

The contactors DIL M and DIL H reduce the sealing power required by up to 96 %, which in turn considerably reduces the temperature inside the switch cabinet. The costs for the switch cabinet and operating costs are also reduced. A smaller switch cabinet can be used than normally required, and expensive fans are often unnecessary.

Example: DIL M185 (RA250)
DC operated
Power consumption 3.3 Watt



Only four coils for every application

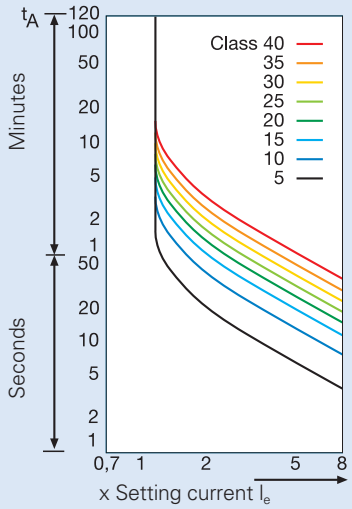
The premium version of the contactors DIL M enables you to cover all application ranges and voltages used worldwide with only four coils. This makes for simple engineering and mostly only requires one contactor in stock. The other voltage ranges of the coils ensure safe operation even with unreliable network conditions. Single voltage coils for the most typical voltages used worldwide are available for the standard contactors.

User benefits of the innovative motor protective relay ZEV

User-friendliness has top priority with the motor protective relay ZEV.

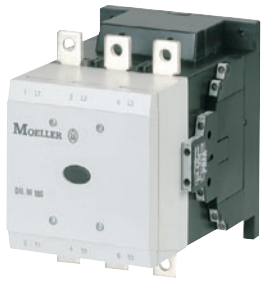
- Simple engineering with multi-voltage coils (24-240 V, 50/60 Hz or DC)
- All settings are menu guided, enabling currents, tripping classes and other functions to be set easily.
- Small and light current sensors with exceptionally broad current ranges simplify selection. The cables are simply passed through the sensors.
- With large currents, the sensor belts are wrapped round the cable and secured with a Velcro fastener (see picture).
- All three phase symbols – L1, L2, L3 – are displayed, so that a faulty phase can be indicated quickly: The symbol for the faulty phase flashes distinctively.
- Differentiated signalling: A trip caused by the thermistor or in the event of an overload can be indicated separately.
- Prewarning on overload: A prewarning is visually indicated or output via a contact before the device trips.

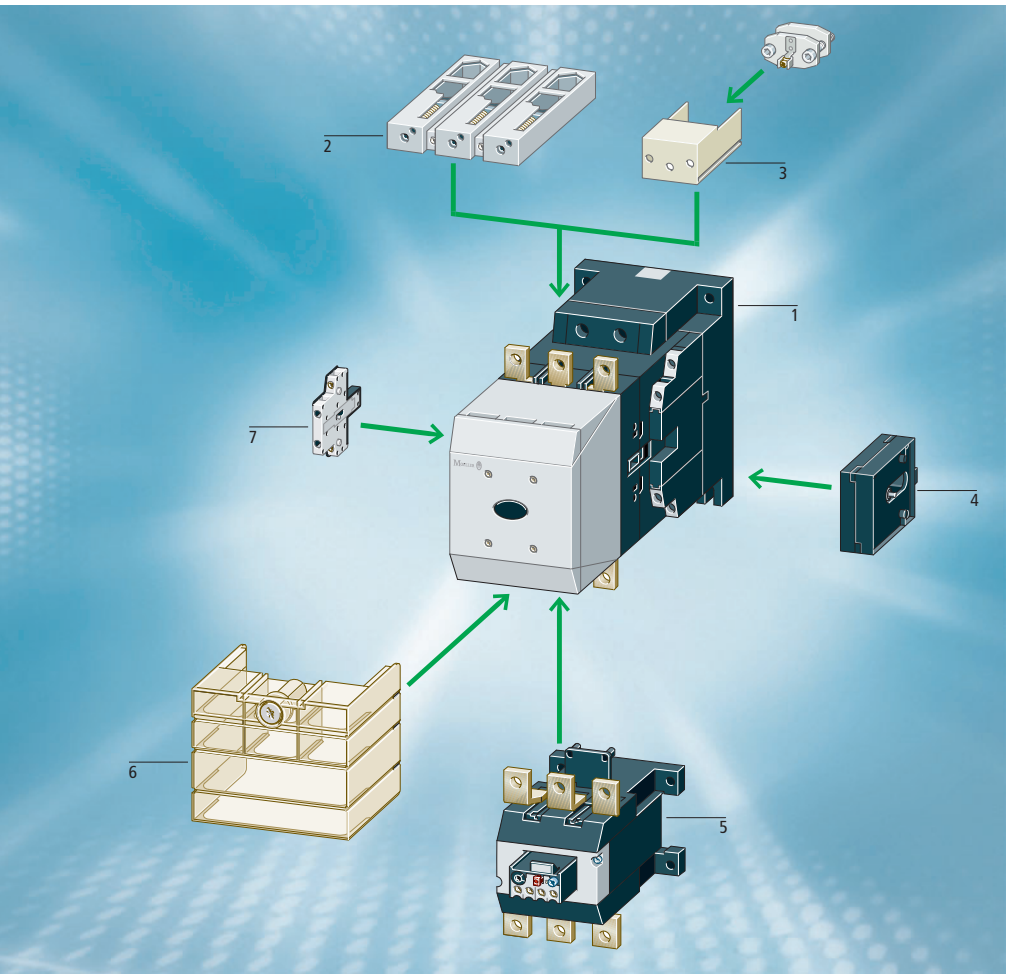
ZEV tripping characteristics



The motor protective relay ZEV can control even the most difficult startup conditions. The extended tripping classes up to Class 40 ensure the reliable protection of motors with long starting times. Optimum protection for any motor startup condition can be provided by selecting one of the eight tripping classes between 5 and 40.

Simply Select: Contactors
DIL M and DIL H up to 2200 A

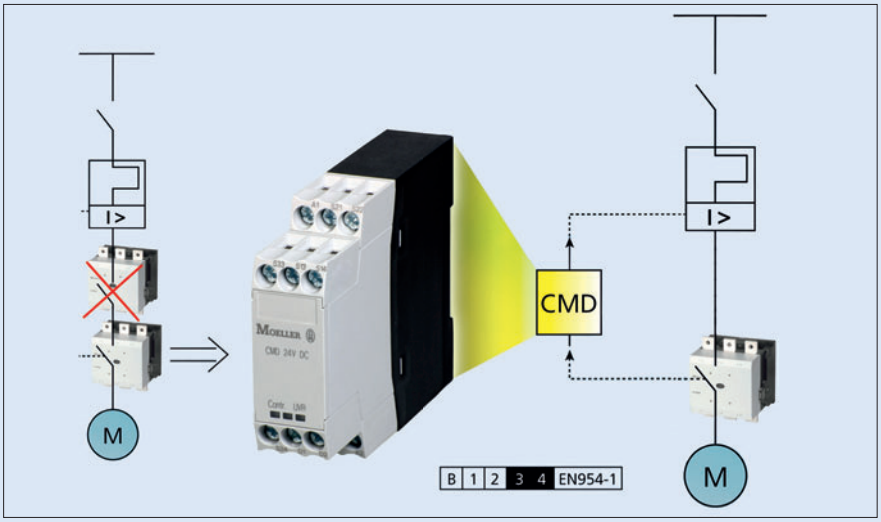




Contactor, 3-pole			
AC-1	AC-3		**Standard electronics AC:** 110 - 120 V 50/60 Hz 220 - 240 V 50/60 Hz
$I_e = I_{th}$ at 60° C	I_e A (400 V)	P kW (400 V)	**Part no.** Add voltages from above
275	185	90	**DILM185-S/22(...)**
315	225	110	**DILM225-S/22(...)**
350	250	132	**DILM250-S/22(...)**
400	300	160	**DILM300-S/22(...)**
500	400	200	**DILM400-S/22(...)**
700	500	250	**DILM500-S/22(...)**
750	570	315	**DILM570-S/22(...)**
800	580	315	–
850	650	355	–
900	750	400	–
1000	820	450	–
1000	1000	560	–
1400	–	–	–
1800	1600	900	–
2000	–	–	–
2200	–	–	–

UL/CSA see page 174

1. **Contactors 90 - 900 kW**
2. **Cable terminal block**
3. **Flat strip conductor terminals**
4. **Mechanical interlock**
5. **Overload relay**
6. **Terminal cover, finger-proof**
7. **Auxiliary contact modules, 2-pole, side mounted**



Redundant design of contactors becomes unnecessary

		Auxiliary contacts		Overload/motor protection			
Premium electronics **AC/DC:** RDC48*, RA110* RA250*, RAC500* conventionel	**AC/DC:** RDC110* RA250*, RAC500* vacuum	2 DILM1000-XHI11SI **integrated**	**Optional** Max. total number of auxiliary contacts: 8	**Relays**			**Circuit-breakers**
Part no. Add voltages from above	**Part no.** Add voltages from above	**Contacts**	**Part no.** SI at side internally SA at side externally	**Part no.**	**Part no.**	**Part no.**	**Part no.**
DILM185/22(...)	–	2N/O 2N/C	**DILM1000-XHI11-SI**				
DILM225/22(...)	–	2N/O 2N/C	**DILM1000-XHI11-SA**	**Z5**			
DILM250/22(...)	–	2N/O 2N/C	**DILM1000-XHI11V-SI**				
DILM300/22(...)	–	2N/O 2N/C	**DILM1000-XHIC11-SI**		**ZW7**		
DILM400/22(...)	–	2N/O 2N/C	**DILM1000-XHIC11-SA**				
DILM500/22(...)	–	2N/O 2N/C				**ZEV**	**NZM...**
–	–	2N/O 2N/C					
–	**DILM580/22(...)**	2N/O 2N/C					
–	**DILM650/22(...)**	2N/O 2N/C					
–	**DILM750/22(...)**	2N/O 2N/C					
–	**DILM820/22(...)**	2N/O 2N/C					
–	**DILM1000/22(...)**	2N/O 2N/C					
–	**DILH1400/22(RAW250)***	2N/O 2N/C					
–	**DILM1600/22(RAW250)***	2N/O 2N/C					**IZM...**
–	**DILH2000/22(RAW250)***	2N/O 2N/C					
–	**DILH2200/22(RAW250)***	2N/O 2N/C					

* RDC48 = 24-48 V DC, RA110 = 48-110 V, 40-60Hz/48-110 V DC, RA250 = 110-250 V, 40-60Hz/110-250 V DC, RAC500 = 250-500 V, 40-60Hz, RAW250 = 230-250 V, 40-60Hz/DC

CMD contactor montoring device

The CMD (Contactor Monitoring Device) monitors the main contacts of a contactor for welding. For this it compares the contactor control voltage with the state of the main contacts, which is indicated reliably by a mirror contact (IEC EN 60947-4-1 Ann. F). If the contactor coil is de-energized and the contactor does not drop out, the CMD trips the backup circuit-breaker, motor-protective circuit-breaker or switch-disconnector via an undervoltage release. The CMD also monitors the functioning of the internal relay using an additional auxiliary make contact of the monitored contactor. For this the auxiliary make and break contact is positively driven. The break contact is designed as a mirror contact.

Components with which the CMD can be combined	
Contactors	**Motor-protective circuit-breakers and circuit-breakers**
DILEM	PKZ2 + U-PKZ2 (18 VDC)
DILM7 to DILM170	NZM1 + NZM1-XUVL
DILM185 (-S) bis DILM500 (-S)	NZM2 + NZM2/3-XUVL
DILM580 to DILM1600	NZM3 + NZM2/3-XUVL
DILH1400 to DILH2200	NZM4 + NZM4-XUVL
SE-1A-PKZ2 and S-PKZ2	N1 + NZM1-XUVL
	N2 + NZM2/3-XUVL
	N3 + NZM3/3-XUVL
	N4 + NZM4-XUVL

Non-Combination Motor-Starter
DILM/Z for North America

Motor starter combinations (Non-Combination Motor Starters) DILM / Z for use in North America

Maximum HP Ratings, 3-phase, 60 Hz, at:				Motor Full Load Current	Contactor	Overload Relay	Maximum Protective device for North America		
							Fuse	Circuit Breaker	
208 V (200 V)	240 V (230 V)	480 V (460 V)	600 V (575 V)	FLC			As per CEC / NEC[1)]	Rated Current	Instantaneous Short-circuit Trip
HP	HP	HP	HP	A	**Part no.**	**Part no.**	A	A	A
-	-	½	½	1	**DILEEM**	**ZE-1**	3	15	-
-	-	¾	1	1.4	**DILEEM**	**ZE-1,6**	6	15	-
½	½	1	1½	2.3	**DILEEM**	**ZE-2,4**	6	15	-
1	1	2	3	3.9	**DILEEM**	**ZE-4**	15	15	-
1½	1½	3	-	6	**DILEEM**	**ZE-6**	20	15	-
1½	2	-	-	6.8	**DILEEM**	**ZE-9**	35	15	-
1½	2	5	5	7.8	**DILEM**	**ZE-9**	35	15	-
1½	3	5	5	9.6	**DILEM**	**ZE-12**	45	-	-
-	-	½	½	1	**DILM7**	**ZB12-1**	3	25	200
-	-	½	1	1.4	**DILM7**	**ZB12-1,6**	6	25	200
½	½	1	1½	2.3	**DILM7**	**ZB12-2,4**	6	25	200
1	1	2	3	3.9	**DILM7**	**ZB12-4**	15	25	200
1½	1½	3	-	6	**DILM7**	**ZB12-6**	20	25	200
3	-	-	7½	9	**DILM9**	**ZB12-10**	25	25	200
3	3	5	7½	9.6	**DILM12**	**ZB12-10**	25	25	200
3	-	7½	10	11	**DILM12**	**ZB12-12**	40	25	200
5	5	10	-	15.2	**DILM15**	**ZB12-16**	40	30	320
-	-	½	½	1	**DILM17**	**ZB32-1**	3	25	200
-	-	¾	1	1.4	**DILM17**	**ZB32-1,6**	6	25	200
½	½	1	1½	2.3	**DILM17**	**ZB32-2,4**	6	25	200
1	1	2	3	3.9	**DILM17**	**ZB32-4**	15	25	200
1½	1½	3	-	6	**DILM17**	**ZB32-6**	20	25	200
-	3	5	7½	9.6	**DILM17**	**ZB32-10**	25	25	200
-	-	7½	10	11	**DILM17**	**ZB32-12**	40	30	320
5	5	10	-	15.2	**DILM17**	**ZB32-16**	40	30	320
7½	7½	15	20	22	**DILM25**	**ZB32-24**	90	100	1200
10	10	20	25	32.2	**DILM32**	**ZB32-32**	125	125	1200
-	3	5	7,5	9.6	**DILM40**	**ZB65-10**	40	40	380
-	5	10	10	15.2	**DILM40**	**ZB65-16**	60	60	760
-	7½	20	25	32.2	**DILM40**	**ZB65-24**	90	90	1200
10	10	20	30	34	**DILM40**	**ZB65-40**	125	125	1200
15	20	40	50	54	**DILM50**	**ZB65-57**	200	150	2000
20	20	50	50	63	**DILM65/72**	**ZB65-65**	200	150	2000
25	30	60	75	80	**DILM80**	**ZB150-70**	250	250	-
25	40	75	100	104	**DILM95**	**ZB150-100**	J 400	J 400	-
40	50	100	100	130	**DILM115**	**ZB150-125**	J 400	J 500	-
40	60	125	125	156	**DILM150/170**	**ZB150-150**	J 600	J 600	-
-	60	125	150	156	**DILM185**	**Z5-160**	700 CLASS L	600	7200
-	75	150	200	192	**DILM225**	**Z5-220**	700 CLASS L	600	7200
-	100	200	250	248	**DILM250**	**Z5-250**	700 CLASS L	600	7200
-	125	250	300	312	**DILM300**	**ZW7-400**	800 CLASS L	600	7200
-	150	300	400	382	**DILM400**	**ZW7-400**	800 CLASS L	600	7200
-	200	400	500	480	**DILM500**	**ZW7-540**	800 CLASS L	600	7200
-	200	400	600	480	**DILM580**	**ZEV-XSW820**	2000	-	-
-	250	500	600	600	**DILM650**	**ZEV-XSW820**	2000	-	-
-	300	600	700	700	**DILM750**	**ZEV-XSW820**	2000	-	-
-	350	700	860	860	**DILM820**	**ZEV-XSW820**	2000	-	-

[1)] North American type fuses only.

Motor contactors for the North American market

Motor contactors in North America are industrial control devices (Industrial Control Equipment per UL 508 and CSA-C22-2 No. 14). North American buyers specify either contactors with so-called "NEMA-Sizes", or they purchase components specifically for motorswitching, which are rated in (HP) Horsepower and can be more customized for the application. The **table** shows the relationship of power and nominal current ratings corresponding to each respective NEMA-size.
Eaton Moeller contactors Type DIL M7 through DIL M65, and matching Type Z overload relays, each have a basic short circuit rating of 5 kA. Larger Eaton Moeller contactors starting with the DIL M80 have, together with their corresponding Type Z overload relays, a shorth circuit rating of 10 kA.

Combination "Contactor + Overload Relay" ("Non-combination Motor Starter")

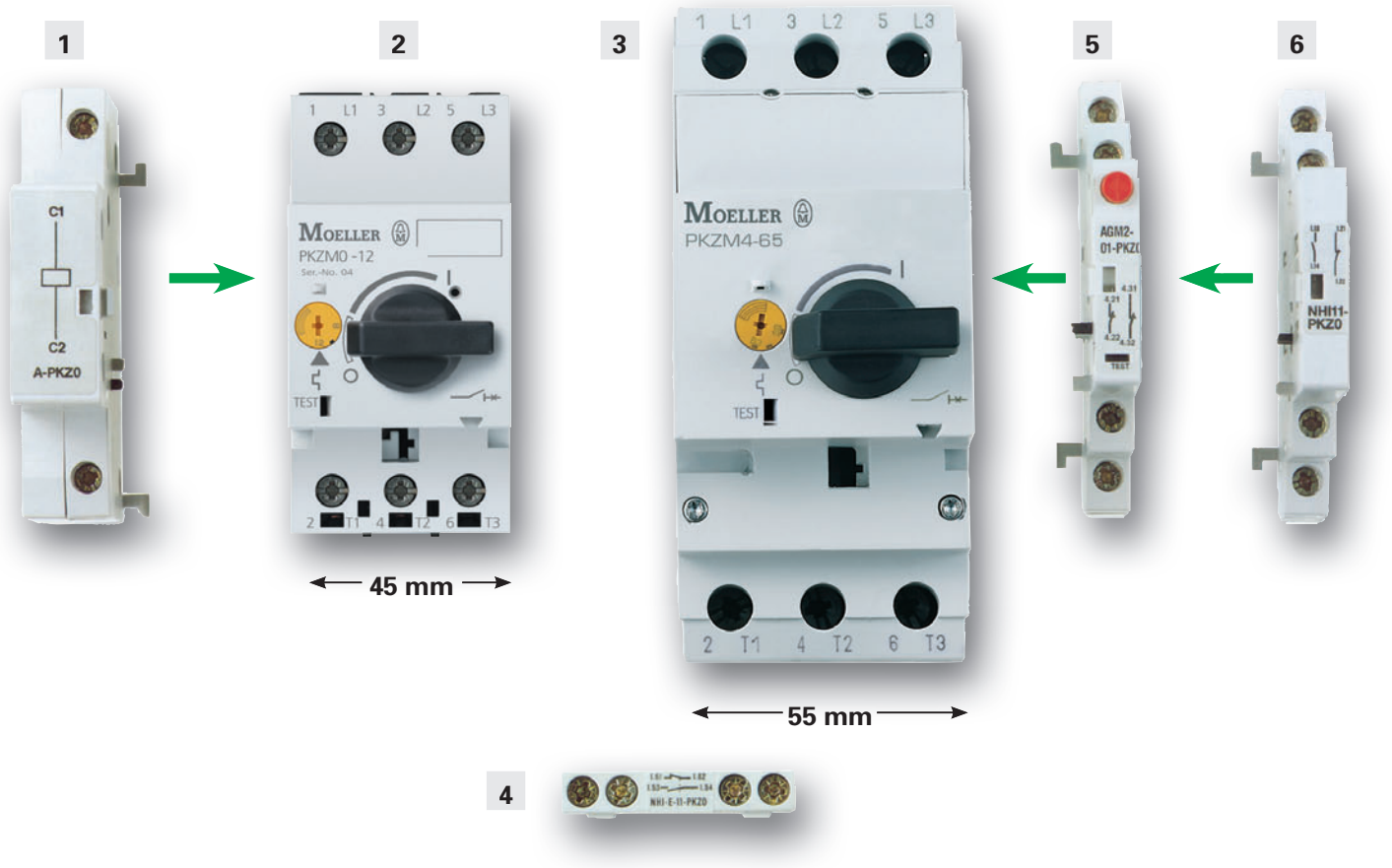
NEMA-sizes, as they relate to the HP ratings of Eaton Moeller contactors, are provided in the table on the left side. Contactors and overload relays make up an assembly that is referred to in North America as a "Non-combination motor starter". For these assemblies, namely consisting of "Contactor + Overload Relay", the North American buyer specifies the same ordering information as it applies to individual contactors. The table clearly indicates that, with respect to all common nominal voltage levels, the combination of "IEC style" contactors DIL M with overload relays Type Z create many more starter combinations than corresponding straight NEMA sizing would allow for.

Three Phase *NEMA Contactors* *NEMA*-Sizes	Rated Current	Three Phase HP ratings [1]			
		200 V / 60 Hz	230 V / 60 Hz	460 V / 60 Hz 575 V / 60 Hz	Highest short time duration current
	A	*HP (PS)*	*HP (PS)*	*HP (PS)*	*A*
00	9	1 ½	1 ½	2	11
0	18	3	3	5	21
1	27	7 ½	7 ½	10	32
2	45	10	15	25	52
3	90	25	30	50	104
4	135	40	50	100	156
5	270	75	100	200	311
6	540	150	200	400	621
7	810	-	300	600	932
8	1215	-	450	900	1400
9	2250	-	800	1600	2590
	[1] HP ratings for 3-Phase contactors, single speed motors, with no jogging, reversing and dynamic current braking.				

Motor-protective circuit-breakers PKZ: now better than ever

Motor-protective circuit-breakers PKZ from Eaton Moeller have long set the benchmark for quality. And now, for inclusion in the xStart concept, these products have been updated once again, and enhanced in terms of their technical specification.

The PKZM 0 now switches motors up to 32 A. At the same time, its short-circuit switching capacity is significantly increased: the short-circuit rating (400 V) is now 150 kA up to 10 A and 50 kA up to 32 A. The PKZM 4 also has a switching capacity of 50 kA. This simplifies the engineering of safety and reliability, with current limiters becoming virtually obsolete. PKZM 01 is a completely new product with push-button operation for switching motors up to 25 A (50 kA/400 V).



Common accessories throughout the system

Whether PKZM 0, PKZM 01 or PKZM 4, the accessories are always the same. Whether On or Off, overload or short circuit, differential indication helps to locate the cause of tripping without delay, every time. The auxiliary contacts can be fitted without tools and are fail-safe in the way they signal every switching state. One particularly convenient component is the front auxiliary contact NHI-E that can be optionally built into already installed and wired circuit-breakers. It goes without saying that all the auxiliary contacts and releases are worldmarket devices, for all the customary mains voltages.

1 Shunt trips and undervoltage trips

2 Motor-protective circuit-breakers PKZM 0 from 0 to 32 A

3 Motor-protective circuit-breakers PKZM 4 from 10 to 65 A

4 The optionally integrable front auxiliary contact indicates the switching position of 1 NO and NC contact or 1 NO contact

5 Trip-indicating contacts: two contacts provide differential indication of short circuit or overload

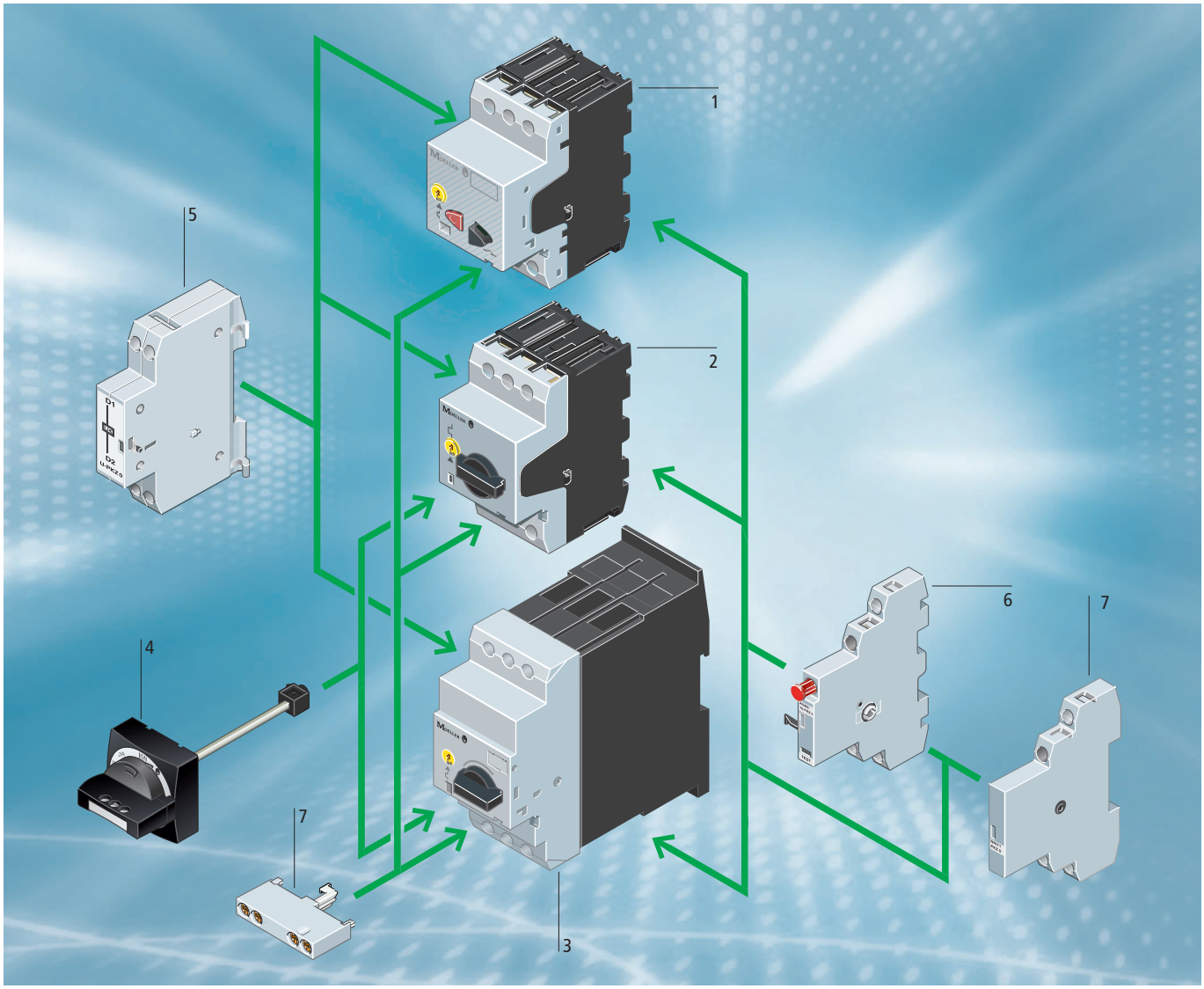
6 Standard auxiliary contacts with up to three contacts for the On/Off switching position

The door coupling handle (IP 65) has a tripped position in addition to the On and Off positions.

Motor-protective circuit-breakers PKZM 01: easy to operate by pressing or hitting a button

The new motor-protective circuit-breakers PKZM 01 for motors up to 25 A are ideally suited to small machines and applications where operation by pressing or even hitting a button is preferred. In addition to the auxiliary contacts from the PKZM 0 range, special enclosures with ingress protection IP 65 or IP 40 and the appropriate Emergency-Stop buttons are available for these new components. Their short-circuit switching capacity is 50 kA.

Motor-protective circuit-breaker PKZ



1. **Motor-protective circuit-breaker PKZM 01**
2. **Motor-protective circuit-breaker PKZM 0**
3. **Motor-protective circuit-breaker PKZM 4**
4. **Door coupling rotary handle IP65**
5. **Voltage release**
6. **Trip-indicating auxiliary contact**
7. **Standard auxiliary contacts**

http://www.moeller.net/xstart

Motor-protective circuit-breaker PKZM 0, PKZM 4

	Max. motor rating AC-3 380 V 400 V 415 V P kW	Rated uninterrupted current I_u A	Setting range Overload releases I_r A	Short-circuit release I_{rm} A	Screw terminals **Part no.**
Motor-protective circuit-breakers, coordination type "1" and "2"	–	0.16	0.1 – 0.16	2.2	**PKZM0-0,16**
	0.06	0.25	0.16 – 0.25	3.5	**PKZM0-0,25**
	0.09	0.4	0.25 – 0.4	5.6	**PKZM0-0,4**
	0.12	0.63	0.4 – 0.63	8.8	**PKZM0-0,63**
	0.25	1	0.63 – 1	14	**PKZM0-1**
	0.55	1.6	1 – 1.6	22	**PKZM0-1,6**
	0.75	2.5	1.6 – 2.5	35	**PKZM0-2,5**
	1.5	4	2.5 – 4	56	**PKZM0-4**
	2.2	6.3	4 – 6.3	88	**PKZM0-6,3**
	4	10	6.3 – 10	140	**PKZM0-10**
	5.5	12	8 – 12	168	**PKZM0-12**
	7.5	16	10 – 16	224	**PKZM0-16**
	9	20	16 – 20	280	**PKZM0-20**
	12.5	25	20 – 25	350	**PKZM0-25**
	15	32	25 – 32	448	**PKZM0-32**
Motor-protective circuit-breaker, coordination type "1" and "2"	7.5	16	10 – 16	224	**PKZM4-16**
	12.5	25	16 – 25	350	**PKZM4-25**
	15	32	25 – 32	448	**PKZM4-32**
	20	40	32 – 40	560	**PKZM4-40**
	25	50	40 – 50	700	**PKZM4-50**
	30	58	50 – 58	812	**PKZM4-58**
	34	65	55 – 65	882	**PKZM4-63**

Note Three-phase motors (approximate values for squirrel-cage rotors)

Motor-protective circuit-breaker PKZM 01

	Max. motor rating AC-3 380 V 400 V 415 V P kW	Rated uninterrupted current I_u A	Setting range Overload releases I_r A	Short-circuit releases I_{rm} A	Screw terminals **Part no.**
Motor-protective circuit-breakers, coordination type "1" and "2" 	–	0.16	0.1 – 0.16	2.2	**PKZM01-0,16**
	0.06	0.25	0.16 – 0.25	3.5	**PKZM01-0,25**
	0.09	0.4	0.25 – 0.4	5.6	**PKZM01-0,4**
	0.12	0.63	0.4 – 0.63	8.8	**PKZM01-0,63**
	0.25	1	0.63 – 1	14	**PKZM01-1**
	0.55	1.6	1 – 1.6	22	**PKZM01-1,6**
	0.75	2.5	1.6 – 2.5	35	**PKZM01-2,5**
	1.5	4	2.5 – 4	56	**PKZM01-4**
	2.2	6.3	4 – 6.3	88	**PKZM01-6,3**
	4	10	6.3 – 10	140	**PKZM01-10**
	5.5	12	8 – 12	168	**PKZM01-12**
	7.5	16	10 – 16	224	**PKZM01-16**
	9	20	16 – 20	280	**PKZM01-20**
	12.5	25	20 – 25	350	**PKZM01-25**

Note Three-phase motors (approximate values for squirrel-cage rotors)

Insulated enclosures

		Protection	For use with	**Part no.**
Insulated enclosures for surface mounting 	–	IP40 NEMA Type 1	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	**CI-PKZ01**
	With actuating diaphragm	IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	**CI-PKZ01-G**
	Lockable in the Off position	IP65 NEMA 4X	PKZM01+NHI-E+U or A+L (2 off)	**CI-PKZ01-SVB**
	Lockable in the Off position, in conjunction with VHI-PKZ01	IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	**CI-PKZ01-SVB-V**
	With stay-put Emergency-Stop mushroom button	IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	**CI-PKZ01-PVT**
	With key-release Emergency-Stop mushroom button	IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	**CI-PKZ01-PVS**
Insulated enclosures for flush mounting 	–	Front IP40 NEMA Type 1	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	**E-PKZ01**
	With actuating diaphragm	Front IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	**E-PKZ01-G**
	Lockable in the Off position	Front IP65 NEMA 4X	PKZM01+NHI-E+U or A+L (2 off)	**E-PKZ01-SVB**
	Lockable in the Off position, in conjunction with VHI-PKZ01	Front IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	**E-PKZ01-SVB-V**
	With stay-put Emergency-Stop mushroom button	Front IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	**E-PKZ01-PVT**
	With key-release Emergency-Stop mushroom button	Front IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	**E-PKZ01-PVS**

Accessories

	Contacts		Type of current AC/DC	For use with	Part no.
Trip-indicating auxiliary contact 	2 × 1 N/O	–	–	PKZM0 PKZM4 PKZM01	**AGM2-10-PKZ0**
	–	2 × 1 N/C	–		**AGM2-01-PKZ0**
Early-make auxiliary contacts 	2 N/O	–	–	PKZM0	**VHI20-PKZ0**
	2 N/O	–	–	PKZM01	**VHI20-PKZ01**
Shunt release 	–	–	AC operation	PKZM0 PKZM4 PKZM01	**A-PKZ0(230V50HZ)**
	–	–	DC operation		**A-PKZ0(24VDC)**
Undervoltage release 	–	–	AC operation	PKZM0 PKZM4 PKZM01	**U-PKZ0(230V50HZ)**
Standard auxiliary contact 	1 N/O	1 N/C	–	PKZM0 PKZM4 PKZM01	**NHI11-PKZ0**
	1 N/O	2 N/C	–		**NHI12-PKZ0**
	2 N/O	1 N/C	–		**NHI21-PKZ0**
Standard auxiliary contact 	1 N/O	1 N/C	–		**NHI-E-11-PKZ0**
	1 N/O	–	–		**NHI-E-10-PKZ0**

Motorprotective circuit-breakers for North America

Rating data for approved types[1] UL 508/CSA C 22.2 No. 14	Maximum motor rating Three-phase current HP				Setting ranges		Maximum protective device to UL/CSA Group protection[2]					
	200 V	230 V	460 V	575 V	Overload release	Overload release	Max. short-circuit current 600 V		Fuse		Circuit breaker	
							with CL		with CL		with CL	
	HP	HP	HP	HP	A	A	kA	kA	A	A	A	A
PKZM 01 motor-protective circuit-breakers	"Manual Motor Starter with thermal and magnetic trip"											
PKZM01-0,16	[3]				0.1 – 0.16	2.2	50		600		600	
PKZM01 -0,25					0.16 – 0.25	3.4	50		600		600	
PKZM01 -0,4					0.25 – 0.4	5.6	50		600		600	
PKZM01-0,63					0.4 – 0.63	8.8	50		600		600	
PKZM01-1			0.5	0.5	0.63 – 1	14	50		600		600	
PKZM01-1,6			0.75	1	1 – 1.6	22	50		600		600	
PKZM01-2,5	0.5	0.5	1	1.5	1.6 – 2.5	35	50		600		600	
PKZM01-4	1	1	2	3	2.5 – 4	56	50		600		600	
PKZM01-6,3	1.5	1.5	3	5	4 – 6.3	88	50		600		600	
PKZM01-10	3	3	7.5	10	6.3 – 11	140	22	50	150	600	125	600
PKZM01-12	3	3	7.5	10	9 – 12	168	22	50	150	600	125	600
PKZM01-16	3	5	10	10	10 – 16	224	22	50	150	600	125	600
PKZM0-20	5	5	10	15	16 – 20	280	10	18	150	600	125	600
PKZM0-25	5	7.5	15	20	20 – 25	350	10	18	150	600	125	600
PKZM 0 motor-protective circuit-breakers	"Manual Motor Starter with thermal and magnetic trip"											
PKZM0-0,16	[3]				0.1 – 0.16	2.2	50		600		600	
PKZM0-0,25					0.16 – 0.25	3.4	50		600		600	
PKZM0-0,4					0.25 – 0.4	5.6	50		600		600	
PKZM0-0,63					0.4 – 0.63	8.8	50		600		600	
PKZM0-1			0.5	0.5	0.63 – 1	14	50		600		600	
PKZM0-1,6			0.75	1	1 – 1.6	22	50		600		600	
PKZM0-2,5	0.5	0.5	1	1.5	1.6 – 2.5	35	50		600		600	
PKZM0-4	1	1	2	3	2.5 – 4	56	50		600		600	
PKZM0-6,3	1.5	1.5	3	5	4 – 6.3	88	50		600		600	
PKZM0-10	3	3	7.5	10	6.3 – 11	140	22	50	150	600	125	600
PKZM0-12	3	3	7.5	10	9 – 12	168	22	50	150	600	125	600
PKZM0-16	3	5	10	10	10 – 16	224	22	50	150	600	125	600
PKZM0-20	5	5	10	15	16 – 20	280	10	18	150	600	125	600
PKZM0-25	5	7.5	15	20	20 – 25	350	10	18	150	600	125	600
PKZM0-32	7.5	10	25	30	24 – 32	448	10	18	150	600	125	600
PKZM 4 motor-protective circuit-breakers												
PKZM4-16	3	5	10	15	10 – 16	224	10		600		600	
PKZM4-25	7,5	7,5	20	25	16 – 25	350	10		600		600	
PKZM4-32	10	10	25	30	25 – 32	448	10		600		600	
PKZM4-40	10	10	30	30	32 – 40	560	10		600		600	
PKZM4-50	10	15	30	40	40 – 50	700	10		600		600	
PKZM4-63	15	15	40	-	52 – 63	882	-		600		600	

Notes

Service factor (SF)
Setting I_r of current scale in dependence of load factor
SF = 1.15 → I_r = 1 x → $I_{n\,mot}$
SF = 1 → I_r = 0.9 x $I_{n\,mot}$

[1] Devices for world markets: IEC = UL/CSA
[2] Important: Changed requirements for group protection
[3] In this range, calculate motor rating according to rated current. Specified values to NEC Table 430 – 150

Manual Motor Controllers (Starters) for the North American market

Manual Motor Starters *PKZ*

As components, manual motor starters are Industrial Control devices that are tested and UL listed per *UL 508* and *CSA* certified per *CSA-C22.2 No.14*. The *PKZM* manual motor starters are world market devices. They feature fixed instantaneous trips (*PKZM0* and *PKZM4*) or adjustable magnetic trips (*PKZ2*) for short circuit protection, adjustable bimetal trips for motor overload protection and they can switch motors directly across the line. They can also be equipped with auxiliary contacts for switching control circuits.

In North America, per current product standards, the built-in and functionally active instantaneous magnetic trips are not recognized as elements that provide the necessary branch circuit overcurrent protective function.

Type E Manual motor protector (MMP) for North America										
Maximum motor rating Three-phase current HP				Setting ranges		Rated short-circuit breaking capacity				
200 V	230 V	460 V	575 V	Overload release	Short-circuit release	240 V	480 V	600 V	Incoming terminal	Manual motor protector (MMP)
HP	HP	HP	HP	A	A	kA	kA	kA	**Part no.**	**Part no.**
				0.16 – 0.25	3.4	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-0,25**
				0.25 – 0.4	5.6	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-0,4**
				0.4 – 0.63	8.8	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-0,63**
		0.5	0.5	0.63 – 1	14	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-1**
		0.75	1	1 – 1.6	22	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-1,6**
0.5	0.5	1	1.5	1.6 – 2.5	35	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-2,5**
1	1	2	3	2.5 – 4	56	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-4**
1.5	1.5	3	5	4 – 6.3	88	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-6,3**
3	3	7.5	10	6.3 – 11	140	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-10**
3	3	7.5	10	9 – 12	168	42	42	18	**BK25/3-PKZ0-E**	**PKZM0-12**
3	5	10	10	10 – 16	224	42	42	18	**BK25/3-PKZ0-E**	**PKZM0-16**
5	5	10	–	16 – 20	280	18	18	–	**BK25/3-PKZ0-E**	**PKZM0-20**
5	7.5	15	–	20 – 25	350	18	18	–	**BK25/3-PKZ0-E**	**PKZM0-25**
7.5	10	20	–	24 – 32	448	18	18	–	**BK25/3-PKZ0-E**	**PKZM0-32**
3	5	10	15	10 – 16	224	50	50	25	**BK50/3-PKZ4-E**	**PKZM4-16**
5	7.5	15	20	16 – 27	350	50	50	25	**BK50/3-PKZ4-E**	**PKZM4-25**
7.5	10	25	30	24 – 34	448	50	50	25	**BK50/3-PKZ4-E**	**PKZM4-32**
10	15	30	30	32 – 40	560	50	50	25	**BK50/3-PKZ4-E**	**PKZM4-40**

Manual motor starters are used primarily as manually operated protective switches in industrial control panels as well as individually enclosed starters for separate motor loads. In North America they are selected primarily in accordance with the motor HP rating, whereas in Europe the selection process is done more in line with respective current ranges as opposed to assigned motor kW ratings. These simply reflect local conventions. Regardless of the method used, the end result will more or less be the same in both cases.
It is worth noting that, apart from molded case circuit breakers, these manual motor starters belong in a category of low voltage equipment for which North American and international approaches and viewpoints tend to be the furthest apart.

From a **North American perspective** this constructionally identical motor protective switch is simply categorized in its basic form as a „manual motor controller", **and is thus not recognized as providing any short circuit protective features**. All of these controllers, aside from those that have undergone further evaluation as explained later in the text, require a back-up overcurrent protective device in their respective branch circuit. This applies equally in cases where the device is operating in its self-protective range and even when the device is additionally *UL* listed and *CSA* certified in group installations per local *NEC* and *CEC* electrical Codes. This rather demoted performance capability is not the result of failed testing but has more to do with the fact that, historically, North American standards have required that the short circuit protective feature be relegated to a separate set of overcurrent protective devices specifically listed or certified for the purpose. As the following clarifications will show however, we have witnessed in the meantime a rapprochement of the *NA* and *IEC* worlds in this respect.

Type E Self-Protected Combination Motor Controller
A significant step in the expansion of *UL 508* and *CSA-C22.2 No. 14* with respect to combination motor controllers came about with the introduction of "Construction Type E" in each respective standard. In order to fulfill the necessary upstream main disconnect and short circuit protective functions which are inherent elements of every combination starter, these components needed to feature a high short circuit rating as well as large electrical clearances on their incoming supply side field wiring terminals in accordance with *UL 489* and *CSA-C22.2 No. 5-02* specifications. It is worth noting that all currently available self-protected *„Type E"*-Starters have only been listed and certified for use in solidly grounded 4 wire, wye-type supply networks (e.g. 480Y/277 VAC or 600Y/347 VAC).

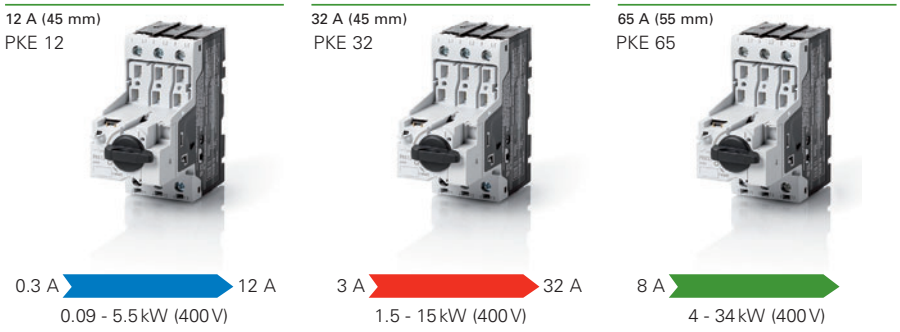
The use of Self-protected *Type E*-Combination Starters provides numerous benefits:

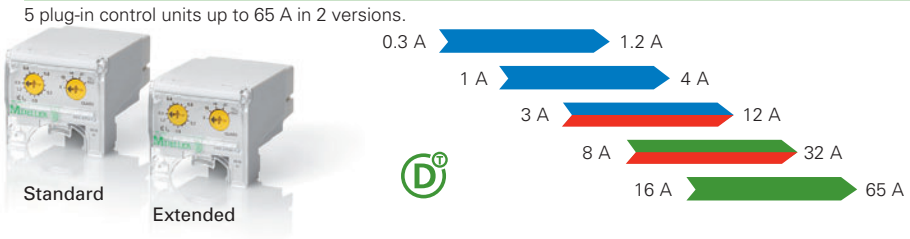
- Simplified engineering, no need to coordinate with a back-up overcurrent protective device (often unknown) due to its stand-alone rating.
- The amount of necessary layout space is greatly reduced.
- No assembly and wiring required between individually mounted starter components.
- Lower component costs
- Lower panel wiring and assembly charges
- A design more in line with current technological control panel advances used throughout the *IEC*-world.

Obliged by tradition
Motor-protective circuit-breaker PKE

Motor-protective circuit-breakers PKZ have been manufactured by Moeller since 1932. Our ideas and developments have decisively influenced the trends in the protection of motors since then. The results are progressive concepts and marketable product innovations that again and again assume the role of international trendsetting, pioneering products. It was Moeller who pioneered the integration of overload protection and short-circuit protection into a compact device, thus abolishing the usual separation between both protective functions as used up to then. The awareness of this long tradition in the motor protection field has helped establish and maintain a core competence which has remained intact through to today. The term PKZ is not just the embodiment of quality, but also the generally used synonym by experts for motor-protective circuit-breakers.

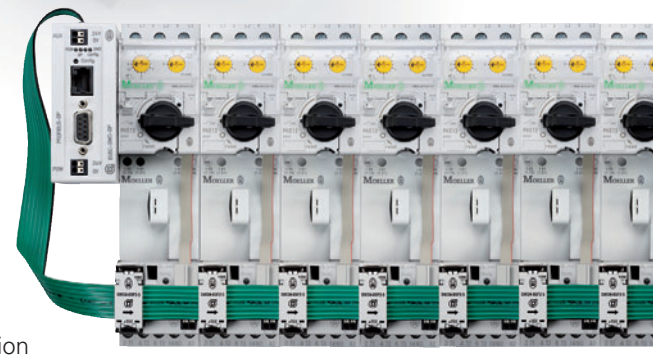
3 base units + 5 control units = current range up to 65 A





Modular with a wide setting range
The functional safety and the service life of a motor depends mainly on the motor protection. Motorprotective circuit-breakers PKE with electronic overload protection offer an interesting alternative to the bimetal solution here, and complement the intelligent PKZ series from Eaton Moeller. The motor-protective circuit-breaker PKE provides the highest level of flexibility featuring a compact and modular design with plug-in control unit for motor currents up to 65 A. The large current setting ranges decisively reduce the number of variants and minimise the engineering work and costs accordingly.

PKE in the xStart system
The motor-protective circuit-breaker PKE has versatile, approved accessories available from the xStart range for safe and rational control panel construction. On most applications, an auxiliary switch is required with varying contact assignment for interlock or for signalling purposes. The motor starter design with two separate contact systems including visible isolating gaps, enables a unique assignment of the protective devices PKE and switching device DIL M, whereby switchgear devices can be exchanged individually.
A universal accessory series from the PKZM0 system facilitates economy in logistical terms and reduces engineering costs.



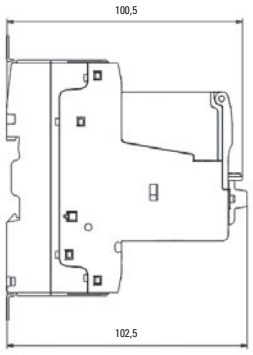
Always well informed
- Current values
- Diagnostics data
- Status messages
- Overload relay function

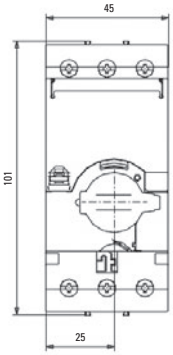
Information at your fingertips thanks to SmartWire-Darwin
Motor starter combinations with PKE enable integration into the automation environment via SmartWire-Darwin. The actual flow of current in the PKE can also be detected via the modular COM port PKE-SWD-32 in addition to the different indication functions such as diagnostics, status or overload messages. The data can be transferred directly into the control and is available across the system.
The data transparency created enhances the efficiency and the operational reliability of the drives in the operation environment of the motor-protective circuit-breaker.

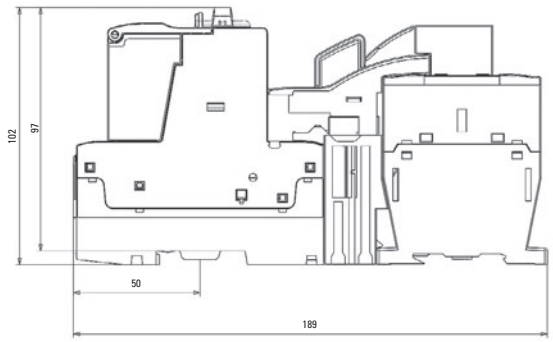
Selection overview

Motor-protective circuit-breaker PKE 12 / PKE 32			Modules			Complete devices
Motor rating	380 V, 400 V, 415 V	**Overload release setting range**	**Base unit**	**Control unit Standard**	**Control unit Extended**	**Motor-protective circuit-breaker standard**
kW	A		**Part no.**	**Part no.**	**Part no.**	**Part no.**
	Motor-protective circuit-breaker, Coordination type "1" and "2"					
0.12	0.41	0.3 ... 1.2 A	**PKE12**	**PKE-XTU-1,2**	**PKE-XTUA-1,2**	**PKE12/XTU-1,2**
0.18	0.6					
0.25	0.8					
0.37	1.1					
0.37	1.1	1 ... 4 A	**PKE12**	**PKE-XTU-4**	**PKE-XTUA-4**	**PKE12/XTU-4**
0.55	1.5					
0.75	1.9					
1.1	2.6					
1.5	3.6					
1.5	3.6	3 ... 12 A	**PKE12**	**PKE-XTU-12**	**PKE-XTUA-12**	**PKE12/XTU-12**
2.2	5					
3	6.6					
4	8.5					
4	8.5	8 ... 32 A	**PKE32**	**PKE-XTU-32**	**PKE-XTUA-32**	**PKE12/XTU-32**
5.5	11.3					
7.5	15.2					
11	21.7					
15	29.3					

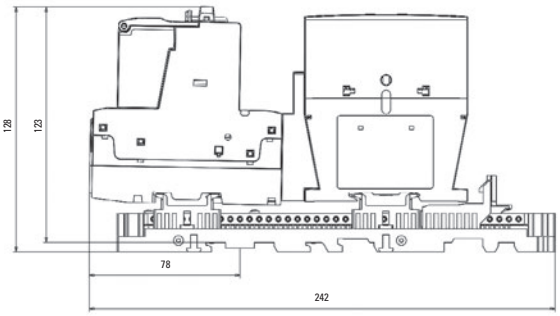
Communication interface for PKE12/32		
	**SWD function element for PKE12/32**	**Part no.**
		PKE-SWD-32







Motor starter MSC-DE ... -M7 to MSC-DE...-M12



Motor starter MSC-DE ... -M17 to MSC-DE...-M32

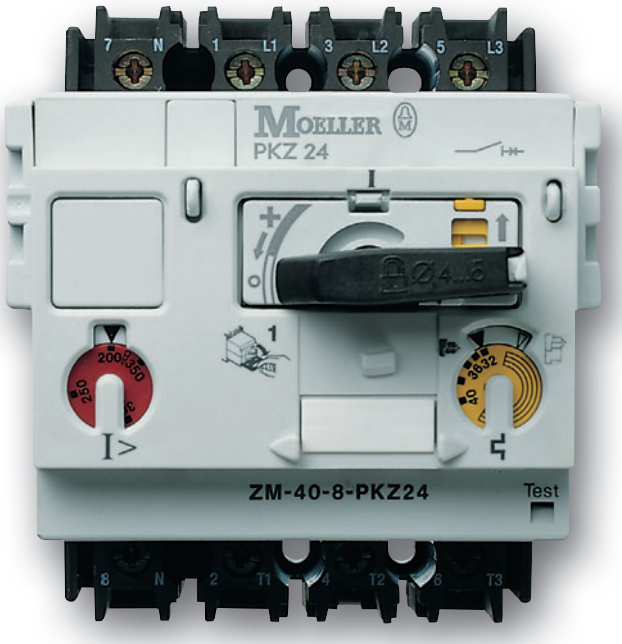
Selection overview



Motor starter MSC – Coordination type «1» and «2»					
Motor rating	380 V, 400 V, 415 V	**Setting range overload release**	**Version Standard 230V/50Hz**	**Version Standard 24V DC**	**Version Extended 24V DC**
kW	A		**Part no.**	**Part no.**	**Part no.**
0.09	0.31	0.3 ... 1.2 A	**MSC-DE-1,2-M7 (230V/50Hz)**	**MSC-DE-1,2-M7 (24VDC)**	**MSC-DEA-1,2-M7 (24VDC)**
0.12	0.41				
0.18	0.6				
0.25	0.8				
0.37	1.1				
0.37	1.1	1 ... 4 A	**MSC-DE-4-M7 (230V/50Hz)**	**MSC-DE-4-M7 (24VDC)**	**MSC-DEA-4-M7 (24VDC)**
0.55	1.5				
0.75	1.9				
1.1	2.6				
1.5	3.6				
1.5	3.6	3 ... 12 A	**MSC-DE-12-M7 (230V/50Hz)**	**MSC-DE-12-M7 (24VDC)**	**MSC-DEA-12-M7 (24VDC)**
2.2	5				
3	6.6				
1.5	3.6	3 ... 12 A	**MSC-DE-12-M9 (230V/50Hz)**	**MSC-DE-12-M9 (24VDC)**	**MSC-DEA-12-M9 (24VDC)**
2.2	5				
3	6.6				
4	8.5				
1.5	3.6	3 ... 12 A	**MSC-DE-12-M12 (230V/50Hz)**	**MSC-DE-12-M12 (24VDC)**	**MSC-DEA-12-M12 (24VDC)**
2.2	5				
3	6.6				
4	8.5				

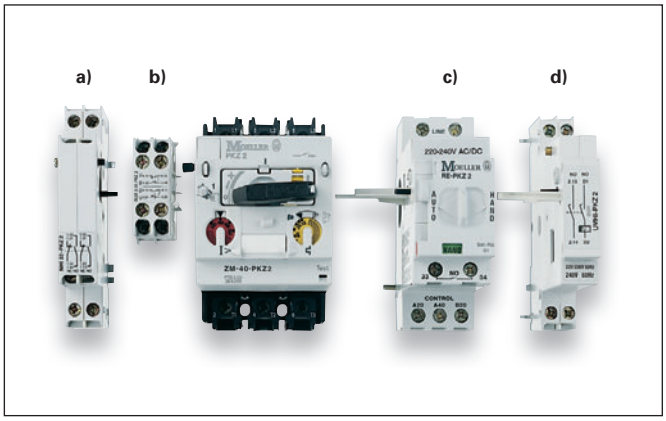


1.5	3.6	3 ... 12 A	**MSC-DE-12-M17 (230V/50Hz)**	**MSC-DE-12-M17 (24VDC)**	**MSC-DEA-12-M17 (24VDC)**
2.2	5				
3	6.6				
4	8.5				
5.5	11.3				
4	8.5	8 ... 32 A	**MSC-DE-32-M17 (230V/50Hz)**	**MSC-DE-32-M17 (24VDC)**	**MSC-DEA-32-M17 (24VDC)**
5.5	11.3				
7.5	15.2				
4	8.5	8 ... 32 A	**MSC-DE-32-M25 (230V/50Hz)**	**MSC-DE-32-M25 (24VDC)**	**MSC-DEA-32-M25 (24VDC)**
5.5	11.3				
7.5	15.2				
11	21.7				
4	8.5	8 ... 32 A	**MSC-DE-32-M32 (230V/50Hz)**	**MSC-DE-32-M32 (24VDC)**	**MSC-DEA-32-M32 (24VDC)**
5.5	11.3				
7.5	15.2				
11	21.7				
15	29.3				



Motor- and System-Protective-Circuit-Breakers PKZ 2: Versatile in Application

Various plug-in trip blocks allow the PKZ 2 to be converted in a single action. 3-pole and 4-pole trip blocks are available for motor and system protection. Differential signalling clearly indicates the switching state of the circuit-breaker. Auxiliary contact modules, voltage releases or trip-indicating auxiliary contacts can be fitted quickly and easily.



Accessories:
a) Standard auxiliary contact module, b) Trip-indicating auxiliary contact module, c) Remote operator
d) Voltage releases
- **Shunt release**
- **Undervoltage release with/without early-make auxiliary contact**
- **Delayed-response under-voltage release**

Plug-in trip blocks allow fast adaptation to engineering changes.

Switching and signalling, locally and remotely

PKZ 2 has intelligent accessories to allow flexible solutions to a wide range of communication tasks. The electronic remote operator RS-PKZ 2 can be actuated directly, without any coupling elements, from the semiconductor outputs of a PLC (24 V DC).

With electrical isolation between CONTROL and LINE, it can take the power for the switching process from a separate power supply (e.g. 230 V 50 Hz).

On the RE-PKZ 2, the electronic remote operator for standard applications, CONTROL and LINE are separate inputs too, although they use the same potential reference. This allows actuation by low consumption units, such as control circuit devices.

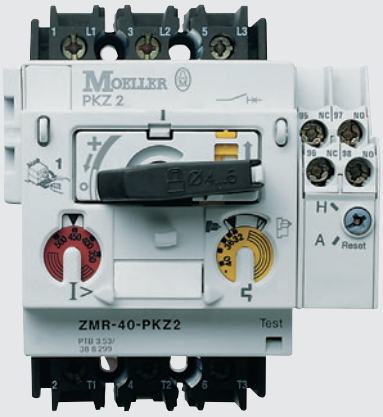
1 The door coupling handle: Operation from the outside

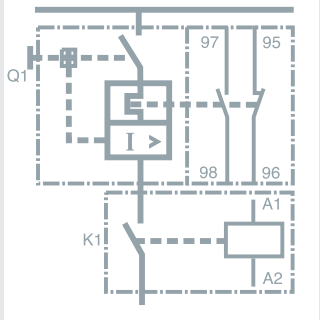
Like the basic unit, the door coupling handle has ON, OFF and TRIPPED positions. When installed in the control panel door, the handle enables the door to be interlocked, if required.

2 Motor-starter with or without manual reset – many advantages rather than many parts

Valuable not just in the chemical industry: the trip block ZMRPKZ2. When used in combination with the PKZ 2 basic unit, the trip block with overload relay function switches Off the down-stream contactor, rather than disconnecting the circuit-breaker in the event of a motor overload. The circuit-breaker PKZ 2 thus remains switched On and does not need to be manually reset locally. After a cooling-down phase for the trip block ZMR, the contactor is reset automatically. In the "Manual" setting, the ZMR block has to be reset by hand.

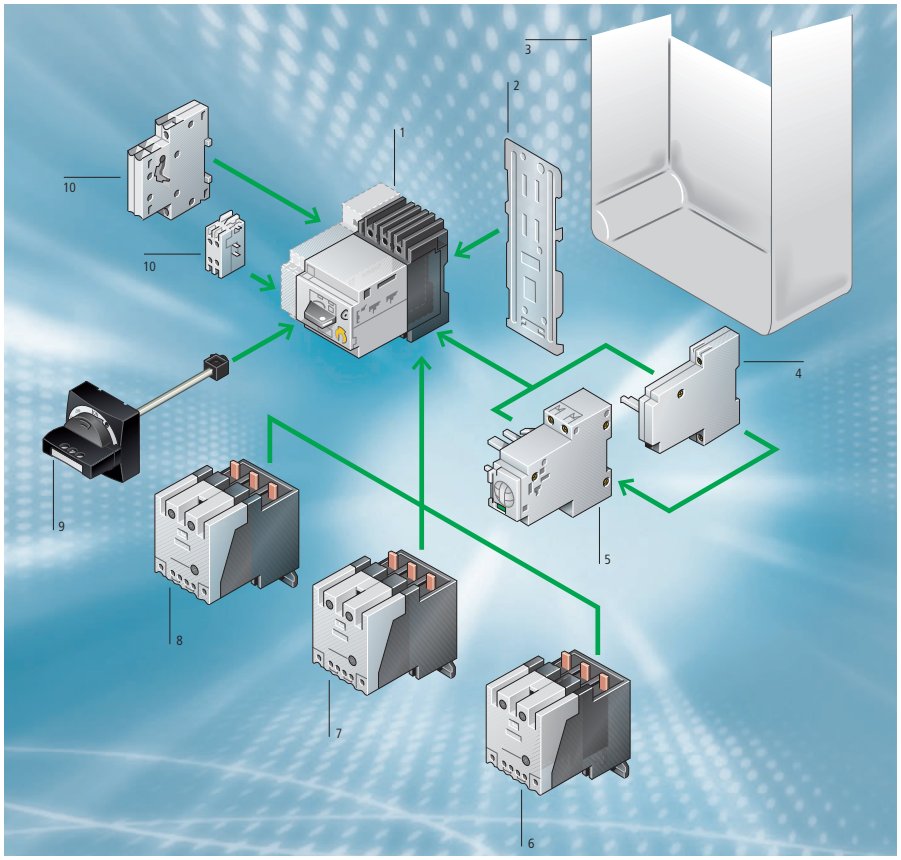
1





2

The complete range for flexible solutions



Legend

1 Motor-protective circuit-breakers, Circuit-breakers

2 Clip plate

3 Insulated enclosures

4 Voltage releases

5 Remote operators

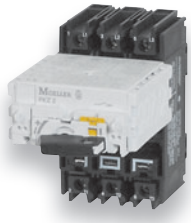
6 Contact module

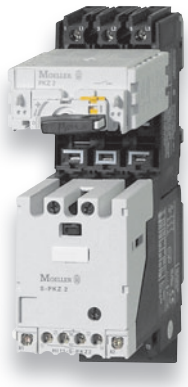
7 High-capacity contact module

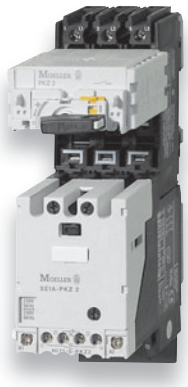
8 Current limiter

9 Door coupling rotary handle IP65

10 Auxiliary contacts







Motor protective basic unit, 3-pole			
Rated uninterrupted current		PKZ2 basic unit with S-PZK2 high-capacity contact module fitted (1 M, 1 B). Supplied on C-PKZ2 clip plate. Cannot be combined with Z...-0,6-PKZ2	PKZ2 basic unit with SE1A/11-PKZ2 contact module fitted (1 M, 1 B). Supplied on C-PKZ2 clip plate. Cannot be combined with Z...-0,6-PKZ2
I_u A	**Part no.**	**Part no.**	**Part no.**
40	**PKZ2**	**PKZ2/S(230V50HZ)**	**PKZ2/SE1A/11(230V50HZ)**

Motor protective trip blocks, 3-pole

AC3 220 V 230 V 240 V	**AC3** 380 V 400 V 415 V	Rated uninterrupted current	Overload release	Short-circuit release	With overload release	With overload/ relay function, with manual/automatic position[1]	Without overload release[2]
P kW	**P** kW	I_u A	I_r A	I_{rm} A	**Part no.**	**Part no.**	**Part no.**
0.09	0.12	0.6	0.4 – 0.6	5 – 8	**ZM-0,6-PKZ2**	**ZMR-0,6-PKZ2**	**M-0,6-PKZ2**
0.12	0.25	1	0.6 – 1	8 – 14	**ZM-1-PKZ2**	**ZMR-1-PKZ2**	**M-1-PKZ2**
0.25	0.55	1.6	1 – 1.6	14 – 22	**ZM-1,6-PKZ2**	**ZMR-1,6-PKZ2**	**M-1,6-PKZ2**
0.37	0.75	2.4	1.6 – 2.4	20 – 35	**ZM-2,4-PKZ2**	**ZMR-2,4-PKZ2**	**M-2,4-PKZ2**
0.75	1.5	4	2.4 – 4	35 – 55	**ZM-4-PKZ2**	**ZMR-4-PKZ2**	**M-4-PKZ2**
1.1	2.2	6	4 – 6	50 – 80	**ZM-6-PKZ2**	**ZMR-6-PKZ2**	**M-6-PKZ2**
2.2	4	10	6 – 10	80 – 140	**ZM-10-PKZ2**	**ZMR-10-PKZ2**	**M-10-PKZ2**
4	7.5	16	10 – 16	130 – 220	**ZM-16-PKZ2**	**ZMR-16-PKZ2**	**M-16-PKZ2**
5.5	12.5	25	16 – 25	200 – 350	**ZM-25-PKZ2**	**ZMR-25-PKZ2**	**M-25-PKZ2**
7.5	15	32	24 – 32	275 – 425	**ZM-32-PKZ2**	**ZMR-32-PKZ2**	**M-32-PKZ2**
11	20	40	32 – 40	350 – 500	**ZM-40-PKZ2**	**ZMR-40-PKZ2**	**M-40-PKZ2**

Accessories

Standard auxiliary contact
For motor-protective circuit-breakers, circuit-breakers and (high-capacity) compact starters

		Part no.
1 N/O	1 N/C	**NHI11-PKZ2**
2 N/O	2 N/C	**NHI22-PKZ2**

Standard auxiliary contact
For (high-capacity) compact starters

		Part no.
1 N/O	1 N/C	**NHI11S-PKZ2**
2 N/O	2 N/C	**NHI22S-PKZ2**
2 x 1 N/O	2 x 1 N/C	**NHI2-11S-PKZ2**

Trip-indicating auxiliary contact with short-circuit indicator
For motor-protective circuit-breakers, circuit-breakers and (high-capacity) compact starters

		Part no.
2 x 1 N/O	2 x 1 N/C	**AGM2-11-PKZ2**

Short-circuit indicators
For motor-protective circuit-breakers, circuit-breakers and (high-capacity) compact starters

		Part no.
-	-	**K-AGM-PKZ2**

Shunt release
For AC and DC voltage

	Part no.
24 – 60 V DC 24 – 48 V 50Hz 24 – 48 V 60Hz	**A-PKZ2-A**
110 – 250 V DC 110 – 240 V 50Hz 110 – 240 V 60Hz	**A-PKZ2-B**
380 – 500 V 50Hz 480 – 600 V 60Hz	**A-PKZ2-C**

Current limiter
To increase the switching capacity of non-inherently short-circuit proof motor-protective circuit-breakers to 100 kA/500 V
CL-PKZ2

Undervoltage release off-delayed, delay time 200 ms
With auxiliary contact
For AC **UVHI-PKZ2** (230V50HZ)

Undervoltage release, non-delayed
Without auxiliary contact
For AC **U-PKZ2** (230V50HZ)
For DC **U-PKZ2** (24VDC)

With auxiliary contact
For AC **U-HI-PKZ2** (230V50HZ)

Remote operator RE-PKZ2
Actuation via auxiliary contact
RE-PKZ2 (220-240V50/60HZ, DC)
RE-PKZ2 (24V50/60HZ, DC)

Remote operator RS-PKZ2
Actuation from PLC semiconductor outputs
RS-PKZ2 (220-240V50/60HZ, DC)
RS-PKZ2 (24V50/60HZ, DC)

Door coupling handle
Degree of protection IP65

		Part no.
For use on main sswitches to IEC/EN 60204	Black	**PKZ2-XH**
	Red-yellow	**PKZ2-XRH**
For use in MCC distribution boards with PKZ2 turned through 90°	Black	**PKZ2-XHMCC**

Plug-fit extension shaft for door coupling handle
Can be extended as required for mounting depths of 171 - 300 mm
PKZ2-XAH

[1] Single-phasing sensitivity, adjustability and Ex as with ZM blocks. When using motor protective trip blocks with overload relay function, an overload does not cause the motor-protective circuitbreaker to trip. The overload indication is produced by means of two auxiliary contacts.
[2] When using the short-circuit protection for motors with heavy starting duty, please notice the projecting notes on page 8/41 in the Main Catalogue Industrial Switchgear, Motor-protective circuit-breakers PKZ 2, Motor protection modules

PKZ 2 motor-protective circuit-breakers, PKZ 2 circuit-breakers for North America

Rating data for approved types[1] UL 508/CSA C 22.2 No. 14	**Maximum motor rating** Three-phase current HP				Setting ranges		Maximum protective device to UL/CSA **Group protection**[2]			
	200 V	230 V	460 V	575 V	Overload release	Short-circuit release	To max. short-circuit rating 600 V		Maximum fuse rating	Circuit-breaker max.
							480 V	600 V		
	HP	HP	HP	HP	A	A	kA	kA	A	A
PKZ 2 motor-protective circuit-breakers	"Manual Motor Starter with thermal and magnetic trip"									
PKZ2/ZM-0.6	[3]				0.4 – 0.6	5 – 8	65	42	500	600
PKZ2/ZM-1			0.5	0.5	0.6 – 1	8 – 14	65	42	500	600
PKZ2/ZM-1,6			0.75	1	1 – 1.6	14 – 22	65	42	500	600
PKZ2/ZM-2,4	0.5	0.5	1	1.5	1.6 – 2.4	20 – 35	65	42	500	600
PKZ2/ZM-4	1	1	2	3	2.4 – 4	35 – 55	65	42	500	600
PKZ2/ZM-6	1.5	1.5	3	5	4 – 6	50 – 80	65	42	500	600
PKZ2/ZM-10	2	3	5	7.5	6 – 10	80 – 140	65	42	500	600
PKZ2/ZM-16	3	5	10	10	10 – 16	130 – 220	65	42	500	600
PKZ2/ZM-25	7.5	7.5	20	25	16 – 27	200 – 350	65	42	500	600
PKZ2/ZM-32	10	10	20	30	24 – 32	275 – 425	65	42	500	600
PKZ2/ZM-40	10	15	30	30	32 – 42	350 – 500	65	42	500	600
PKZ 2 high-capacity compact starters	"Manual Motor Starter with thermal and magnetic trip"									
PKZ2/ZM-0,6/S(...)	[3]				0.4 – 0.6	5 – 8	65	42	2000	2000
PKZ2/ZM-1/S(...)			0.5	0.5	0.6 – 1	8 – 14	65	42	2000	2000
PKZ2/ZM-1,6/S(...)			0.75	1	1 – 1.6	14 – 22	65	42	2000	2000
PKZ2/ZM-2,4/S(...)	0.5	0.5	1	1.5	1.6 – 2.4	20 – 35	65	42	2000	2000
PKZ2/ZM-4/S(...)	1	1	2	3	2.4 – 4	35 – 55	65	42	2000	2000
PKZ2/ZM-6/S(...)	1.5	1.5	3	5	4 – 6	50 – 80	65	42	2000	2000
PKZ2/ZM-10/S(...)	2	3	5	7.5	6 – 10	80 – 140	65	42	2000	2000
PKZ2/ZM-16/S(...)	3	5	10	10	10 – 16	130 – 220	65	42	2000	2000
PKZ2/ZM-25/S(...)	7.5	7.5	20	25	16 – 27	200 – 350	65	42	2000	2000
PKZ2/ZM-32/S(...)	10	10	20	30	24 – 32	275 – 425	65	42	2000	2000
PKZ2/ZM-40/S(...)	10	15	30	30	32 – 42	350 – 500	65	42	2000	2000
High-capacity contact module motor-protective circuit-breaker	"Contact module" in combination with PKZ2/ZM(R)-...or base for separate mounting of EZ-PKZ2									
S-PKZ2(...)	10		15		30	30				
S/HI20-S-PKZ2(...)	10		15		30	30				
S-G-PKZ2(...)	10		15		30	30				

Notes

Service factor (SF)

Setting I_r of current scale in dependence of load factor

SF = 1.15 → I_r = 1 x → $I_{n\,mot}$

SF = 1 → I_r = 0.9 x $I_{n\,mot}$

[1] Devices for world markets: IEC = UL/CSA

[2] Important: Changed requirements for group protection

[3] In this range, calculate motor rating according to rated current. Specified values to NEC Table 430 – 150

PKZ2 system self-protected starters for North America									
Maximum motor rating Three-phase current HP				Setting ranges		Rated short-circuit breaking capacity			
200 V	230 V	460 V	575 V	Overload release	Short-circuit release	230 V	460 V	575 V	
HP	HP	HP	HP	A	A	kA	kA	kA	**Part no.**
[1]	[1]	0.5	0.5	0.6 – 1	8 – 14	100	65	42	**PKZ2/ZM-1/S-SP(120V60HZ)**
[1]	[1]	0.75	1	1 – 1.6	14 – 22	100	65	42	**PKZ2/ZM-1,6/S-SP(120V60HZ)**
0.5	0.5	1	1.5	1.6 – 2.4	20 – 35	100	65	42	**PKZ2/ZM-2,4/S-SP(120V60HZ)**
1	1	2	3	2.4 – 4	35 – 55	100	65	42	**PKZ2/ZM-4/S-SP(120V60HZ)**
1.5	1.5	3	5	4 – 6	50 – 80	100	65	42	**PKZ2/ZM-6/S-SP(120V60HZ)**
2	3	5	7.5	6 – 10	80 – 140	100	65	42	**PKZ2/ZM-10/S-SP(120V60HZ)**
3	5	10	10	10 – 16	130 – 220	100	65	42	**PKZ2/ZM-16/S-SP(120V60HZ)**
7.5	7.5	20	25	16 – 27	200 – 350	100	65	42	**PKZ2/ZM-25/S-SP(120V60HZ)**
10	10	20	–	24 – 32	275 – 425	100	65	–	**PKZ2/ZM-32/S-SP(120V60HZ)**
10	15	30	–	32 – 42	350 – 500	100	65	–	**PKZ2/ZM-40/S-SP(120V60HZ)**

Notes Without additional short-circuit protection element, with built-in short-circuit indicator, to UL 508 "Combination motor controller Type E". Immediate continuity of service possible after short-circuit tripping.

[1] In this range, calculate motor rating according to rated current. Specified values to NEC Table 430 – 150

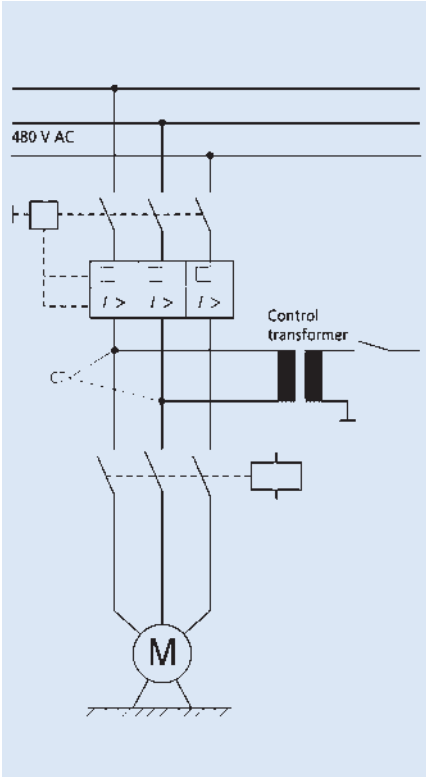
Self-Protected Combination Starter PKZ2/ZM-.../S-SP

The Self-Protected Combination Starter Type *PKZ2/ZM-.../S-SP* fulfills all „Type E"-requirements. This high fault rated compact combination starter is made up of a thermal-magnetic manual motor protective switch *PKZ2/ZM-*.. and a high fault capacity magnetic controller (contactor) */S*. The unit features a built-in short circuit trip indicator. Following a short circuit interruption and after the source of the fault has been cleared, the device remains fully calibrated and can be immediately brought back in line to provide „Continuity of service" performance. The manual motor protective portion *PKZ2/ZM-*… features the large electrical clearances on its incoming supply side field wiring terminals in accordance with *UL 489*. An important element in fulfilling *Type E* requirements for high fault ratings is the high capacity magnetic contactor which features current limiting contacts and a customized internal magnetic trip to provide the starter's high level fault interrupting capability. This special contactor is a vital part of the assembly and provides the additional current limitation capability necessary to achieve self-protection. The starter is suitable for 600 *VAC* solidly grounded wye supply systems (600Y/ 347 V) for motor full load currents up to 27A (25HP at 575 V) and 480Y/277 *VAC* circuits for motor FLCs up to 42 A (15/30 HP at 230/460 V).

The *PKZ2/ZM-.../S-SP's* stand alone short circuit rating is 65 kA / 480 V and 42 kA / 600 V. The compact starter's main design features include:

- A plug-in, adjustable thermal-magnetic trip module in line with North American motor full load current ratings and a high capacity, high fault current limiting contactor for motor switching purposes which is countoured to fit directly into the protective switch portion.

All system component modules, e.g. auxiliary contacts, voltage trips and remote control drive are *UL* listed and *CSA* certified accessories which can be field installed. The starter also features control circuit tap-offs between the disconnect and the contactor. That is especially useful in tight, limited space applications like Motor Control Center (*MCC*) starter units which incorporate control transformers to supply the starter's control circuit loads and circuitry. All of these features contribute to make the *PKZ 2* a truly innovative and high performance combination motor starter.

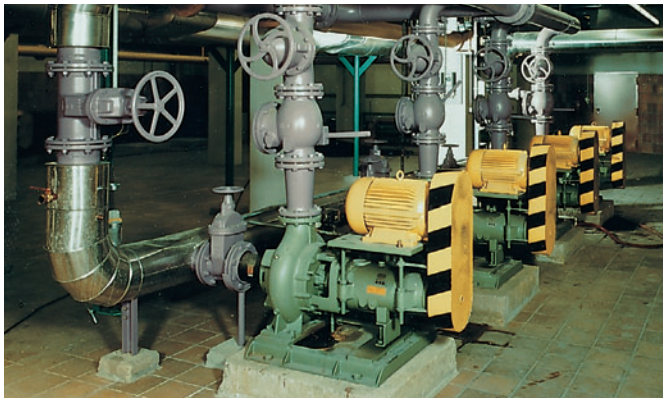


Control circuit tap-offs on the *PKZ2-ZM../S-SP* for transformer feed in a Motor Control Center starter application.

The simplicity of it! – Tool-less plug connection without tools!

Using the new xStart motor-starter combinations it is possible to create the best solutions from standard products even more easily and efficiently.

Eaton Moeller has optimised the DIL and PKZ standard products in such a way that, by using simple toolless plug connectors, they can be assembled to form reliable motor-starters. Without the need for tools! The MSC motor-starter combinations can also be supplied as complete devices. Costs for fitting and wiring can be considerably reduced in this way. Costs for testing are cut and errors are prevented from the start. Another advantage lies in increased safety during maintenance work where removal of the combination plug connector produces a visible isolating gap. This Eaton Moeller technology is available on our direct-on-line and reversing starters up to 15 A.



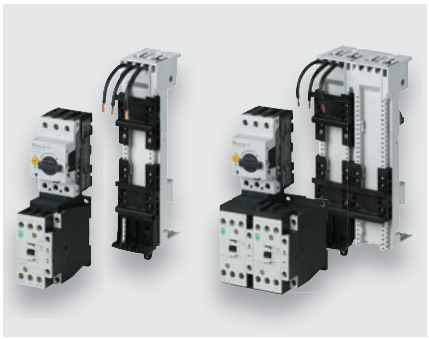
Simple and low-priced engineering
If coordination type “1” or coordination type “2”: PKZM 0 and PKZM 4 motor-starter combinations with DIL M contactors master short-circuit currents from 50 kA to 35 kW/400 V. With a power of 5.5 kW/400 V even 100 kA is not a problem.
Depending on the combination of motor-protective circuit-breaker and contactor, a motor starter conform to coordination type “1” or coordination type “2” is the result. Thus, the most frequent applications are covered with just a few standard components. This provides added benefits in terms of stockkeeping.

Tested motor-starter combinations from Eaton Moeller – staying on the safe side.

Operational continuity with standard components
The IEC/EN 60947 and VDE 0660 standards differentiate between motor starters according to coordination type “1” and coordination type “2”. The coordination types provide information about the behaviour of motor starters under short-circuit conditions. Both types safely shutdown the short-circuit. Motor starters to coordination type “1” are low-priced starters for standard applications. The standard allows damage to the starter with a short-circuit. In order to comply with the demands of coordination type “2”, the motor starter must be capable of continued operation without replacing parts after shutting down a short-circuit. These motor starter types assure the highest level of operational continuity.

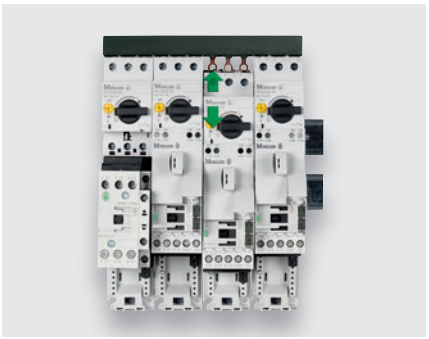
Slim solutions: DOL starters from standard components

The new direct-on-line starters built from standard components are available in four slim frame sizes. The contactor and the protective switch are of the same compact width dimension. Thus you lose not a millimetre of control panel space. The convenient MSC motor-starters using toolless plug connection technology are available up to 15 A and require only a top-hat rail for mounting. The mechanical connector ensures a secure hold and the electrical connector provides optimum reliability and safety. Complete mounting connectors are offered for DOL and reversing starters from 16 up to 32 A. This prevents fitting errors and cuts down on wiring time.



New busbar adapters (not only) for motor-starter combinations

Their standard dimensions enable them to be fitted on all 60mm busbar systems of leading manufacturers. Their UL/CSA approvals make them suitable for use in both the European and the North American market. They are 100% compatible with Wöhner system accessories. The new busbar adapters support the mounting of starter combinations that are assembled with the tool-less connectors of the xStart system. They are available as single devices or complete with motor starters. This saves the customer time and money and provides a complete solution from a single source.



Easier installation and removal of individual motor starters

The switchgear interconnected with the three phase commoning links is generally snapped onto a mounting rail. If it is a motor starter, all motor-protective circuit-breakers and all contactors are snapped onto two mounting rails underneath one another, or onto a particularly useful mounting rail adapter.
The result is an additional benefit where components can be easily removed from an interconnected group by offsetting the adapter mounting rail without having to disassemble the entire three phase commoning link.

Direct-on-line starter and Reversing starter

Direct-on-line starter, 400/415 V

				Setting range		Motor starter	
	AC-3 380 V 400 V 415 V	Rated operation current 400 V	Rated short-circuit current 380 – 415 V	Overload release	short-circuit release	Actuating voltage Coordination type "1"	Actuating voltage Coordination type "2"
Complete units PKZ and DIL M	***P*** kW	I_e A	I_q kA	I_r A	I_{rm} A	**Part no.**	**Part no.**
	0.06	0.21	150 (50)[1]	0.16 – 0.25	3.5	**MSC-D-0,25-M7 (...)**	**MSC-D-0,25-M7 (...)**
	0.09	0.31	150 (50)[1]	0.25 – 0.4	5.6	**MSC-D-0,4-M7 (...)**	**MSC-D-0,4-M7 (...)**
	0.12	0.41	150 (50)[1]	0.40 – 0.63	8.82	**MSC-D-0,63-M7 (...)**	**MSC-D-0,63-M7 (...)**
	0.18	0.6	150 (50)[1]	0.40 – 0.63	8.82	**MSC-D-0,63-M7 (...)**	**MSC-D-0,63-M7 (...)**
	0.25	0.8	150 (50)[1]	0.63 – 1	14	**MSC-D-1-M7 (...)**	**MSC-D-1-M7 (...)**
	0.37	1.1	150 (50)[1]	1.00 – 1.6	22.4	**MSC-D-1,6-M7 (...)**	**MSC-D-1,6-M7 (...)**
	0.55	1.5	150 (50)[1]	1.00 – 1.6	22.4	**MSC-D-1,6-M7 (...)**	**MSC-D-1,6-M7 (...)**
	0.75	1.9	150 (50)[1]	1.60 – 2.5	35	**MSC-D-2,5-M7 (...)**	**MSC-D-2,5-M7 (...)**
	1.1	2.6	150 (50)[1]	2.50 – 4	56	**MSC-D-4-M7 (...)**	**MSC-D-4-M7 (...)**
	1.5	3.6	150 (50)[1]	2.50 – 4	56	**MSC-D-4-M7 (...)**	**MSC-D-4-M7 (...)**
	2.2	5	150 (50)[1]	4.00 – 6.3	88.2	**MSC-D-6,3-M7 (...)**	**MSC-D-6,3-M7 (...)**
	3	6.6	150 (50)[1]	6.30 – 10	140	**MSC-D-10-M7 (...)**	**MSC-D-10-M17 (...)**
	4	8.5	150 (50)[1]	6.30 – 10	140	**MSC-D-10-M9 (...)**	**MSC-D-10-M17 (...)**
	5.5	11.3	50	8 – 12	168	**MSC-D-12-M12 (...)**	**MSC-D-12-M17 (...)**
	7.5	16 (15.5)[2]	50	10 - 16	224	**MSC-D-16-M15(...)**	**MSC-D-16-M17(...)**
	11	21.7	50	20 – 25	350	**MSC-D-25-M25 (...)**	**MSC-D-25-M25 (...)**
	15	29.3	50	25 – 32	448	**MSC-D-32-M32 (...)**	**MSC-D-32-M32 (...)**

Reversing starter 400/415 V

				Setting range		Motor starter	
	AC-3 380 V 400 V 415 V	Rated operational current 400 V	Rated short-circuit current 380 – 415 V	Overload release	Short-circuit release	Actuating voltage Coordination type "1"	Actuating voltage Coordination type "2"
Complete units PKZ and DIL M	***P*** kW	I_e A	I_q kA	I_r A	I_{rm} A	**Part no.**	**Part no.**
	0.06	0.21	150 (50)[1]	0.16 – 0.25	3.5	**MSC-R-0,25-M7 (...)**	**MSC-R-0,25-M7 (...)**
	0.09	0.31	150 (50)[1]	0.25 – 0.4	5.6	**MSC-R-0,4-M7 (...)**	**MSC-R-0,4-M7 (...)**
	0.12	0.41	150 (50)[1]	0.40 – 0.63	8.82	**MSC-R-0,63-M7 (...)**	**MSC-R-0,63-M7 (...)**
	0.18	0.6	150 (50)[1]	0.40 – 0.63	8.82	**MSC-R-0,63-M7 (...)**	**MSC-R-0,63-M7 (...)**
	0.25	0.8	150 (50)[1]	0.63 – 1	14	**MSC-R-1-M7 (...)**	**MSC-R-1-M7 (...)**
	0.37	1.1	150 (50)[1]	1.00 – 1.6	22.4	**MSC-R-1,6-M7 (...)**	**MSC-R-1,6-M7 (...)**
	0.55	1.5	150 (50)[1]	1.00 – 1.6	22.4	**MSC-R-1,6-M7 (...)**	**MSC-R-1,6-M7 (...)**
	0.75	1.9	150 (50)[1]	1.60 – 2.5	35	**MSC-R-2,5-M7 (...)**	**MSC-R-2,5-M7 (...)**
	1.1	2.6	150 (50)[1]	2.50 – 4	56	**MSC-R-4-M7 (...)**	**MSC-R-4-M7 (...)**
	1.5	3.6	150 (50)[1]	2.50 – 4	56	**MSC-R-4-M7 (...)**	**MSC-R-4-M7 (...)**
	2.2	5	150 (50)[1]	4.00 – 6.3	88.2	**MSC-R-6,3-M7 (...)**	**MSC-R-6,3-M7 (...)**
	3	6.6	150 (50)[1]	6.30 – 10	140	**MSC-R-10-M7 (...)**	**MSC-R-10-M17 (...)**
	4	8.5	150 (50)[1]	6.30 – 10	140	**MSC-R-10-M9 (...)**	**MSC-R-10-M17 (...)**
	5.5	11.3	50	8 – 12	168	**MSC-R-12-M12 (...)**	**MSC-R-12-M17 (...)**
	7.5	16	50	10 - 16	224	**MSC-R-16-M17(...)**	**MSC-R-16-M17(...)**
	11	21.7	50	20 – 25	350	**MSC-R-25-M25 (...)**	**MSC-R-25-M25 (...)**
	15	29.3	50	25 – 32	448	**MSC-R-32-M32 (...)**	**MSC-R-32-M32 (...)**

[1] For coordination type "2" [2] If DILM15-... is used

Motor protective circuit-breaker	Coordination type "1"		Coordination type "2"	
	Contactor	DOL starter Set Mechanical connection element + Electrical contact element	Contactor	DOL starter Set Mechanical connection element + Electrical contact element
Part no.	**Part no.**	**Part no.**	**Part no.**	**Part no.**
PKZM0-0,25	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-0,4	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-0,63	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-0,63	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-1	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-1,6	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-1,6	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-2,5	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-4	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-4	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-6,3	DILM7-..	PKZM0-XD M12	DILM7-..	PKZM0-XD M12
PKZM0-10	DILM7-..	PKZM0-XD M12	DILM17-..	PKZM0-XD M32
PKZM0-10	DILM9-..	PKZM0-XD M12	DILM17-..	PKZM0-XD M32
PKZM0-12	DILM12-..	PKZM0-XD M12	DILM17-..	PKZM0-XD M32
PKZM0-16	DILM17-..	PKZM0-XD M32	DILM17-..	PKZM0-XD M32
PKZM0-25	DILM25-..	PKZM0-XD M32	DILM25-..	PKZM0-XD M32
PKZM0-32	DILM32-..	PKZM0-XD M32	DILM32-..	PKZM0-XD M32

Motor protective circuit-breaker	Coordination type "1"		Coordination type "2"	
	Contactor	Reversing starter set Mechanical connection element + Electrical contact element	Contactor	Reversing starter set Mechanical connection element + Electrical contact element
Part no.	**Part no.**	**Part no.**	**Part no.**	**Part no.**
PKZM0-0,25	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-0,4	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-0,63	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-0,63	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-1	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-1,6	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-1,6	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-2,5	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-4	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-4	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-6,3	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12
PKZM0-10	2x DILM7-01	PKZM0-XR M12	2x DILM17-01	PKZM0-XR M32
PKZM0-10	2x DILM9-01	PKZM0-XR M12	2x DILM17-01	PKZM0-XR M32
PKZM0-12	2x DILM12-01	PKZM0-XR M12	2x DILM17-01	PKZM0-XR M32
PKZM0-16	2x DILM17-01	PKZM0-XR M32	2x DILM17-01	PKZM0-XR M32
PKZM0-25	2x DILM25-01	PKZM0-XR M32	2x DILM25-01	PKZM0-XR M32
PKZM0-32	2x DILM32-01	PKZM0-XR M32	2x DILM32-01	PKZM0-XR M32

Notes

The direct-on-line starters (complete units) consist of a motor-protective circuit-breaker PKZM 0 and a contactor DIL M.
The reversing starters (complete units) consist of a motor-protective circuit-breaker PKZM 0 and two contactors DIL M. Up to 15 A, starters are mounted without adapter plates, with only the motor-protective circuit-breaker being secured to the top-hat rail. The contactors receive their mechanical hold via a mechanical connection module.
Up to 15 A, starters are mounted without adapter plates, with only the motor-protective circuit-breaker being secured to the top-hat rail. The contactors receive their mechanical hold via a mechanical connection module.
From 16 A, motor-protective circuit-breakers and contactors are mounted on top-hat-rail adapter plates.
The connection of the main contacts between PKZ and contactor is effected via an electrical contact module.

Eaton Moeller provides a PC-based electronic selection program for motor starters in addition to the comprehensive selection page in the Eaton Moeller main catalogue. This program considers various operating voltages, short-circuit ratings and co-ordination types, as well as fuseless and fused combinations. This small program is available from Eaton Moeller free of charge on the Internet. Eaton Moeller has provided the practically-minded with a carton selection slider for a number of years.

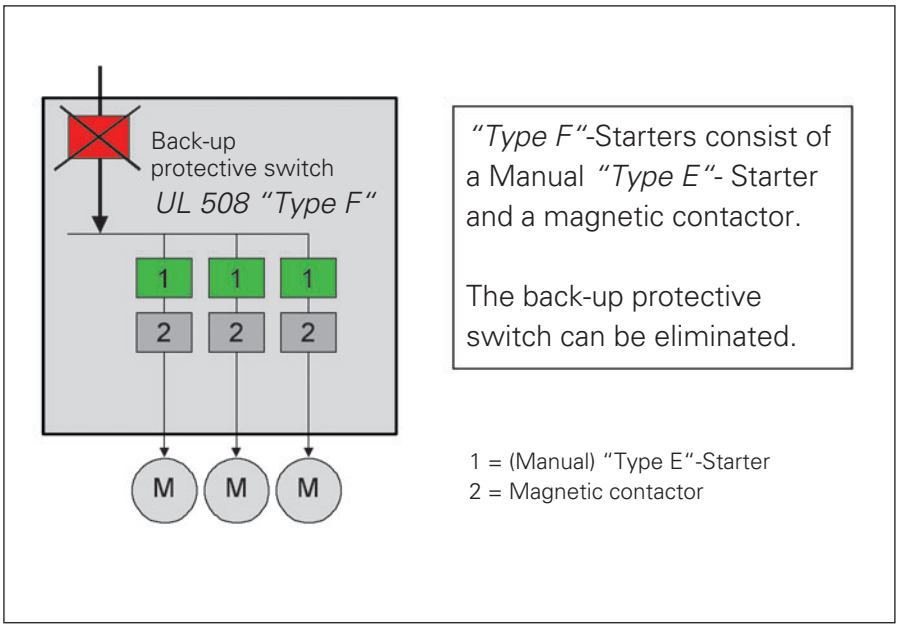
www.moeller.net/select

Type F Combined Motor Controller for North America

Type F Combination Starter
UL has now officially introduced in the *UL 508* standard the latest category of combination motor starters: a "Type F Combination Motor Controller". A Type F combination controller consists simply of a Manual self-protected *"Type E"* combination motor controller (e.g. a *PKZM0-...* equipped with the large clearance terminal block Type *BK25-..-E*) combined with a standard magnetic contactor (controller). *"Type F Combination Motor Starters"* also eliminate the need for a backup overcurrent protective device. All such combinations must be submitted by the manufacturer for *UL* listing and *CSA* certification. Eaton Moeller already has in submittal to *UL* a number of Type F combination starters covering a wide range of HP ratings. It is also worth noting that all currently available "Type F"-Starters, like "Type E"-Starters, are only suitable for solidly grounded 4 wire, wye-type supply networks (e.g. 480Y/277 V). "Type F"-combination Starters are only possible in the *US* at this time, because the *CSA* standard has not yet officially adopted it.

A straight-forward modular assembly set-up system, in which the manufacturer or the independent panel builder can put together *UL* listed and *CSA* certified components and self-certify or label the resulting starter or assembly, does not exist as such in North America. It is possible, however, to have a *UL* listed or *CSA* certified panel shop and assemble combinations that are covered by a procedure or file. It is strongly recommended, therefore, for such an assembly workshop or panel builder in the market to build or engineer similar combinations and assemblies, to work closely with the manufacturer for the latest approval updates and component rating information, since there are always ongoing design improvements being developed which could represent significant technological and economical advantages to their business.

It is generally acknowledged that the approval process can be both a time and cost intensive endeavor which can often unduly delay the introduction of new products and technology into the market place. This not only puts the component manufacturer at a disadvantage but can also be detrimental to the panel builder and end-user, since the introduction of certain design innovations could translate into significant improvements for their business. Because of the very high export quota of European machinery and panel builders it is also neither practical nor feasible for a manufacturer to introduce and establish new products and technologies that have not yet been approved per North American standards, even

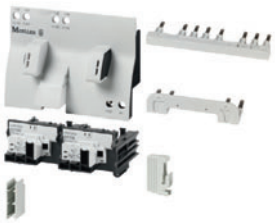


"Type F Combination Motor Starters" fulfill all 4 functions of a combination motor starter per *UL 508*. The back-up protective switch can be eliminated.

Type F Combined motor controller (CMC) for North America											
Maximum motor rating Three-phase current HP				Setting ranges		Rated short-circuit breaking capacity					
200 V	230 V	460 V	575 V	Overload release	Short-circuit release	230 V	460 V	575 V	Incoming terminal	Manual motor protector (MMP)	Contactor
HP	HP	HP	HP	A	A	kA	kA	kA	**Part no.**	**Part no.**	**Part no.**
				0.16 – 0.25	3.4	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-0,25**	**DILM7**
				0.25 – 0.4	5.6	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-0,4**	**DILM7**
				0.4 – 0.63	8.8	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-0,63**	**DILM7**
		0.5	0.5	0.63 – 1	14	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-1**	**DILM7**
		0.75	1	1 – 1.6	22	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-1,6**	**DILM7**
0.5	0.5	1	1.5	1.6 – 2.5	35	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-2,5**	**DILM7**
1	1	2	3	2.5 – 4	56	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-4**	**DILM7**
1.5	1.5	3	5	4 – 6.3	88	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-6,3**	**DILM7**
3	3	7.5	10	6.3 – 11	140	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-10**	**DILM9**
3	3	7.5	–	6.3 – 11	168	50	50	50	**BK25/3-PKZ0-E**	**PKZM0-12**	**DILM12**
3	5	10	–	10 – 16	224	18	18	–	**BK25/3-PKZ0-E**	**PKZM0-16**	**DILM17**
5	5	10	–	16 – 20	280	18	18	–	**BK25/3-PKZ0-E**	**PKZM0-20**	**DILM25**
5	7.5	15	–	20 – 25	350	18	18	–	**BK25/3-PKZ0-E**	**PKZM0-25**	**DILM25**
7.5	10	20	–	25 – 32	448	18	18	–	**BK25/3-PKZ0-E**	**PKZM0-32**	**DILM32**
3	5	10	–	10 – 16	224	50	50	–	**BK50/3-PKZ4-E**	**PKZM4-16**	**DILM17**
7.5	7.5	20	–	20 – 25	350	50	50	–	**BK50/3-PKZ4-E**	**PKZM4-25**	**DILM25**
10	10	25	–	25 – 32	448	50	50	–	**BK50/3-PKZ4-E**	**PKZM4-32**	**DILM32**
10	10	30	–	32 – 40	560	50	50	–	**BK50/3-PKZ4-E**	**PKZM4-40**	**DILM40**

when a significant portion of this equipment is destined for the domestic EU market and would manual rating remain in Europe. The approval process also practically rules out customized assembly designs that would combine products from different manufacturers. These mixed combinations are also not usual in the *IEC* world because the manufacturer is solely able to verify the electrical coordination and performance of components of his own make, particularly with respect to short circuit testing and determination of proper overcurrent coordination performance levels. The European "Declarations of Conformity" must, by definition, also be current because they are essentially verifying to the user that a particular combination of products and assemblies reflects actual on going production quality levels which were in place at the time the "Declaration of Conformity" was issued. Practically speaking, manufacturers which would combine products of different makes to produce starters and assemblies would not be able to keep up with on going changes in competitive products, which could be significant in view of the consequences it may have on short circuit coordination values and component performance levels.

PKZM accessories

PKZM motor-protective circuit-breaker accessories			
	For use with	Part no.	Application note The set consists of
Wiring set DOL starter 	PKZM0+DILM7 PKZM0+DILM9 PKZM0+DILM12 PKZM0+DILM15	**PKZM0-XDM12**	Mechanical connection module for PKZM 0 and contactor Main current wiring between PKZM 0 and contactor in tool-less plug connection
	PKZM0+DILM17 PKZM0+DILM25 PKZM0+DILM32 PKZM0+DILM38	**PKZM0-XDM32**	Mounting rail adapter plate Main current wiring between PKZM 0 and contactor
	PKZM4+DILM40 PKZM4+DILM50 PKZM4+DILM65 PKZM4+DILM72	**PKZM4-XDM65**	Mounting rail adapter plate Main current wiring between PKZM 4 and contactor
Wiring set reversing starter 	PKZM0+DILM7-01 PKZM0+DILM9-01 PKZM0+DILM12-01	**PKZM0-XRM12**	Mechanical connection module for PKZM 0 and contactor Main current wiring between reversing starters in tool-less plug connection Control cable in tool-less plug connection
	PKZM0+DILM17-01 PKZM0+DILM25-01 PKZM0+DILM32-01	**PKZM0-XRM32**	Mounting rail adapter plate Reversing starter main current wiring
Electrical contact module for main current wiring 	PKZM0+DILM17 PKZM0+DILM25 PKZM0+DILM32 PKZM0+DILM38	**PKZM0-XM32DE**	For electrical connection of the main current contacts between PKZM 0 and DIL M17..M25..M32 contactors only for use in conjunction with busbar adapter or mounting rail adapter plate
	PKZM4+DILM40 PKZM4+DILM50 PKZM4+DILM65 PKZM4+DILM72	**PKZM4-XM65DE**	For electrical connection of the main current contacts between PKZM 4 and DIL M40..M50..M65 contactors only for use in conjunction with busbar adapter or mounting rail adapter plate
Mounting rail adapter plate 	PKZM0-XDM12 PKZM0-XRM12	**PKZM0-XC45**	Consisting of: 45 mm wide adapter plate Connection nose for alignment of further plates
		PKZM4-XC55/2	Consisting of: 55 mm wide adapter plate Connection nose for alignment of further plates **Reversing starter design with DIL M40..M50..M65 contactors** 1x PKZM 4-XDM65 + 1x PKZM 0-XC55 adapter plate + 1x DIL M65-XRL **Star-delta starter design with DIL M40..M50..M65 contactors** 1x PKZM 4-XDM65 + 2x PKZM 0-XC55 adapter plates + 1 x DIL M65-XSL

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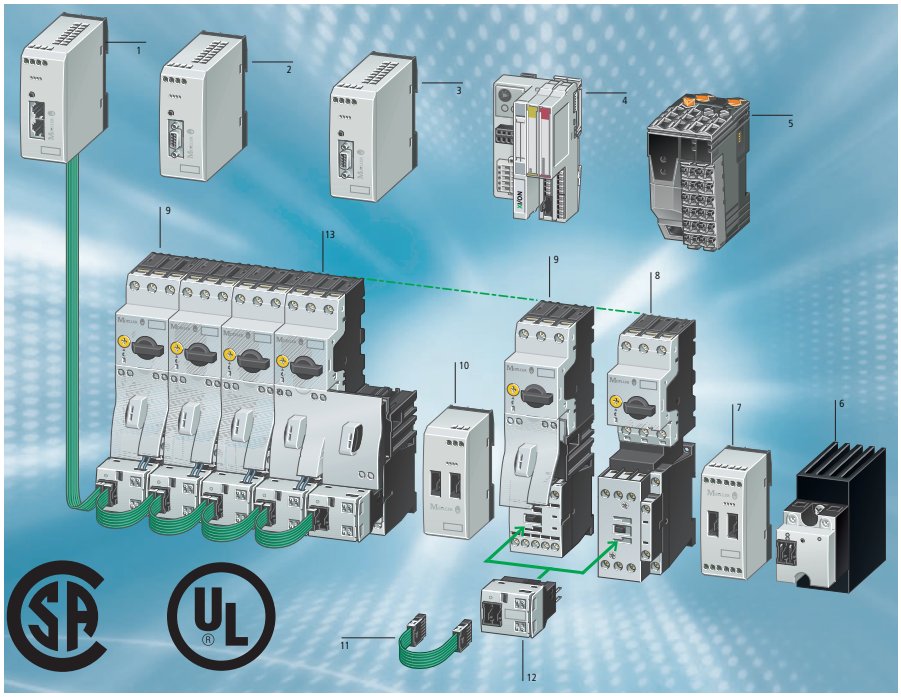


1 easyNet/CANopen gateway
2 PROFIBUS DP gateway
3 MODBUS-RTU gateway
4 XI/ON gateway with SmartWire interface slice[1)]
5 SmartWire interface slice for X20 system[2)]
6 DOLD Semiconductor relay up to 50 A[3)]
7 I/O module
8 Direct-on-line-starter MSC-D up to 32 A
9 Direct-on-line-starter MSC-D up to 15.5 A
10 Power module
11 Connection cable
12 SWIRE-DIL contactor module
13 Star-delta starter MSC-R up to 32 A

SmartWire			
		Description	**Part no.**
Gateway	PROFIBUS DP (2)	Gateway with integrated power supply for the SmartWire modules and control voltage for the switching devices: • Connection to PROFIBUS DP as slave. • Transfer rate: 9.6 Kbit/s to 12 Mbit/s. • 9-pole SUB-D socket. • Address range 1-126. • Connection to SmartWire as master. • Supports 16 SmartWire modules.	**SWIRE-GW-DP**
	easyNet/ CANopen (1)	Gateway with integrated power supply for the SmartWire modules and control voltage for the switching devices: • Connection to easyNet or CANopen • Supports 16 SmartWire modules. • Mode selectable: easyNet or CANopen	**EASY223-SWIRE**
	MODBUS-RTU (3)	Gateway with integrated power supply for the SmartWire modules and control voltage for the switching devices: • Connection to MODBUS-RTU as slave over RS232 or RS485 • Transfer rate: 9.6 kBit/s to 57.8 kBit/s • Supports 16 SmartWire modules. • Connection to SmartWire as master.	**SWIRE-GW-MB**
Modules	Modules for DILM (12)	SmartWire module for mounting on DILM 7 to DILM 38 contactor: • One module is required for each contactor • Connection to SmartWire as slave. • max. 16 SmartWire modules per line • 1 digital input for isolated contact • Indication of contactor switch position	**SWIRE-DIL**
	I/O module (7)	SmartWire I/O module for connecting switching devices over 15 kW: • 4 digital inputs for isolated contacts 2 relay outputs • 2 relay outputs	**SWIRE-4DI-2DO-R**
	Power module (10)	SmartWire Power module for feeding the control voltage: • Connection to SmartWire as passive module (no address).	**SWIRE-PF**
Accessories	Connection cable (11)	SmartWire connection cable fully made up: Length : 85 mm Length : 110 mm Length : 150 mm Length : 250 mm Length : 500 mm Length : 1000 mm Length : 2000 mm	**SWIRE-CAB-008** **SWIRE-CAB-011** **SWIRE-CAB-015** **SWIRE-CAB-025** **SWIRE-CAB-050** **SWIRE-CAB-100** **SWIRE-CAB-200**
	Termination plug	Termination plug for last SmartWire Module, 6-pole, no electrical function.	**SWIRE-CAB-000**
	NHI-E with cable	NHI-E-10-PKZ0 with connection cable AWG18 blue, for connection to SmartWire module for DILM.	**NHI-E-10L-PKZ0**

Note: The number of motor starters or DILM contactors to be connected depends on the power consumption of the magnet systems per SmartWire line. Power modules can be used to increase the number of SmartWire modules to be connected.

1) Product available from Micro Innovation GmbH. Information available at *www.microinnovation.com*
2) Product available from B&R Industrie-Elektronik Ges.m.b.H. Information available at *www.br-automation.com*
3) Product available from E. DOLD & Söhne KG. Information available at *www.dold.com*

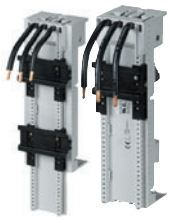
Busbar adapter for all 60 mm busbar systems

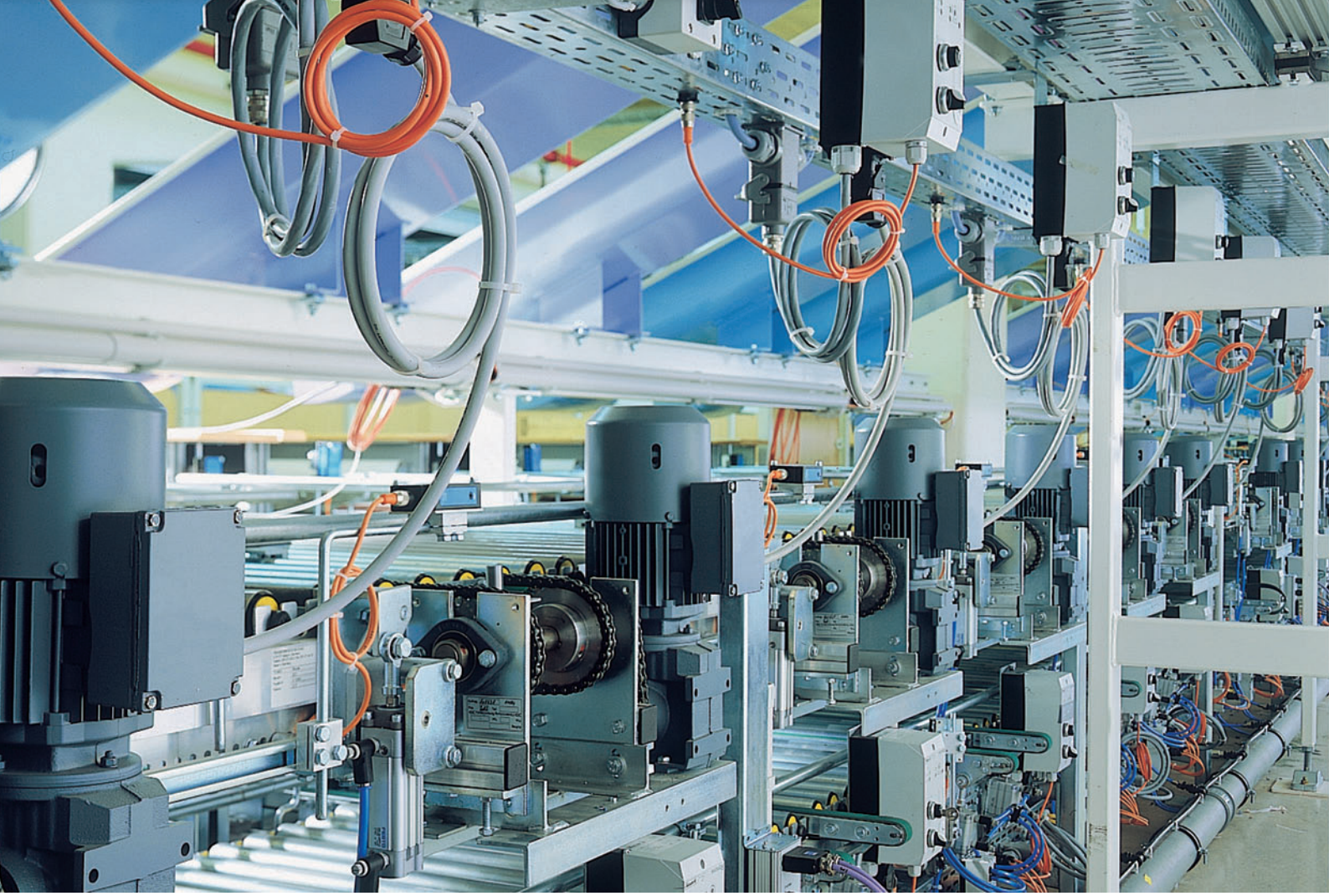
Busbar adapter, 3-pole[1]

Version	Rated operational voltage U_e V	Rated operational current I_e A	Cable cross-section	Adapter width mm	Adapter length mm	Support rail	For use with:	Designation	Notes Electrical connections
Busbar adapter 16 A, for spring-loaded terminals 	690	16	AWG 14 (2.5 mm²)	45	200	2	PKZM0…C+ Contactor DILM7 : Contactor DILM15	**BBA0C-16**	For PKZM0-...C with spring-loaded terminals
Busbar adapter 25 A 	690	25	AWG 12 (4 mm²)	45	200	1	PKZM0+ Contactor DILM7 : Contactor DILM15 MSC-D-0,25-M7… : MSC-D-16-M15…	**BBA0-25**	Set direct starter *PKZM0-XDM12*
	690	25	AWG 12 (4 mm²)	90	200	1	PKZM0+ 2 x Contactor DILM7-01 2 x Contactor DILM9-01 2 x Contactor DILM12-01 MSC-R-0,25-M7… : MSC-R-12-M12…	**BBA0R-25**	Set reversing *PKZM0-XRM12*
Busbar adapter 25 A, universal 	690	25	AWG 12 (4 mm²)	45	200	2	universal	**BBA0-25/2TS**	Mounting rail can be offset at 1.25 mm grid
Busbar adapter 32 A 	690	32	AWG 10 (6 mm²)	45	200	2	PKZM0+ Contactor DILM17 Contactor DILM25 Contactor DILM32 MSC-D-16-M17… : MSC-D-32-M32…	**BBA0-32**	Electrical contact module *PKZM0-XM32 DE*
	690	32	AWG 10 (6 mm²)	90	200	3	PKZM0+ 2 x Contactor DILM17-01 2 x Contactor DILM25-01 2 x Contactor DILM32-01 MSC-R-16-M17… : MSC-R-32-M32…	**BBA0R-32**	Electrical contact module *PKZM0-XM32 DE* Reverse wiring set *DILM32-XRL*
	690	32	–	45	200	2		**BBA0-32/2TS-C**	Mounting rail can be offset at 1.25 mm grid With spring-loaded terminals for cables up to 6 mm². For example with single-phase applications

[1] Can be used on all busbars in a 60 mm system. Suitable for double T and triple T profiles using a combined adaper for 5 and 10 mm busbar thicknesses.

Busbar adapter, 3-pole[1]

Version	Rated operational voltage U_e V	Rated operational current I_e A	Cable cross-section	Adapter width mm	Adapter length mm	Support rail	For use with:	Designation	Notes Electrical connections
Busbar adapter 63 A 	690	63	AWG 8 (10 mm²)	72	260	2	PKZ2+ Contactor DILM7 : Contactor DILM40	**BBA2L-63**	
	690	63	AWG 8 (10 mm²)	72	200	1	PKZ2	**BBA2-63**	
	690	63	AWG 8	72	200	2	PKZ2+ Contactor DILM 7 - DILM 15 Contactor DILM 17 - DILM 38 Contactor DILM 40 - DILM 65	**BBA2-63/2TS**	Contact module SE1A-PKZ2 and S-PKZ-2 in conjunction with the clip plate C-PKZ-2
	690	63	AWG 8 (10 mm²)	55	260	2	PKZM4+ Contactor DILM17 : Contactor DILM65	**BBA4L-63**	
	690	63	AWG 8 (10 mm²)	55	200	1	PKZM4	**BBA4-63**	
Busbar adapter 80 A	80	690	–	72	200	2	universal	**BBA2-80/2TS-S**	With screw terminals up to AWG 6, for example with 1-phase applications (not without additional components, UL/CSA compatible)
Busbar adapter, universal empty module 	–	–	–	45	200	2	universal	**BBA0/2TS-L**	Without establishment of electrical contacts, as an extension of BBA… for implementation, e.g. of reversing starters. Mounting rail can be offset at 1.25 mm grid
	–	–	–	54	260	2	universal	**BBA4/2TS-L**	Without establishment of electrical contacts, as an extension of BBA… for implementation, e.g. of reversing starters. Mounting rail can be offset at 1.25 mm grid
Accessories for mounting rails	–	–	–	45	–	–	for BBA0....Adapter	**PKZM0-XMR**	
	–	–	–	54	–	–	for BBA4....Adapter	**PKZM0-XMR54**	
	–	–	–	72	–	–	for BBA2....Adapter	**PKZM0-XMR72**	
Accessories for connection cables	–	–	6 mm²	–	130	–	for BBA with screw or spring-loaded terminals	**BBA-XLT-6-130**	
	–	–	16 mm²	–	142			**BBA-XLT-16-142**	
Busbar adapter 160 A 	690	160	6 x 9 x 0,8	90	200	–	NZM1 PN1 N1 NS1	**NZM1-XAD160**	For switch with standard box terminal connection, connection to system top by supplied connection cable
Busbar adapter 250 A 	690	250	–	106	190	–	NZM2 PN2 N2 NS2	**NZM2-XAD250**	Connection to system optionally at top or bottom by rear side connection *(+)NZM2-XKR4…*
Busbar adapter 630 A 	690	630	–	140	300	–	NZM3 PN3 N3	**NZM3-XAD630**	Connection to system optionally at top or bottom by rear side connection *(+)NZM3-XKR13…*



Rapid Link – Decentral Motor Starter and Speed Controller

The Rapid Link system is designed for use with materials handling applications, particularly for distribution and production logistics as well as in baggage handling systems at airports. Rapid Link offers all the functions required for remotely controlling, switching and protecting spatially distributed drives via PROFIBUS-DP and AS-Interface networks featuring IP65 degree of protection.

Simple planing
Rapid Link enables the generation and "copying" of mechatronic functional units. The wide range motor protection simplifies commissioning.

Timesaving installation
The plug connection on Rapid Link saves installation time. The power and data bus is quickly connected without errors using insulation displacement terminals.

Fast commissioning
The manual operating features allow initial commissioning without a PLC. The standard direction of operation is simply corrected using a phase reversal switch.

Safe operation
The electrical isolation in Rapid Link modules also enhances safety with an interwinding fault in the motor.
The "interlocked manual mode" protects the systems against damage caused by incorrect operation.

Europe's largest returned product warehouse operates with Rapid Link
Otto Versand the catalogue order company based in Hamburg built the largest returned goods handling facility in Europe to meet the rising demands associated with returned items. Rapid Link the innovative, decentralised installation system from Eaton Moeller is the preferred solution. Rapid Link is used here to control more than 750 drives. The fast mounting and the simple commissioning features impressed Otto Versand as well as Swisslog Automatisierungstechnik GmbH, who were contracted to complete the work involved.

Baggage handling system provider relies on Rapid Link
Baggage handling facilities at airports are provided by complex systems which are generally comprised of standardised material handling system modules, such as linear and curved conveyors. Rapid Link supports the software technology based implementation of the functions in standardised software modules. The complete Rapid Link plug-in units are fitted when installing the mechanical components onsite, or beforehand in ready-made modules. The power and data bus are simply connected using insulation displacement terminals. The airport operator profits from the diagnostics and status features located in the direct vicinity of the motors. They assist with trouble shooting and maintenance. The manual operating features enable quick action even when the control fails.

Header station

- Interface to the open field-bus ensures independence from manufacturer based standards
- Fast data transfer up to 12 Mbaud as a Profibus-DP slave
- Head station for up to 62 slaves enables efficient use and is ideal for combination with commercially available sensors and actuators
- IP65 plug connector for quick connection and exchange

Incoming circuit-breaker

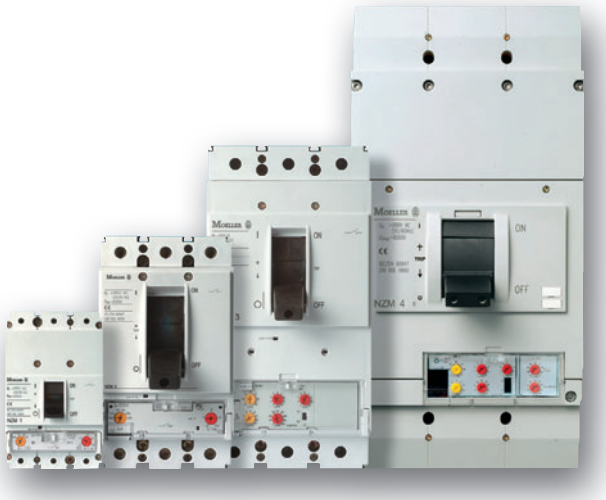
- Disconnection of the energy feed
- Can be secured with 3 padlocks
- Protection against overload and short-circuit
- Small tripping currents enable long cable lengths
- Decentralised status display for quick onsite diagnostics

Motor starter

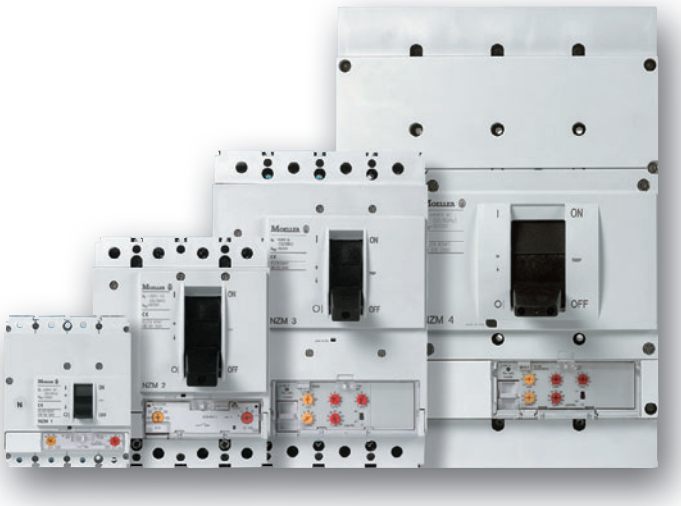
- 3-phase electronic motor protection with a wide range from 0.09 to 3 kW (400 V) reduces the number of variants
- Integrated thermistor monitoring provides full motor protection
- Available as a DOL starter or reversing starter
- Two sensor inputs on board reduce costs
- IP65 plug connector for quick connection and exchange

Speed control unit

- Control of motors up to 2.2 kW at 400 V with up to 4 fixed speeds and two operating directions
- Soft starting protects the mechanical features and provides full torque
- Speed, ramp and deceleration times can be set individually and are infinitely variable.
- Thermistor protection, monitoring of overload and earth faults ensure safety
- IP65 plug connector for quick connection and exchange



3-pole circuit-breaker



4-pole circuit-breaker

The new range up to 1600 A – New ideas for better circuit-breakers

The new Eaton Moeller circuit-breakers cover a range from 15 to 1600 A with just four frame sizes. And they are optimally matched to one another. The wide application spectrum covers every requirement as Eaton Moeller has closely examined what every customer needs and implemented the appropriate solutions. Outstanding, for example, is the continuous switching power range – which extends from the smallest to the largest circuit-breaker or the modular system which can be matched without difficulty to suit the specific application. Thus, the circuit-breakers can be used universally – from the smallest of service distribution boards, to machine controls or motor starter combinations, up to large energy distribution systems with a short-circuit breaking capacity of up to 150 kA.

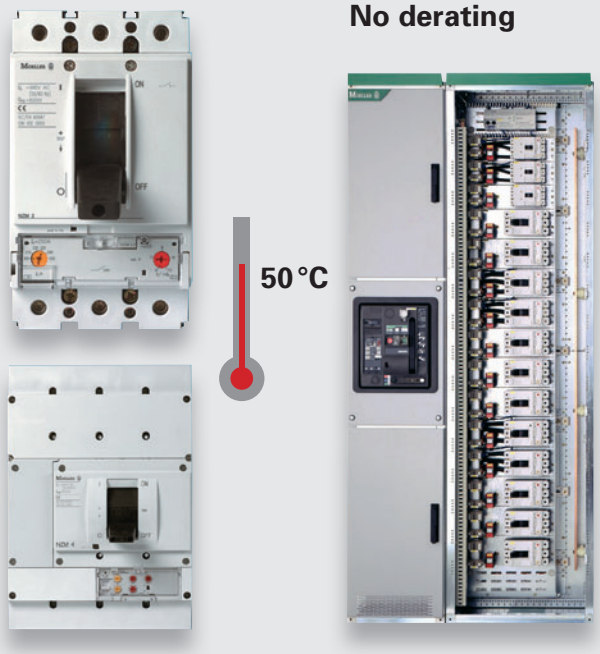
Circuit-breakers for use all over the world

All circuit-breakers fulfil the demands for world-wide use. This applies for the United States, Canada and the Chinese markets with the certification to UL, CSA and CCC (China Compulsory Certification).

In conjunction with the shipping classification authorities, Eaton Moeller also conducts testing in order to obtain the following certification: Lloyds Register of Shipping, Bureau Veritas, Det Norske Veritas, Polski Rejestr Statkow.

Full performance up to 50 °C

All circuit-breakers and switch-disconnector's are designed to facilitate operation up to an ambient temperature of 50 °C under full load conditions without need to reduce the rated current (derate). This is a comfortable prerequisite for simple and practice relevant engineering with important safety components.

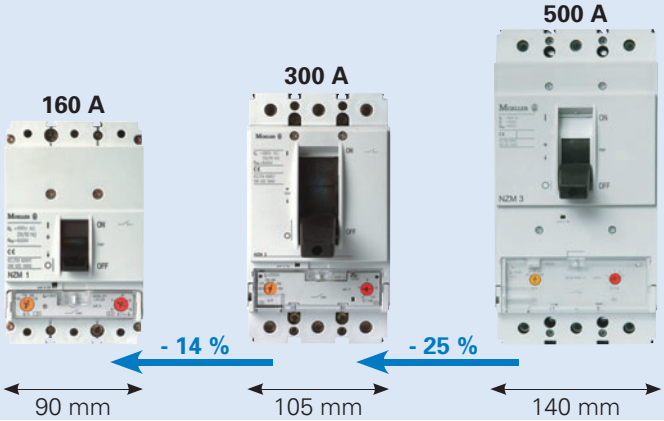


Circuit-breaker		NZM1	NZM2	NZM3	NZM4
Short-circuit breaking capacity	25 kA				
I_{cu} to IEC/EN 60947	36 kA				
At 415 V	50 kA				
	100 kA				
	150 kA				
Application range in A		15 – 160	15 – 300	125 – 630	315 – 1600
Nuber of poles		3/4	3/4	3/4	3/4
Rated voltage in V		690	690	690	690
Circuit-breakers for North America		**NZM1-NA**	**NZM2-NA**	**NZM3-NA**	**NZM4-NA**
Short-circuit breaking capacity	25 kA				
I_{cu} to UL489	35/42 kA				
At 480 V	85/100 kA				
Short-circuit breaking capacity	18 kA				
I_{cu} to CSA 22.2 No 5.1	25/35 kA				
At 600 V	50 kA				
Application range in A		1.2 – 125	1.6 – 250	125 – 600	400 – 1200
Nuber of poles		3	3	3	3
Rated voltage in V		480	600	600	600
Dimensions in mm	Width 3/4-polig	90/120	105/140	140/185	210/280
	Height	145	184	275	401
	Depth	68	103	120.5	138

More power on the smallest space: NZM1 up to 160 A, NZM2 up to 300 A

Space in the control panel – and accordingly the costs – can be easily saved with the circuit-breakers NZM1 and NZM2. Instead of using the next larger size, now simply use the more compact further development from the NZM system series.

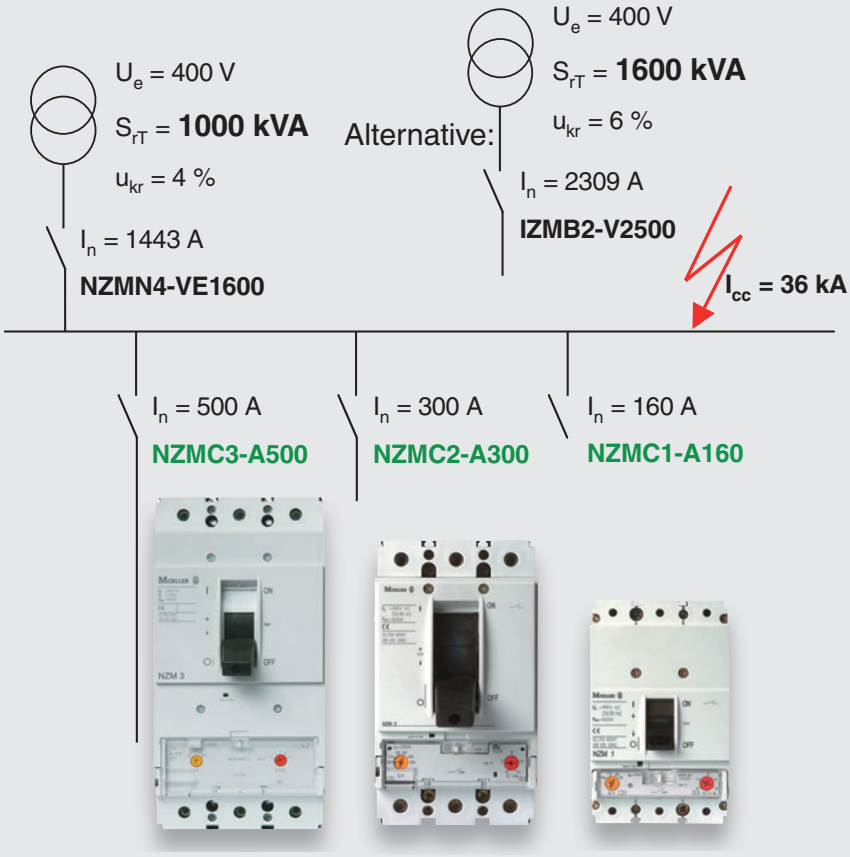
Two advantages at once:
same performance with up to 25% reduced space requirement and up to 20% cost savings.



Economically dimensioned. Circuit-breakers with 36 kA

OC61EN

Online catalogue Quicklink to www.moeller.net



Circuit-breakers from the new C series with 36 kA short-circuit breaking capacity and nominal current from 20 - 500 A are the correct choice for the most frequently used standard applications. The decisive factor for the level of the short-circuit current in the most widely used low-voltage radial networks is the capacity of the low-voltage transformer.

With 36 kA breaking capacity, the highest short-circuit currents of the conventional 630 kVA transformer class – even with a double parallel connection – are mastered. Even for power networks with transformers up to 1600 kVA, the attractively-priced switches of the new C switch series are the first choice.

They are derived from the high-performance type of the modern Eaton Moeller NZM series and also feature their good system features and simple handling characteristics. The thermo-magnetic releases can be adapted over a wide setting range to the permissible loading currents of the equipment to be protected. They can be equipped with accessories suited for every application in power distribution networks or for the equipment on electrical machines.

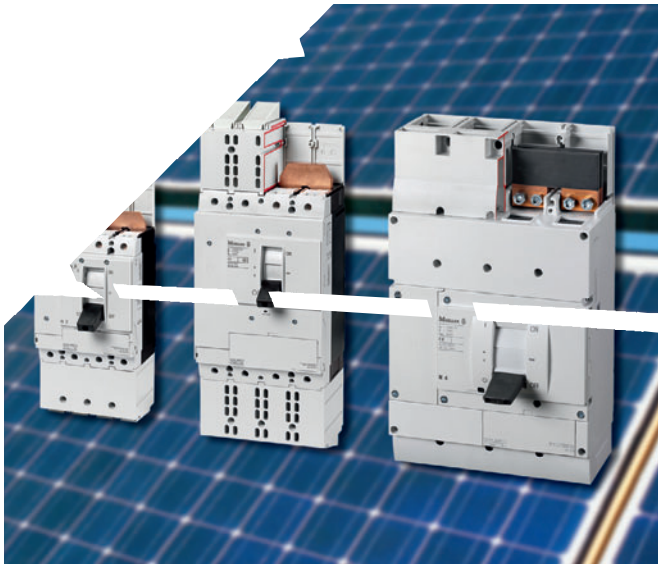
Low-voltage power transformers

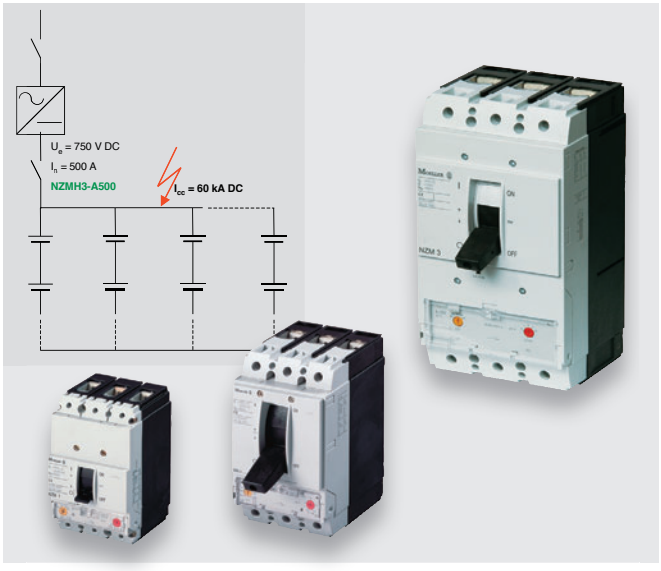
Rated Voltage U_n	400/230 V		
Short-circuit voltage U_k		4 %	6 %
Rated power S kVA	Rated current I_n A	Short-circuit current I_k'' A	A
50	72	1 805	–
100	144	3 610	2 406
160	230	5 776	3 805
200	288	7 220	4 812
250	360	9 025	6 015
315	455	11 375	7 583
400	578	14 450	9 630
500	722	18 050	12 030
630	909	22 750	15 166
800	1 158	–	19 260
1 000	1 444	–	24 060
1 250	1 805	–	30 080
1 600	2 312	–	38 530

≤ 36 kA

"In practice the short-circuit current is attenuated by about 10 % due to the cable connection between the transformer and main power distribution. Thus, the Comfort class is the perfect solution for transformers up to 1600 kVA."

Switch-disconnectors and circuit-breakers for DC current applications





Switch-disconnectors up to 1400 A

Eaton Moeller is offering DC switch-disconnectors specially designed for large photovoltaic plants such as energy parks. These are available in three sizes 200 A / 450 A / 1400 A with a differentiated rated current and a maximum rated voltage of 1000 V. All switches can be used at ambient temperatures up to 65 °C without limitation or derating. If users also require overload and short-circuit protection in addition to the basic isolating function, circuit-breakers are available in three sizes with a rated current of up to 500 A and a maximum rated voltage of 750 V.

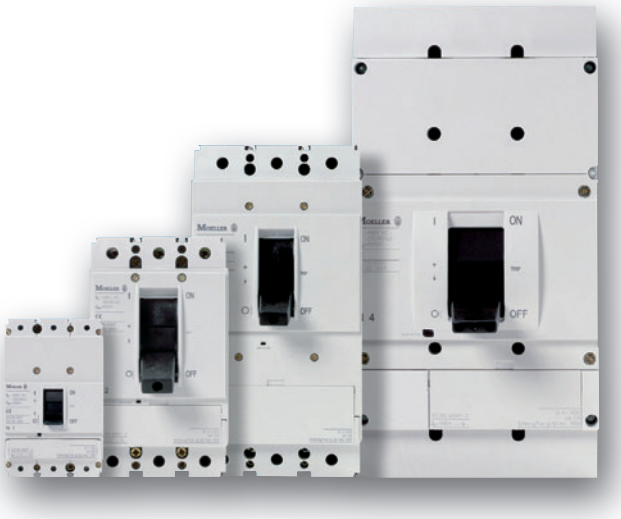
All switch-disconnectors switch the plus and minus pole together. Jumper kits that provide easy-to-install current connection across all four contacts are available up to an ambient temperature of 65 °C. A protective cover offers allround touch protection and fingerproof protection to IP2X. The switches comply with the isolation properties even for earthed IT networks.

Circuit-breakers up to 500A

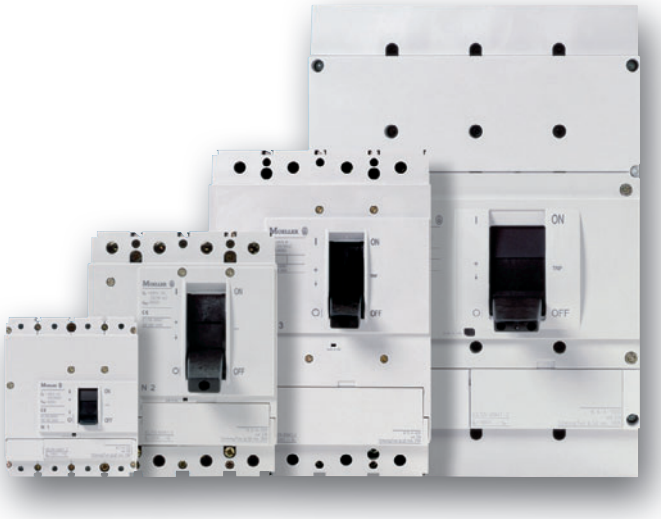
The circuit-breakers can either switch on three poles, only plus or minus, or alternatively one and two poles of either plus or minus cables. The short-circuit switching capacity is between 15 kA to 70 kA depending on the device type selected. The switches can be used universally because of the high DC-3 utilization category: ranging from photovoltaic to emergency-generating unit batteries to sophisticated switching and protection of DC shunt-wound motors in reverse and jog mode.

For these DC applications, the users can use the circuit-breakers with a thermo-magnetic release system from the standard Eaton Moeller range. Accessories, such as connection terminals and door coupling rotary handles enable individual installation in the most varied of distribution systems. Auxiliary switches, voltage releases and remote operators facilitate signalling and automation.

DC switch disconnectors								
Construction design	open							
I_e at DC21A (A)	160	200	320	450	800	1000	1250	1400
U_e (VDC)	1000							
Number of poles	2							
Part no.	**N2-4-160-S1-DC**	**N2-4-200-S1-DC**	**N3-4-320-S1-DC**	**N3-4-450-S1-DC**	**N4-4-800-S1-DC**	**N4-4-1000-S1-DC**	**N4-4-1250-S1-DC**	**N4-4-1400-S1-DC**
Dimensions								
Width (mm)	140		185		280			
Height (mm)	184		275		401 (613 incl. connection kit 1400A 65°C)			
Depth (mm)	149		166		207			



Switch-disconnector 3-pole

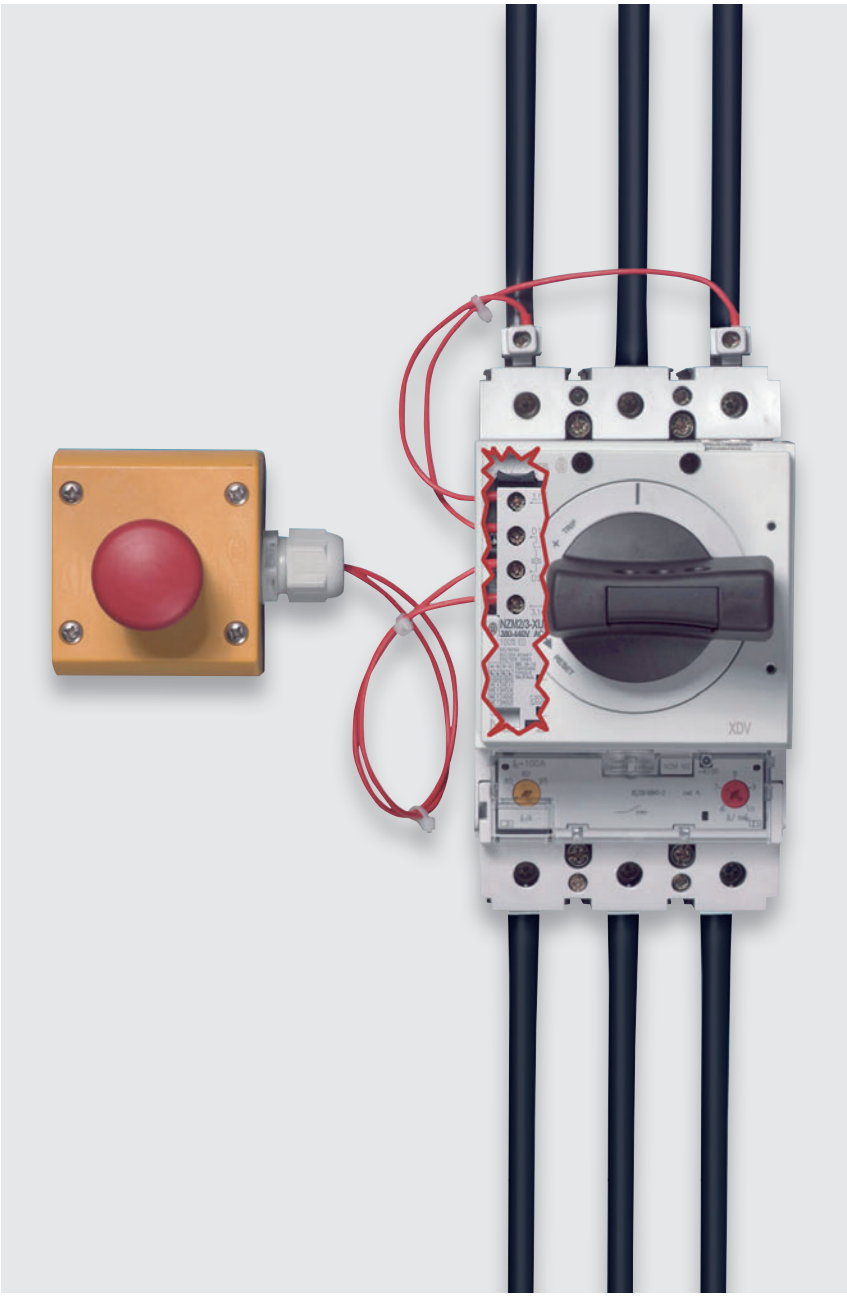


Switch-disconnector 4-pole

Excellent under load – Switch-disconnector's for safe switching under load

Even under load conditions the Eaton Moeller switch-disconnector operates safely. The reason: the 3- or 4-pole snap-action closing mechanism which is also applied with circuit-breakers.

That's why the rated short time withstand current is so high and can handle currents up to 150000 A. The long lifetime with up to 7500 switching operations in AC3 mode enables usage as a motor switch, in order to switch large motors during operation. Application as a main switch with an emergency-stop function via a remote pushbutton is easily implemented in conjunction with the double early-make auxiliary contacts and undervoltage release. This in conjunction with the UL/CSA approvals is a prerequisite for use in process and processing machines which are destined for export.

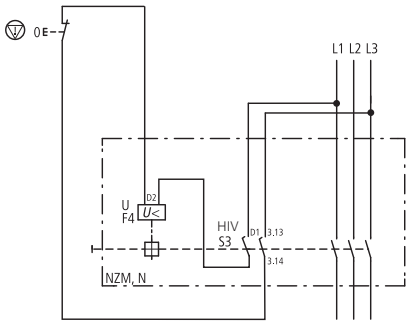


Main switch application

The main switch application with an emergency-stop function up to 1600 A conform to IEC/EN 60204-1, VDE 0113 Part 1 can be easily and cost-effectively implemented with the new Eaton Moeller products.

The voltage is switched off on all current conducting circuits are when the switch is switched off using the undervoltage release with two integrated early-make auxiliary contacts. Safety is guaranteed at all times in this manner when the switch is in the Off position.

The early-make auxiliary contacts can always be installed – even if the circuit-breaker is equipped with a toggle-lever or rotary drive.



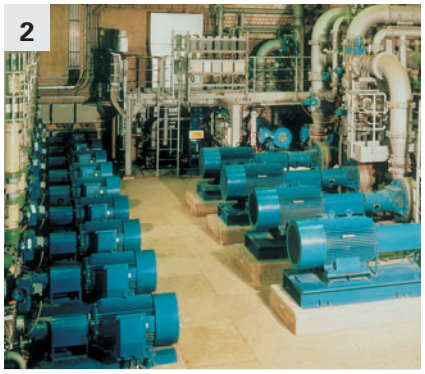
Switch-disconnector		PN1/N1	PN2/N2	PN3/N3	N4
Application ran ge in A		63 – 160	160 – 250	400 – 630	800 – 1600
Number of poles		3/4	3/4	3/4	3/4
Rated voltage in V		690	690	690	690
Switch-disconnectors for North America		**NS1-NA**	**NS2-NA**	**NS3-NA**	**NS4-NA**
Application range in A		63 – 125	160 – 250	400 – 600	800 – 1200
Number of poles		3	3	3	3
Rated voltage in V		480	600	600	600
Dimensions in mm	Width 3/4-polig	90/120	105/140	140/185	210/280
	Height	145	184	275	401
	Depth	68	103	120.5	138

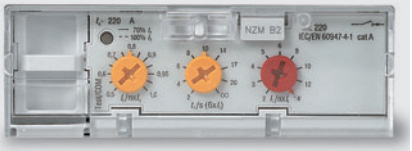
New in the range:
Specially for the North American market: Molded Case switches featuring a short-circuit release for self-protection.
Thus, the use of a back-up fuse is no longer required in many applications, e.g. as a main switch.

Protection flexibility: Systems, generators, motors

1 NZM protects systems

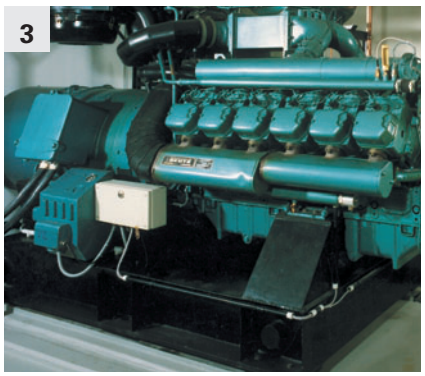
Circuit-breakers NZM protect entire systems as well as cables and wiring on all levels, from the main distribution board right up to the loads. As the incoming circuit-breaker, the NZM will of course also provide secondary side overload protection for the transformer. A variant with modified short-circuit releases also enables a power network with time selectivity.





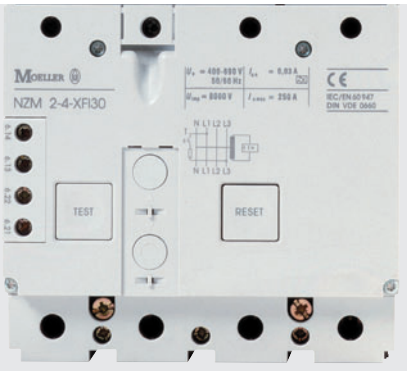
2 NZM protects motors

Circuit-breakers NZM protect motors and cables against overloads and short-circuits. The short-circuit release of the NZM can be set to 12 to 14 times the rated motor current to ensure that starting current peaks are not shut down by the protective device. Circuit-breakers NZM provide reliable and phase failure sensitive protection for motors from 15 A to 1400 A.



3 NZM protects generators

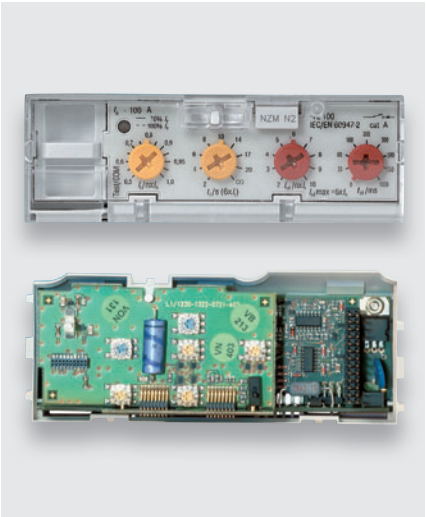
Even when the generators have difficulty generating two to six times the continuous current, it does not present a problem for the NZM. It can master shutdown of even the smallest short-circuit currents within a few milliseconds. A setting which ignores short-circuit currents for up to 1 s is possible for special tasks.



4 NZM protects with fault currents

The mains and auxiliary voltage independent residual current circuit-breaker trips as soon as the set rated fault currents are exceeded. The module is pulse current sensitive and also discriminative.

The $I_{\Delta N}$ = 30 mA in this function module also ensures personnel safety.



Trip electronics featuring micro-processors enhance the operating continuity

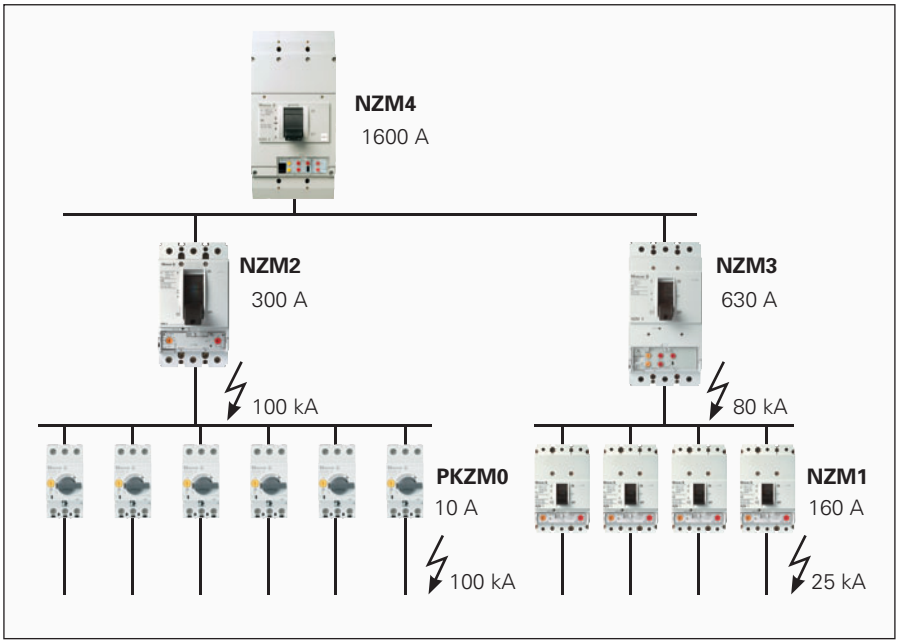
The microprocessor controlled digital electronics determine r.m.s. values for the load current to be monitored. In contrast to analog electronics, any harmonics which may be in the power grid will be correctly evaluated and do not cause premature and unexpected trips. This prevents a standstill.

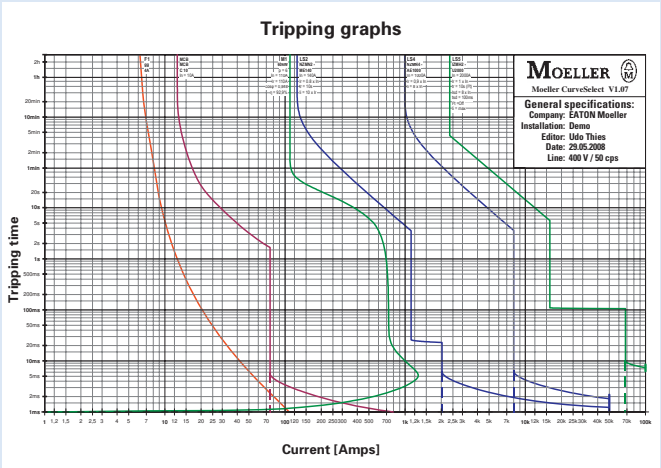
Special components simulate a thermal memory even when the switch trips during a currentless period due to a load overload. Thus, safe protection of the connected equipment is guaranteed – even when the device is switched back on after a brief cooling off phase.

All electronics have been routinely tested and preaged in an oven. This corresponds to a real operating time of about six months. Thermocouples guarantee a safety-oriented trip of the circuit-breaker in the improbable case that an inadmissible overtemperature is due to the electronic components.

Selectivity table

Circuit-breakers NZM achieve selectivity during a short-circuit even without additional electronic short-time delayed devices. For example, the 1000 A circuit-breaker in combination with a 300 A outgoing circuit-breaker is fully selective up to a maximum existing short-circuit current of 100 000 A. Even two high energy incoming supplies of e.g. two parallel 2 000 kVA distribution transformers are cost-effective and are simple to engineer with high levels of supply reliability.

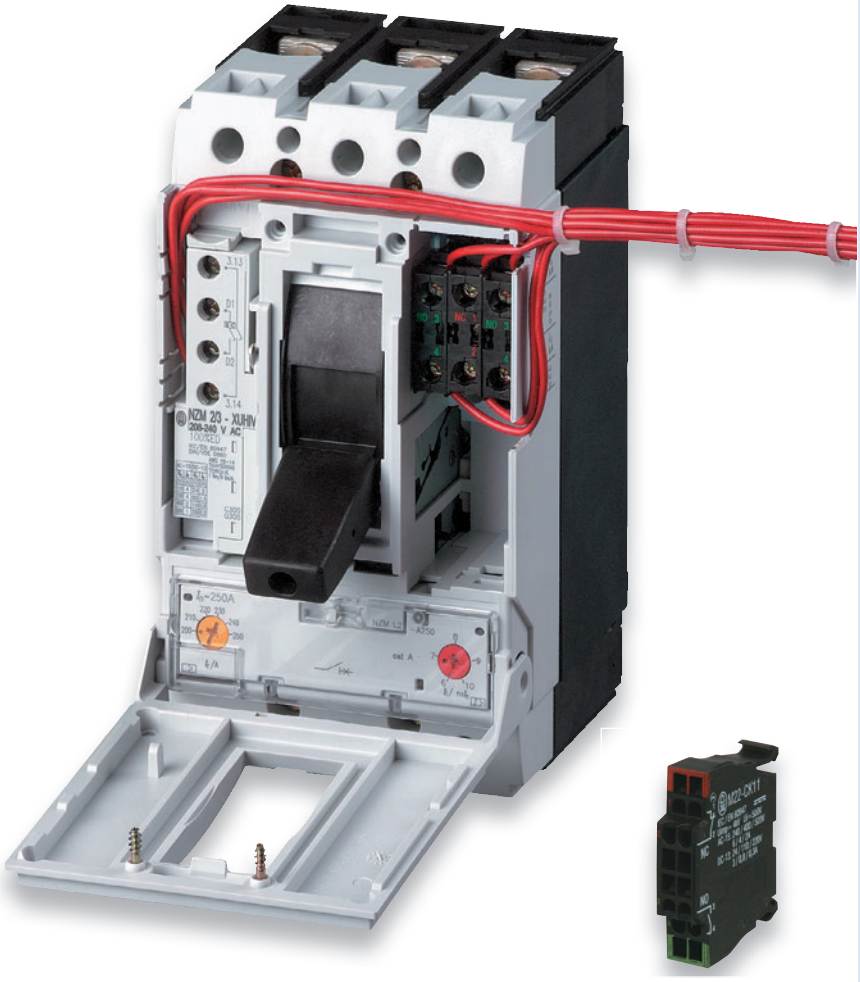


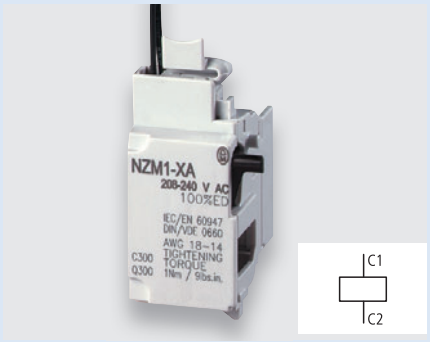


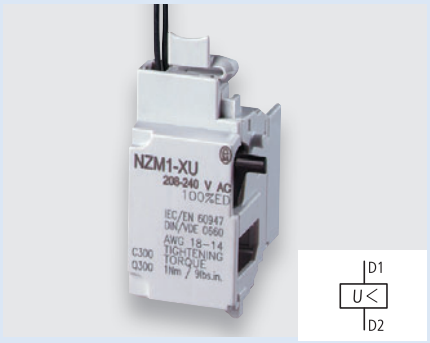
Simpler visualisation, comparison and documentation of characteristic curves
The free-of-charge characteristic curve program supports documentation of the circuit-breakers which are used in completed switchgear systems. All setting parameters can be easily determined, graphically displayed and printed-out. A direct comparison of circuit-breaker NZM and circuit-breaker IZM in combination with h.b.c. fuses enables assessment of the selectivity for the overload and time-delayed overcurrent range. Motor staring characteristics can be created which assist in the selection and adjustment of the corresponding protection device.

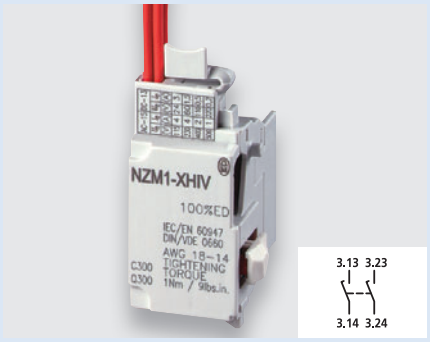
www.moeller.net/curves

System benefits – the universal accessory range









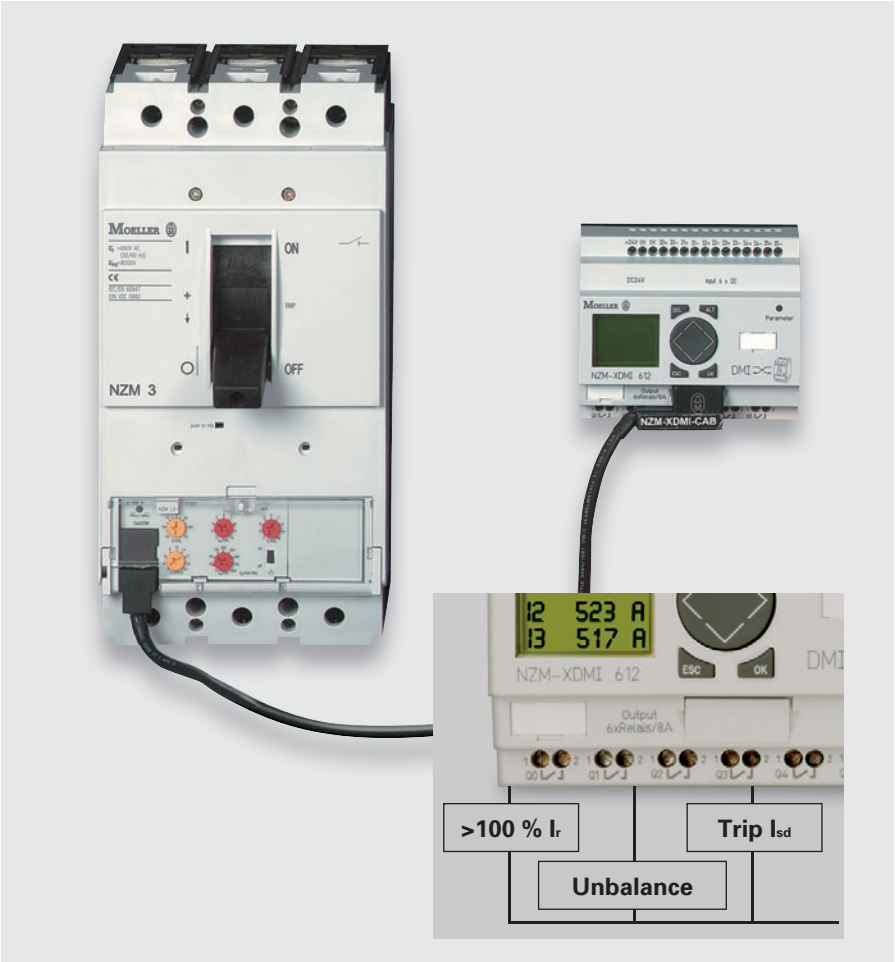
The method of functioning and fitting of the accessories is identical for every size.

Contact elements from the RMQ-Titan® range of control circuit devices are used for the entire NZM range of circuit-breakers.

This has many advantages: it ensures a reduction in the variety of types, a decrease in ordering expense and effort and consequently, simpler inventory management. The contact elements can be simply clipped-on from the front. The position determines the function: signalling contact or trip-indicating auxiliary contact, and like all auxiliary contacts and releases, they are available with terminal bolts or spring-loaded connections, for circuit-breakers or switch-disconnector's. The new twin contacts provide twice as many auxiliary and signalling contacts in the same amount of space. They feature spring-loaded terminal connections.

Flexible solutions for safety and interlock functions

Effective shunt or undervoltage releases, combined also with early-make auxiliary contacts for Emergency-Stop functions or load-shedding circuits, offer elegant solutions for a wide range of functioning applications. All contact points are available with sturdy bolt connection.



All messages in detail – the Data Management Interface

It does not matter if the causes for a trip or a warning message with unbalance are required, or if all phase currents are to be displayed directly on-site and corrective actions are to be implemented with a critical load state. The Data Management Interface (DMI) always signals exact details. The relay outputs of the DMI signal up to 6 different messages. All trip causes are available as group signals and I_i, I_r, I_{sd}, I^2t, and I_{dn} detail signals. The trip cause, phase state, switch setting as well as date and time can be accessed via the 4-line display. Representation of the actual phase currents can be in absolute or relative (% I_r) terms. Warnings with regard to the load status are issued at 70 %, 100 % and 120 % I_r. Thus, the DMI is perfect for direct display on-site or for the integration in higher-level energy management concepts.

A single tool for all screws

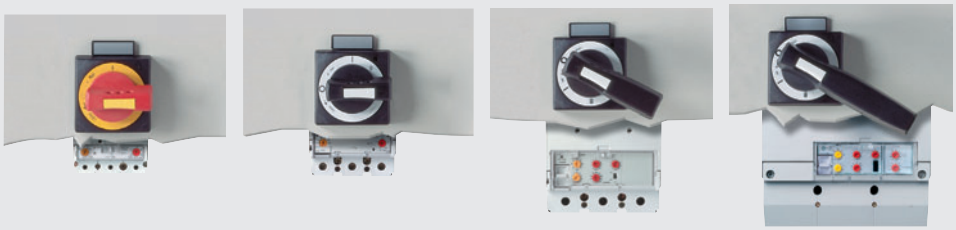
The heads on all screws used in the circuit-breakers – with the exception of the main connection screws – feature a plus-minus profile. The advantage is that a fast screw driving machine can be used with the single Posidriv 2 screwdriver tool, or alternatively, a flat-bladed screwdriver can also be used. This applies for all fixing screws, auxiliary connection terminals, as well as hinged flaps and covers and also all setting buttons.

The plus-minus slot can be used like the Pozidriv slot to apply a high torque and provides improved centring performance and a lower high loading pressure to an area. Furthermore, it can be used with several tool designs and is particularly suitable for high-maintenance devices.

Variable operation – toggle, turn, automatic operation

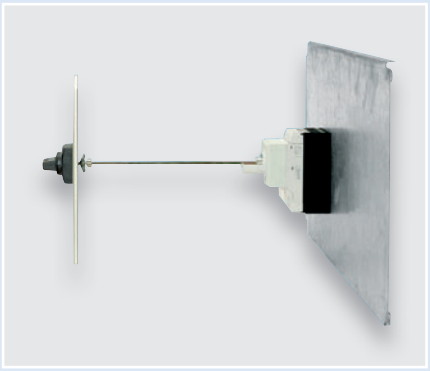
Circuit-breaker NZM2: Rotary handle for main switches of machine controls in North America

The North American user guidelines prescribe that the actuating device must be permanently connected to the switch. This also applies when the control panel door is open. The new door coupling handle developed by Eaton Moeller, with additional handle on the switch, complies with this requirement. The new handle complies with the latest NFPA79 and UL508A standards in terms of a deliberate action.
The deliberate action is based on the presumption that the additional handle must initially be rotated by about 15° (1), so that it is subsequently pressed (2) and rotated (3) simultaneously to switch on the switch. The most important safety attributes, such as the actuation options, switch position indication and interlocking features, are provided twofold, both externally on the door coupling rotary handle as well as internally on the switch.



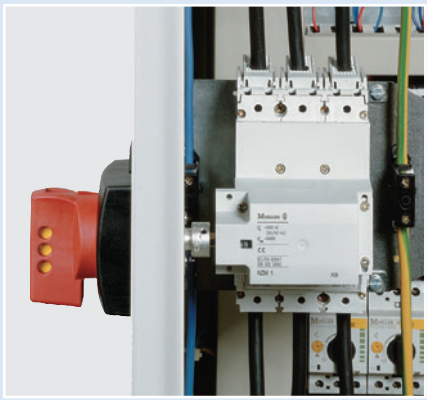
Door coupling rotary handles – ergonomic switching

Shaft lengths which can be cut to suit enable device installation in various control panels and housings up to a depth of 600 mm. A cost-effective and simple to mounting solution is available for the narrowest component mounting where the switch makes direct contact with the cover.



The main switch types – the side operator

Up to 1600 A, the side wall operator enables the switch to be operated from the right or left hand side as desired. Optional fitting of our mounting bracket results in optimum use of space in the control panel. The mounting plate can thus be used for other machine control elements.



The door coupling rotary handle – for uniform, flexible solutions

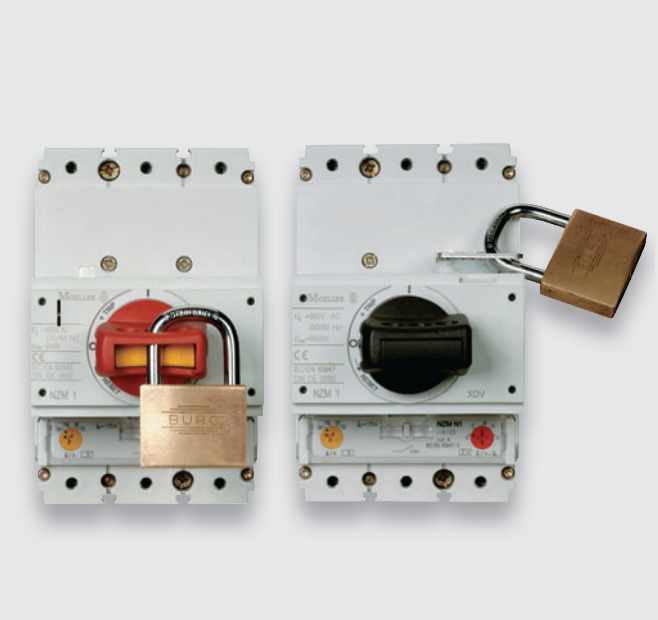
The base plate is the same for every door coupling rotary handle, this means faster fitting due to the identical drilling diagram. The switches can also be fitted vertically or horizontally in the control panel.

Application related locking

Multiple versions of the door coupling rotary handle provide individual solutions.

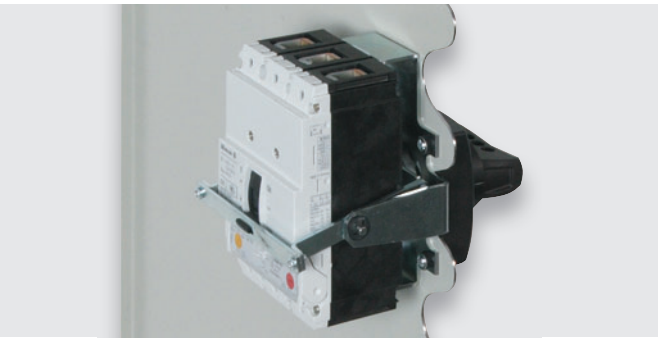
- The standard handle features automatic handle position locking, which facilitates comfortable locking of control panel doors even with differing switch positions.
- The second version can be locked with padlocks and automatically locks the doors when closed. This is the typical application for a main switch as the control panels can only be opened in the Off position.
- With the third version, there is an additional locking feature directly on the switch. For example, the switches can be locked individually in a complex energy distribution system.

Handles in red/yellow contrasting colours are available for the emergency-stop function.



Operator on rear for switches up to 300 A rated current

If a power disconnecting device with door coupling rotary handle is to be used in a confined space: up to 300 A rated current can be quickly mounted using the compact mechanical features and comfortably operated using the solid rotary handle. All switch variants from the NZM1 and NZM2 range – regardless of if they are circuit-breakers or switch-disconnectors – can be combined with a rear operator.



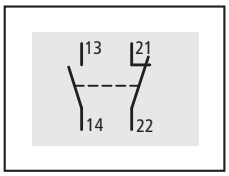
The economic remote operator for standard tasks for NZM2 to NZM4

The switching time of the new remote operator is a max. of just 170 ms and can thus be used with standard applications for automated or remote operated energy control.
The folding mounting plate enables a quick inspection of the installed auxiliary contacts and voltage releases. The narrow construction design of the remote operator requires no additional mounting area. It is equipped with a selector switch which guarantees a secure differentiation of the connected positions. Furthermore, the switches can be securely locked in the 0 setting using padlocks.

The comfortable remote operator for synchronisation tasks for NZM2 to NZM4

The spring-powered actuator permits closing delays of 60 or 100 ms, thereby also allowing application in the field of synchronization. Short function sequences and fewer parts ensure a high degree of stability and a long service life. Safety is also emphasized here by the sealing option for the Auto function and by the facility for padlocking the remote operator.

Safe to operate, easy to handle

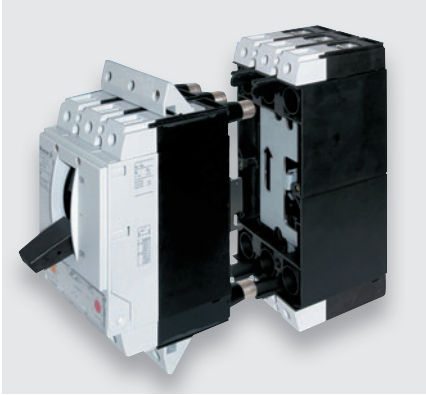


The plug-in unit – open to possibilities

The plug-in feature enables rapid and uncomplicated exchange of circuit-breakers without having to shutdown the entire system. The same widths for the fixed and withdrawable circuit-breakers ensure simple engineering during the system design phase.

A very visible isolating distance can be implemented in addition to the isolating characteristics by the use of plug-in breakers. The open plug-in contacts are finger-proof (IP2X).

If the system is to be modified at a later date, the use of plug-in sockets for reserve outgoers is recommended.



The withdrawable unit – signalling of states

As usual, Eaton Moeller offers plug-in and withdrawable units in addition to the fixed mounted option. It makes it easier to quickly adapt to malfunctions or increases in the rated current range and thus avoid long downtimes. Uniform racking handle operation for withdrawable units enhances operating safety and ensures a test position for function testing without having to switch the main contacts.

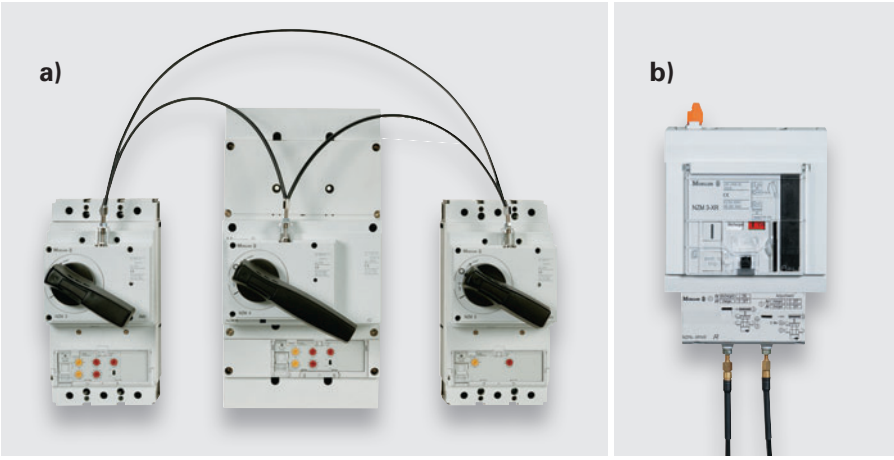
The “Inserted“, “Test“ and “Retracted“ positions can be remotely signalled using auxiliary switch contacts RMQ.

Mesh network switch provides enhanced trip security

Eaton Moeller offers two solutions for the mesh network switch application: a shunt which functions as specified in a range from 10 to 110 % of the control voltage, and a special shunt release which also provides trip security in conjunction with a capacitor unit, if up to 12 hours have elapsed since the power loss.

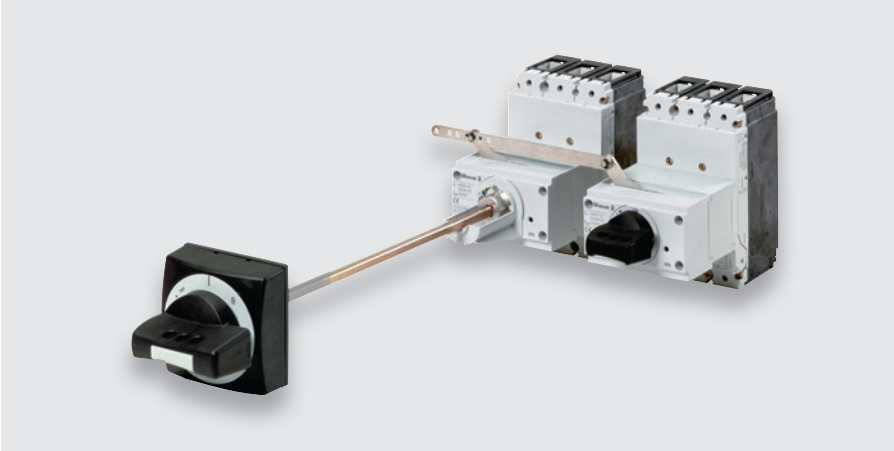
Interlock with Bowden cable technology

Mechanical interlock components enable the interlocking of two or three switches, equipped with rotary handles (a) or remote operators (b), which can also feature different frame sizes. The Bowden cable technology enables free installation of the switches in differing positions. The switches can be installed up to 1 m apart – e.g. in different control panel sections.



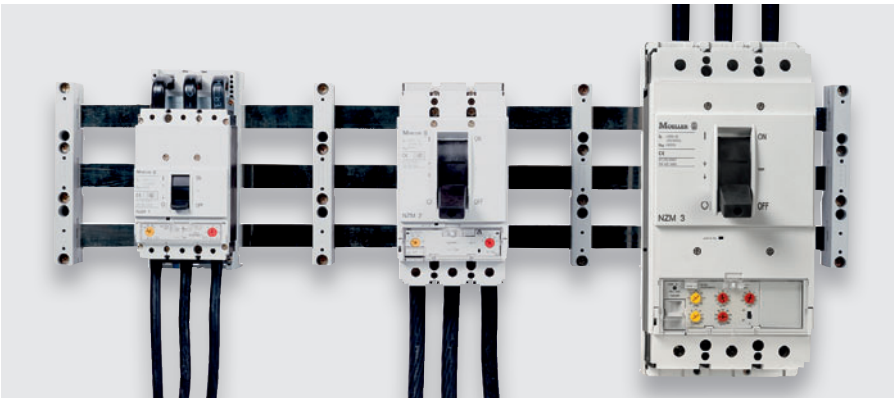
Parallel operation: smart technology

Parallel drives for switches up to 630 A enable simultaneous switching with just a single action – e.g. with main or auxiliary circuits. In this manner the main and auxiliary circuits can be switched simultaneously with process and processing machines.



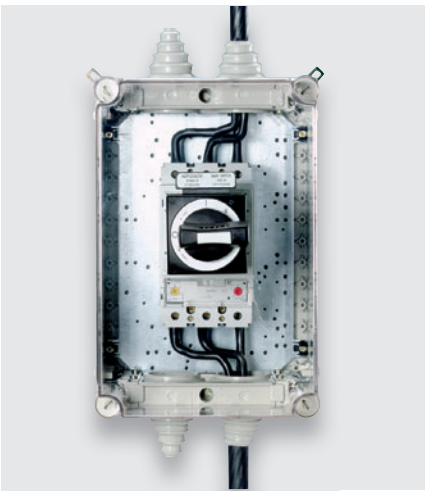
Busbar adapter

Busbar adapters featuring space-saving contacts enable installation of many devices in confined spaces. They can be used universally on every 60 mm busbar system. The three frame sizes for 160, 250 as well as 550 A can be snapped on.



Switches in enclosures – certified safety

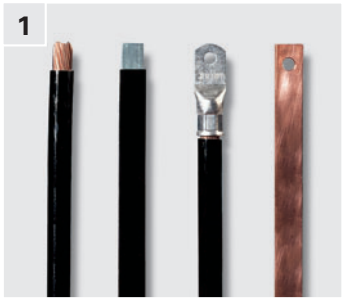
The transparent enclosures available with protection degrees up to IP 65 provide mechanical protection with impact resistant polycarbonate.
The 3- and 4-pole switches are equipped ready for installation with rotary handles. Additional isolated terminations for a 4th or 5th conductor are also available.



"You realise the competence of the people working for Eaton Moeller with every solution. All the features you require are implemented."

Clever mounting and connection increases economy

1



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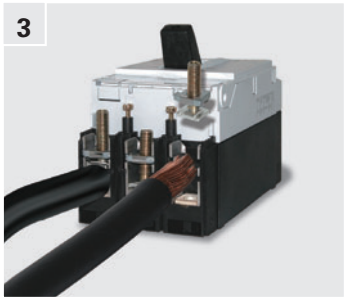

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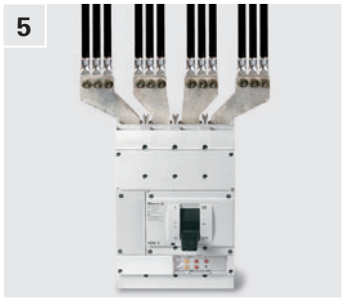

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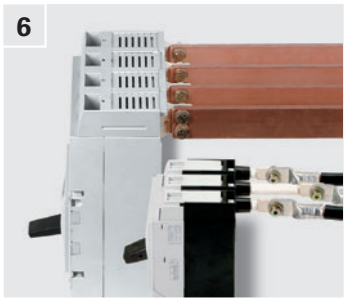


Back of hand or finger-proof

Cable-lug, box-terminal or tunnel terminal, it does not matter as covers will always ensure that they are back-of-hand proof.

Fingerproof to IP2X, conform to IEC/EN 60204-1 for main switches is fast and easy to implement. The new additional covers can be matched to every cross-section.

1 Easy to connect

Circuit-breakers NZM and switch disconnectors PN, N can be connected with and without cable lugs, braided copper bands or copper busbars. And there's another special feature: Special narrow cable lug versions are available for bolt connection of round conductors up to 240 mm.

2 Screw terminal

The screw terminal is the most attractively priced solution for the connection of cable-lugs, flat drilled metal strip or copper busbars.

3 Box terminal for copper cable

Box terminals guarantee secure contact for the direct connection of 1 – 2 flexible copper conductors or flat strip. With NZM2 and NZM3, the top of the box terminal can be opened for easy insertion.

4 Terminal for aluminium and copper cables

The terminal area of these special terminals is tunnel-shaped to prevent the typical "flow-properties" of aluminium under great pressing power. Up to four copper or aluminium conductors can be connected depending on the type.

5 Connection preparation for multiple conductors

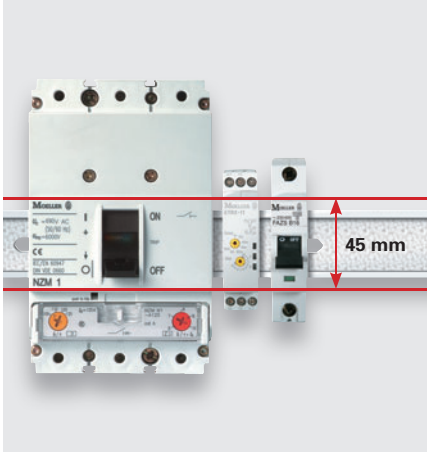
It enables the connection of up to six conductors with cable lugs per phase. Auxiliary busbars are no longer required.

6 Rear connection

This method of connection allows busbars or round conductors to be connected at the rear. Partitioning of the switch area, terminal area and operator area is carried out without difficulty.

Control circuit terminals

The control circuit terminals are simply screwed onto the respective connection type. The tap-offs for voltage meters, control transformers and undervoltage releases are implemented quickly.



The spacer – saving time and expense

All switches including the accessories fitted on them were designed with the grid spacing of the spacer. Different depths of switch are evened-out simply by means of inexpensive, rapidly fitted spacers.

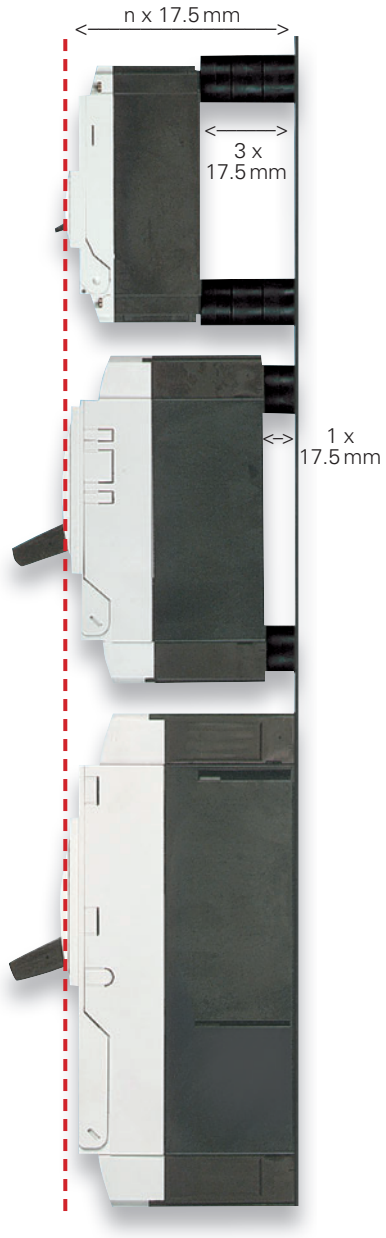
The result is a cost-effective alternative to the door coupling rotary handle with extension shaft for external operation of the circuit-breaker.

This worldwide innovation gains time and saves expense.

Clever installation and terminations

Fast and efficient top-hat rail installation with the use of a clip plate. Just simply attach the clip plate from the rear onto the circuit-breaker and clip it onto the top-hat rail. No need to drill holes in the mounting plate.

The particular advantage of the small NZM1: the "standard dimension" enables side-by-side installation with miniature circuit breakers in service distribution boards.



The insulating surrounds have IP 40 degree of protection and the inscription labels can be simply clipped in.

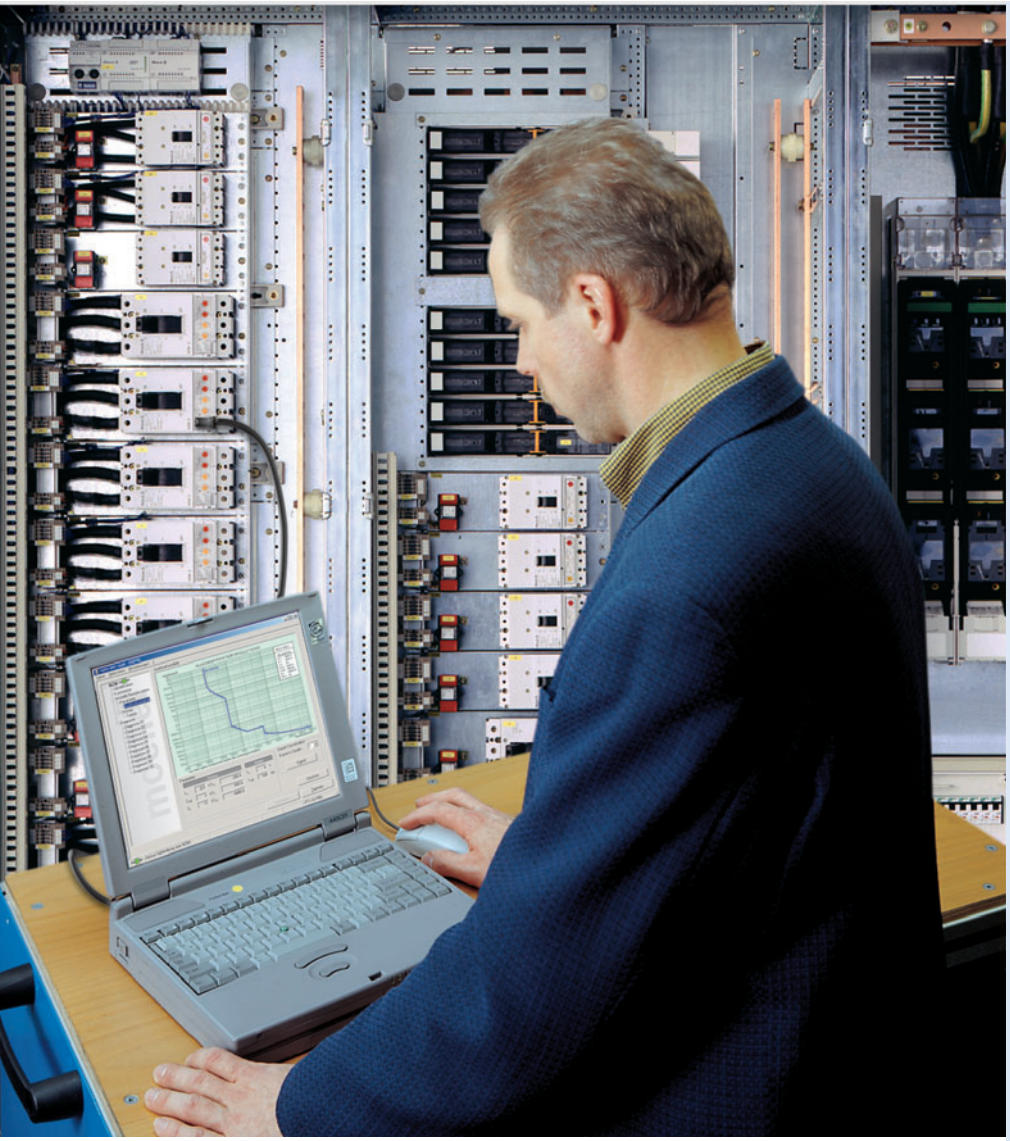
Insulating surrounds – always the right fit

The insulated surround always fits. Regardless of if the circuit-breaker is equipped with a toggle-lever, rotary drive or remote operator. It is unnecessary to keep differing insulating surrounds in stock. It is the cost-effective method to operate circuit-breakers externally when the control panel door is closed.

Insulating surround XBRS for the toggle lever

Narrow design for space-saving side by side mounting.

Diagnostics included!
NZM circuit-breakers

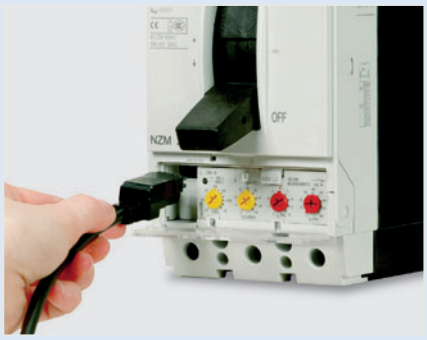


NZM circuit breakers provide on-site diagnostics – easily accessed from its clever electronic trip unit

NZM circuit breakers protect people, installations and power supply networks. Faults are immediately recognised and reliably disconnected – but the following must be clarified in order to quickly re-establish the power supply safely.

- Was there an overload or short-circuit?
- Which phases were affected?
- Which chain of events led to the trip?
- Have settings been adjusted in the meantime?
- Is it possible – and more importantly – *is it safe* - to re-close the circuit breaker and restore power?

In such events NZM circuit breakers from Eaton Moeller provide valuable insight with diagnostic information that's quickly and easily accessible with a standard PC.

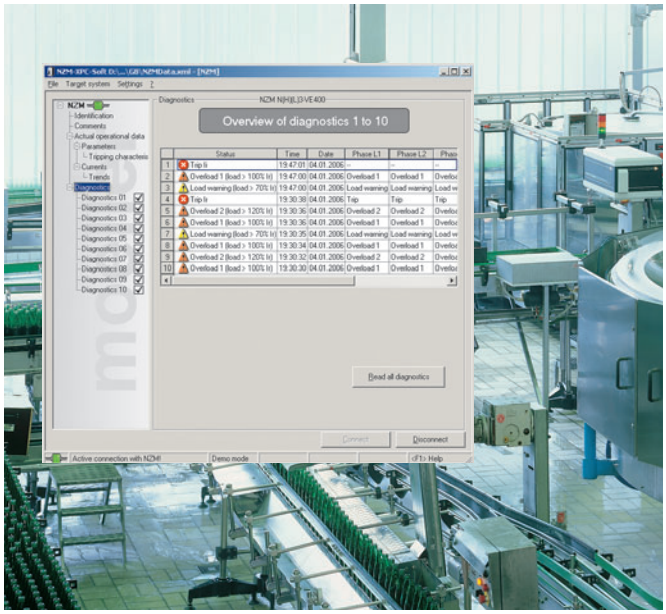


NZM provides the quick overview – directly onsite

NZM delivers all the necessary diagnostics information via an integrated interface directly to a PC or laptop. Configuration in advance is not necessary.

The connection is quickly established: Simply plug the connection cable into the front of the intelligent electronic trip unit – and you are ready to go. This diagnostics access is possible at any time, regardless of if the system is operational or not.

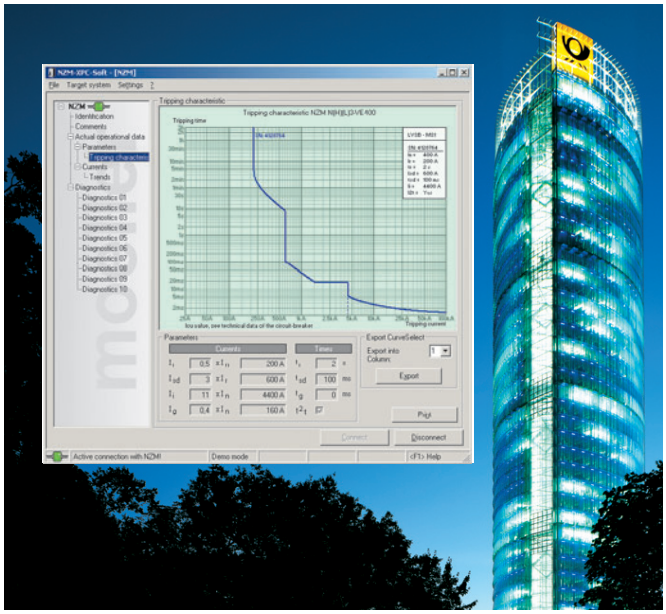
"System diagnostics was never so easy to implement. That's what I call real Plug & Work!"



NZM provides diagnostic analysis after a fault that eliminates ambiguity and error!

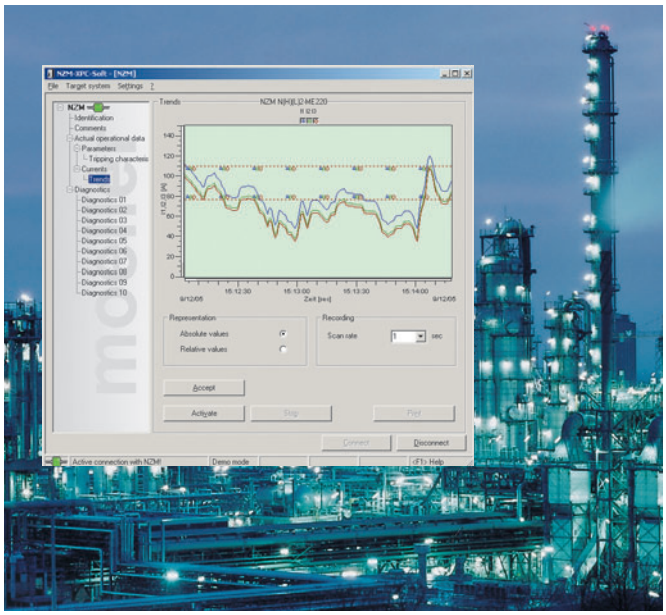
The cause of a trip is documented by the clever circuit-breaker NZM in its internal memory. Ten events are logged in detail which enables the source of the fault to be quickly identified based on hard facts. The information is clearly and unambiguously displayed onsite with the NZM-XPC-SOFT software. It can be saved as a file, printed and sent for the purpose of analysis.
The NZM event protocol eliminates ambiguities and "human error" of keeping notes during the entire lifecycle of the circuit-breaker and the low-voltage installation. Even replacement circuit-breakers can be identified and traced based on their serial number.

The NZM-XPC-SOFT supports nine languages for maximum safety and operating availability world-wide.



NZM validates protection settings at a glance

With NZM a power disruption can be limited to the areas which are directly affected by the fault using a selective design concept. The effects and costs of a malfunction are minimised without making any compromises in safety.
The active tripping curve and the planned selectivity can be exactly represented in the NZM-XPC-SOFT based on the selected switch settings and tripping characteristic. Selection of the optimum protective parameters and validation of the desired selectivity is supported during the commissioning phase by a direct comparison of the upstream and downstream protective devices. Possible fault sources are immediately indicated by a visual comparison of the individual breaker settings. Later modifications are clearly illustrated. Even the matching of the protection settings of a specific motor characteristic is illustrated by graphic optimisation of the inrush-, starting- and operating current of the motor.



NZM load analysis for valuable resource management

Electrical energy is a valuable and critical resource. Each clever NZM is capable of being transformed into a load analysis tool with the help of NZM-XPC-SOFT. Simply plug-in the PC connection cable at the electronic trip block and both graphical and data-logging trend measurement commences.
The effective values of all phases can be recorded over the time periods of minutes, hours or even days. Power distribution is therefore transparent.
Measurements and trends over defined periods can be compared or processed further using the protocol function to generate files for MS Excel©.
Evaluating the performance of manufacturing processes and assessing preventative maintenance of motors are examples of important resource management functions easily carried out with this simple software.

Metering and communication module for energy distribution and motor control centres

The new compact solution

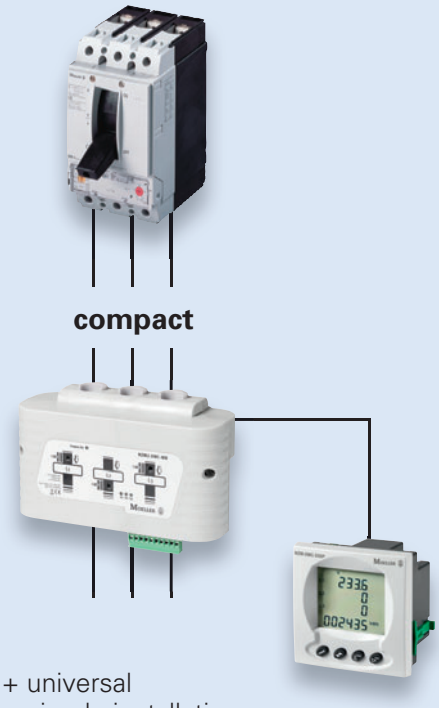
A combination of current transformer, voltage tap-off, measurement electronics, fieldbus interface and display interface in an enclosure is a very interesting solution. Four individual devices (3 current transformers and 1 measurement device) are combined in a single enclosure. Considerable wiring and installation effort and expense are avoided. The installation of the metering and communication module can be undertaken at any location in the control panel. The system is independent of the switch design and model. All existing circuit-breakers and switch disconnectors can be used, only the minimum clearances required by the design of the respective switches must be observed. This solution offers a very large range of applications and can even be retrofitted in a short time to existing switchboards.

Recording energy consumption

The requirement for a simple metering function to detect the transferred energy is in demand with energy distribution and motor control centres. Energy is a precious resource and everyone is urged to conserve it. A prerequisite for reduction in consumption requires knowledge of the level of consumption, and accordingly simple sensors for recording energy consumption are becoming ever more important.

The product range

The new range of metering and communication modules (XMC) are specially designed for circuit-breakers NZM2 and NZM3 and can be used universally in a voltage range from 35 V - 500 V and in a current range from 1.5 - 630 A. There are two sizes matched to the NZM current ranges. Size 2 (NZM2-XMC) extends up to 300 A and size 3 (NZM3-XMC) accordingly up to 500 A. Each of these sizes are available as 3 or 4-pole versions.



+ universal
+ simple installation
+ low price

XMC as a data source for 3 recipients
All relevant data is provided for the control level in addition to the local display for on-site personnel. These include the current states ON/OFF/TRIP of the circuit-breaker as well as control of a remote operator for automatic switch functions. The **management level** is concerned with the present values of currents, voltages and powers which can be individually displayed as well as saved. The course for optimization of consumption can be set here.

Mechanical connection
A central factor in its success is the simplicity of the mechanical installation of the devices. The cables or braids are connected through the apertures of the XMC to the switching/protective device. They can be mounted on both the incoming and outgoing side. The tunnel diameter for both module types with a diameter of 27.5 mm is suitable for max. 185 mm² conductor cross-sections. Alternatively, a 11 x 21 x 1 mm copper braid can be used. An NZM 3 up to 500 A can be operated using this conductor. An adapter is supplied for smaller cross-sections.

Pre-processing in the XMC enables load shedding

Pre-processing means reducing the load on the processing stations. A simple form of optimization is load shedding. If a defined threshold is reached, a digital output can be controlled that is integrated into the interlock. A range of digital and analog input/output expansion boards are available for this extended functionality. These boards are installed in the base unit and can be supplied directly with the unit, or retrofitted later. The following expansion boards are available:

1. 2 outputs as a changeover contact
2. 4 outputs as NO contacts
3. 4 digital inputs / 4 digital outputs
4. 1 analog output 4 - 20 mA / 1 - 10 V

As an intelligent pre-processing unit the XMC offers further information for the control and management level. For example, the **maximum values** of measured values can be calculated and issued over a time period, or **time window values** can also be mapped for a specific time. The XMC can also score points in terms of **diagnostics**. Load warnings can be issued to counteract tripping due to an overload.

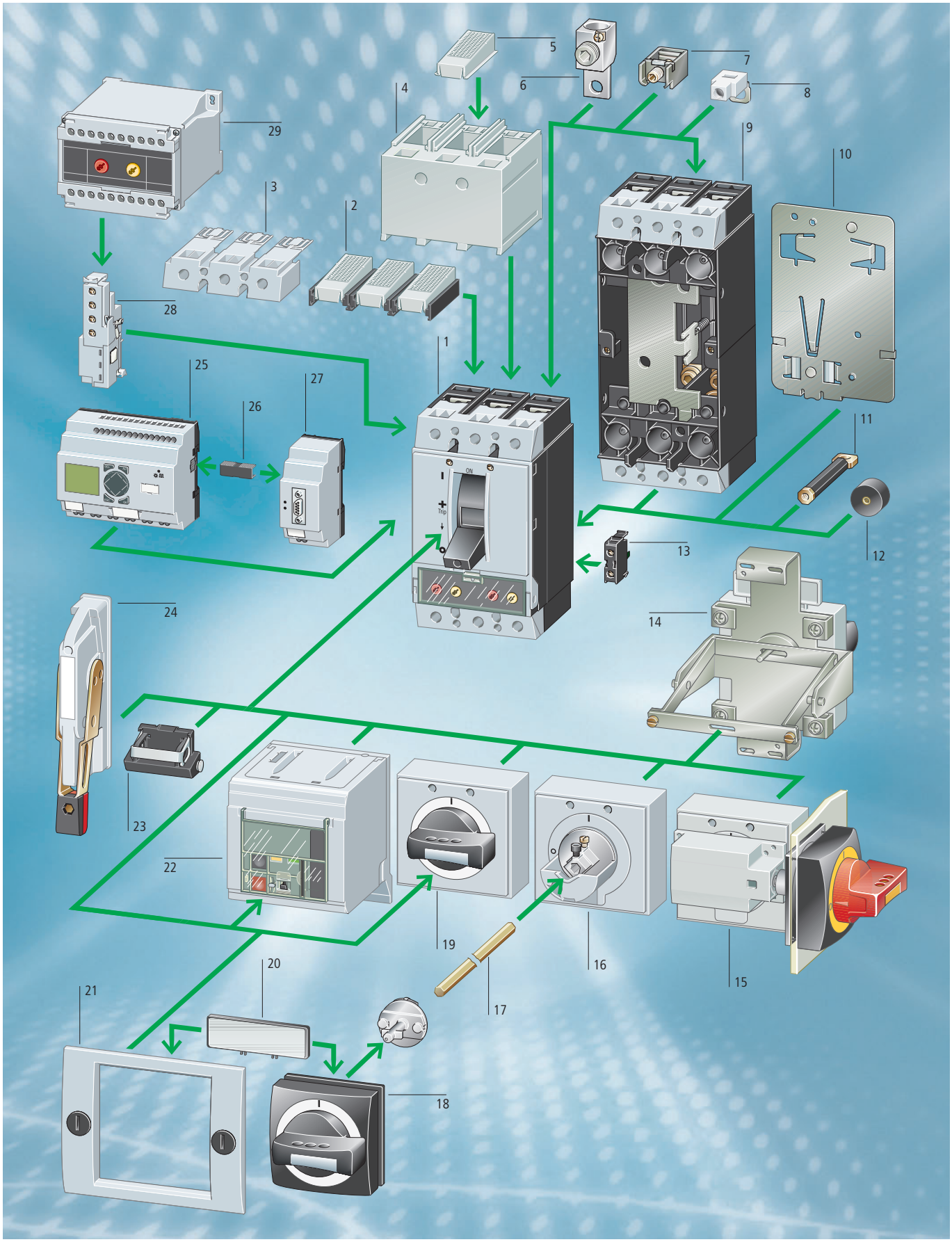
Adapter for smaller cross-sections	MC2/3
Tunnel diameter	27.5 mm
Conductor cross-section with adapter	35 mm²-120 mm²
Conductor cross-section without adapter	95 mm²-185 mm²

	Part no.	Number of poles	Maximum rating	Main features
	**NZM2-XMC-S0**	3	300 A	Digital S_0 output
	NZM3-XMC-S0	3	500 A	Digital S_0 output
	NZM2-XMC-MB	3	300 A	Modbus, 2 S_0 outputs, display interface
	NZM3-XMC-MB	3	500 A	Modbus, 2 S_0 outputs, display interface
	**NZM2-4-XMC-S0**	4	300 A	Digital S_0 output
	NZM3-4-XMC-S0	4	500 A	Digital S_0 output
	NZM2-4-XMC-MB	4	300 A	Modbus, 2 S_0 outputs, display interface
	NZM3-4-XMC-MB	4	500 A	Modbus, 2 S_0 outputs, display interface

Display for all Modbus types	Part no.
	**NZM-XMC-DISP**

Power supply for AC supply	Part no.
	**NZM-XMC-AC**

System Overview
Circuit-Breakers, Switch-Disconnectors



Circuit-breakers, switch-disconnectors

IEC/EN 60947-2
UL 489

Switch-Disconnectors	3-pole IEC		4-pole IEC		IEC 3-pole UL/CSA	
rated current = Rated uninterrupted current $I_n = I_u$ A	2 switch positions[1]	3 switch positions[2]	2 switch positions[1]	3 switch positions[2]	rated current = Rated uninterrupted current $I_n = I_u$ A	3 switch positions[2]
Terminals standard Terminal screws as accessories						
63 100 125 160	PN1-63 PN1-100 PN1-125 PN1-160	N1-63 N1-100 N1-125 N1-160	PN1-4-63 PN1-4-100 PN1-4-125 PN1-4-160	N1-4-63 N1-4-100 N1-4-125 N1-4-160	63 100 125	NS1-63-NA NS1-100-NA NS1-125-NA
Terminals standard Terminal screws as accessories						
200 250 400 630 800 1000 1250 1600	PN2-200 PN2-250 PN3-400 PN3-630 – – – –	N2-200 N2-250 N3-400 N3-630 N4-800 N4-1000 N4-1250 N4-1600	PN2-4-200 PN2-4-250 PN3-4-400 PN3-4-630 – – – –	N2-4-200 N2-4-250 N3-4-400 N3-4-630 N4-4-800 N4-4-1000 N4-4-1250 N4-4-1600	160 200 250 400 600 800 1000 1200	NS2-160-NA NS2-200-NA NS2-250-NA NS3-400-NA NS3-600-NA NS4-800-NA NS4-1000-NA NS4-1200-NA

[1] I, 0 ; Cannot be remotely operated
[2] I, + , 0 ; Can be remotely operated with U/A voltage release

Thermomagnetic release

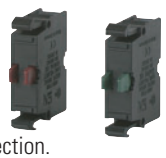
Rated current = rated uninterrupted current	Setting range overload release	Short-circuit release adjustable	Circuit-breaker with **Basic switching capacity 25 kA at 415 V 50/60 Hz**	
			Part No.	Part No.
In=Iu A	Ir A		3-pole	4-pole
Standard terminals, terminal screws as accessories				
20	15-20	350	**NZMB1-A20**	**NZMB1-4-A20**
25	20-25	350	**NZMB1-A25**	**NZMB1-4-A25**
32	25-32	350	**NZMB1-A32**	**NZMB1-4-A32**
40	32-40	320-400	**NZMB1-A40**	**NZMB1-4-A40**
50	40-50	300-500	**NZMB1-A50**	**NZMB1-4-A50**
63	50-63	380-630	**NZMB1-A63**	**NZMB1-4-A63**
80	63-80	480-800	**NZMB1-A80**	**NZMB1-4-A80**
100	80-100	600-1000	**NZMB1-A100**	**NZMB1-4-A100**
125	100-125	750-1250	**NZMB1-A125**	**NZMB1-4-A125**
160	125-160	1280	**NZMB1-A160**	**NZMB1-4-A160**
Terminal screws standard				
20	15-20	350	-	-
25	20-25	350	-	-
32	25-32	350	-	-
40	32-40	320-400	-	-
50	40-50	300-500	-	-
63	50-63	380-630	-	-
80	63-80	480-800	-	-
100	80-100	600-1000	-	-
125	100-125	750-1250	-	-
160	125-160	960-1600	**NZMB2-A160**	**NZMB2-4-A160**
160	125-160	960-1600	-	**NZMB2-4-A160/100**[3]
200	160-200	1280-2000	**NZMB2-A200**	**NZMB2-4-A200**
200	160-200	1280-2000	-	**NZMB2-4-A200/125**[3]
250	200-250	1500-2500	**NZMB2-A250**	**NZMB2-4-A250**
250	200-250	1500-2500	-	**NZMB2-4-A250/160**[3]
300	240-300	2000-2500	**NZMB2-A300**	**NZMB2-4-A300**
300	240-300	2000-2500	-	**NZMB2-4-A300/200**[3]
Standard terminals				
20	15-20	350	-	-
25	20-25	350	-	-
32	25-32	350	-	-
40	32-40	320-400	-	-
50	40-50	300-500	-	-
63	50-63	380-630	-	-
80	63-80	480-800	-	-
100	80-100	600-1000	-	-
125	100-125	750-1250	-	-
160	125-160	960-1600	**NZMB2-A160-BT**	-
200	160-200	1280-2000	**NZMB2-A200-BT**	-
250	200-250	1500-2500	**NZMB2-A250-BT**	-
300	240-300	2000-2500	**NZMB2-A300-BT**	-
Terminal screws standard				
320	250-320	1920-3200	-	-
320	250-320	1920-3200	-	-
400	320-400	2400-4000	-	-
400	320-400	2400-4000	-	-
500	400-500	3000-5000	-	-
500	400-500	3000-5000	-	-
Standard terminals				
320	250-320	1920-3200	-	-
400	320-400	2400-4000	-	-
500	400-500	3000-5000	-	-
Electronic releases, terminal screws standard, terminals as accessories				
630	315-630	1260-5040	-	-
630	315-630	1260-5040	-	-
800	400-800	1600-9600	-	-
800	400-800	1600-9600	-	-
1000	500-1000	2000-12000	-	-
1000	500-1000	2000-12000	-	-
1250	630-1250	2500-15000	-	-
1250	630-1250	2500-15000	-	-
1600	800-1600	3200-19200	-	-
1600	800-1600	3200-19200	-	-

1) Applies for NZM1
2) applies for NZM2 and NZM3
3) 60% release on neutral pole

Circuit-breaker with **Comfort switching capacity 36 kA at 415 V 50/60 Hz**		Circuit-breaker with **Normal switching capacity 50 kA at 415 V 50/60 Hz**		Circuit-breaker with **High switching capacity 100[1]/150[2] kA at 415 V 50/60 Hz**	
Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
3-pole	4-pole	3-pole	4-pole	3-pole	4-pole
NZMC1-A20	**NZMC1-4-A20**	**NZMN1-A20**	**NZMN1-4-A20**	**NZMH1-A20**	**NZMH1-4-A20**
NZMC1-A25	**NZMC1-4-A25**	**NZMN1-A25**	**NZMN1-4-A25**	**NZMH1-A25**	**NZMH1-4-A25**
NZMC1-A32	**NZMC1-4-A32**	**NZMN1-A32**	**NZMN1-4-A32**	**NZMH1-A32**	**NZMH1-4-A32**
NZMC1-A40	**NZMC1-4-A40**	**NZMN1-A40**	**NZMN1-4-A40**	**NZMH1-A40**	**NZMH1-4-A40**
NZMC1-A50	**NZMC1-4-A50**	**NZMN1-A50**	**NZMN1-4-A50**	**NZMH1-A50**	**NZMH1-4-A50**
NZMC1-A63	**NZMC1-4-A63**	**NZMN1-A63**	**NZMN1-4-A63**	**NZMH1-A63**	**NZMH1-4-A63**
NZMC1-A80	**NZMC1-4-A80**	**NZMN1-A80**	**NZMN1-4-A80**	**NZMH1-A80**	**NZMH1-4-A80**
NZMC1-A100	**NZMC1-4-A100**	**NZMN1-A100**	**NZMN1-4-A100**	**NZMH1-A100**	**NZMH1-4-A100**
NZMC1-A125	**NZMC1-4-A125**	**NZMN1-A125**	**NZMN1-4-A125**	**NZMH1-A125**	**NZMH1-4-A125**
NZMC1-A160	**NZMC1-4-A160**	**NZMN1-A160**	**NZMN1-4-A160**	**NZMH1-A160**	**NZMH1-4-A160**
-	-	-	-	**NZMH2-A20**	**NZMH2-4-A20**
-	-	-	-	**NZMH2-A25**	**NZMH2-4-A25**
-	-	-	-	**NZMH2-A32**	**NZMH2-4-A32**
-	-	-	-	**NZMH2-A40**	**NZMH2-4-A40**
-	-	-	-	**NZMH2-A50**	**NZMH2-4-A50**
-	-	-	-	**NZMH2-A63**	**NZMH2-4-A63**
-	-	-	-	**NZMH2-A80**	**NZMH2-4-A80**
-	-	-	-	**NZMH2-A100**	**NZMH2-4-A100**
-	-	-	-	**NZMH2-A125**	**NZMH2-4-A125**
NZMC2-A160	**NZMC2-4-A160**	**NZMN2-A160**	**NZMN2-4-A160**	**NZMH2-A160**	**NZMH2-4-A160**
-	**NZMC2-4-A160/100**[3]	-	**NZMN2-4-A160/100**[3]	-	**NZMH2-4-A160/100**[3]
NZMC2-A200	**NZMC2-4-A200**	**NZMN2-A200**	**NZMN2-4-A200**	**NZMH2-A200**	**NZMH2-4-A200**
-	**NZMC2-4-A200/125**[3]	-	**NZMN2-4-A200/125**[3]	-	**NZMH2-4-A200/125**[3]
NZMC2-A250	**NZMC2-4-A250**	**NZMN2-A250**	**NZMN2-4-A250**	**NZMH2-A250**	**NZMH2-4-A250**
-	**NZMC2-4-A250/160**[3]	-	**NZMN2-4-A250/160**[3]	-	**NZMH2-4-A250/160**[3]
NZMC2-A300	**NZMC2-4-A300**	**NZMN2-A300**	**NZMN2-4-A300**	**NZMH2-A300**	**NZMH2-4-A300**
-	**NZMC2-4-A300/200**[3]	-	**NZMN2-4-A300/200**[3]	-	**NZMH2-4-A300/200**[3]
-	-	-	-	**NZMH2-A20-BT**	-
-	-	-	-	**NZMH2-A25-BT**	-
-	-	-	-	**NZMH2-A32-BT**	-
-	-	-	-	**NZMH2-A40-BT**	-
-	-	-	-	**NZMH2-A50-BT**	-
-	-	-	-	**NZMH2-A63-BT**	-
-	-	-	-	**NZMH2-A80-BT**	-
-	-	-	-	**NZMH2-A100-BT**	-
-	-	-	-	**NZMH2-A125-BT**	-
NZMC2-A160-BT	-	**NZMN2-A160-BT**	-	**NZMH2-A160-BT**	-
NZMC2-A200-BT	-	**NZMN2-A200-BT**	-	**NZMH2-A200-BT**	-
NZMC2-A250-BT	-	**NZMN2-A250-BT**	-	**NZMH2-A250-BT**	-
NZMC2-A300-BT	-	**NZMN2-A300-BT**	-	**NZMH2-A300-BT**	-
NZMC3-A320	**NZMC3-4-A320**	**NZMN3-A320**	**NZMN3-4-A320**	**NZMH3-A320**	**NZMH3-4-A320**
-	**NZMC3-4-A320/200**[3]	-	**NZMN3-4-A320/200**[3]	-	**NZMH3-4-A320/200**[3]
NZMC3-A400	**NZMC3-4-A400**	**NZMN3-A400**	**NZMN3-4-A400**	**NZMH3-A400**	**NZMH3-4-A400**
-	**NZMC3-4-A400/250**[3]	-	**NZMN3-4-A400/250**[3]	-	**NZMH3-4-A400/250**[3]
NZMC3-A500	**NZMC3-4-A500**	**NZMN3-A500**	**NZMN3-4-A500**	**NZMH3-A500**	**NZMH3-4-A500**
-	**NZMC3-4-A500/320**[3]	-	**NZMN3-4-A500/320**[3]	-	**NZMH3-4-A500/320**[3]
NZMC3-A320-BT	-	**NZMN3-A320-BT**	-	**NZMH3-A320-BT**	-
NZMC3-A400-BT	-	**NZMN3-A400-BT**	-	**NZMH3-A400-BT**	-
NZMC3-A500-BT	-	**NZMN3-A500-BT**	-	**NZMH3-A500-BT**	-
-	-	**NZMN3-AE630**	**NZMN3-4-AE630**	**NZMH3-AE630**	**NZMH3-4-AE630**
-	-	-	**NZMN3-4-AE630/400**	-	**NZMH3-4-AE630/400**
-	-	**NZMN4-AE800**	**NZMN4-4-AE800**	**NZMH4-AE800**	**NZMH4-4-AE800**
-	-	-	**NZMN4-4-AE800/500**	-	**NZMH4-4-AE800/500**
-	-	**NZMN4-AE1000**	**NZMN4-4-AE1000**	**NZMH4-AE1000**	**NZMH4-4-AE1000**
-	-	-	**NZMN4-4-AE1000/630**	-	**NZMH4-4-AE1000/630**
-	-	**NZMN4-AE1250**	**NZMN4-4-AE1250**	**NZMH4-AE1250**	**NZMH4-4-AE1250**
-	-	-	**NZMN4-4-AE1250/800**	-	**NZMH4-4-AE1250/800**
-	-	**NZMN4-AE1600**	**NZMN4-4-AE1600**	**NZMH4-AE1600**	**NZMH4-4-AE1600**
-	-	-	**NZMN4-4-AE1600/1000**	-	**NZMH4-4-AE1600/1000**

Circuit-breaker			
Rated current = Rated uninterrupted current		Setting ranges of the release	
	$I_n = I_u$	I_r	I_i
	A	A	A
Distribution circuit and line protection			
Terminals standard Terminal screws as accessories	15 20 25 30 35 40 45 50 60 70 80 90 100 110	15 20 25 30 35 40 45 50 60 70 80 90 100 110	350 350 350 350 320 - 400 320 - 400 300 - 500 300 - 500 380 - 630 480 - 800 480 - 800 600 - 1000 600 - 1000 750 - 1250
Standard terminal screws Terminals as accessories	125 150 175 200 225 250 300 350 400 450 500 550 600 700 800 900 1000 1200	125 150 175 200 225 250 300 350 400 450 500 550 600 700 800 900 1000 1200	750 - 1250 960 - 1600 1200 - 2000 1200 - 2000 1500 - 2500 1500 - 2500 600 - 3300 700 - 3850 800 - 4400 900 - 3600 1000 - 4000 1100 - 4400 1200 - 4800 1400 - 8400 1600 - 9600 1800 - 10800 2000 - 12000 2400 - 14400
Motor protection in conjunction with contactors and overload relays with short-circuit releases without overload release			
Terminals standard Terminal screws as accessories	1.2 2 3 5 8 12 18 26 33 40 50 63 80 100	– – – – – – – – – – – – – –	8 - 14 12.8 - 22.4 19.2 - 33.6 32 - 56 48 - 84 80 - 140 128 - 224 200 - 350 256 - 448 320 - 560 400 - 700 504 - 882 640 - 1120 800 - 1250
Standard terminal screws Terminals as accessories	125 160 200 250	– – – –	1000 - 1750 1280 - 2240 1600 - 2500 2000 - 2500

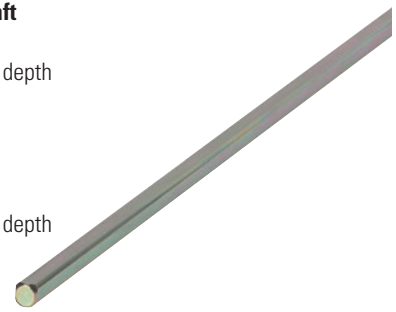
	3-pole		
	Switching capacity		
	Basic 25 kA 480 V 60 Hz 18 kA 600 V 60 Hz	Standard 35/42 kA 480 V 60 Hz 25/35 kA 600 V 60 Hz	High 85/100kA 480V 60 Hz 50kA 600V 60 Hz
	NZMB1-AF15-NA	**NZMN1-AF15-NA**	**NZMH2-AF15-NA**
	NZMB1-AF20-NA	**NZMN1-AF20-NA**	**NZMH2-AF20-NA**
	NZMB1-AF25-NA	**NZMN1-AF25-NA**	**NZMH2-AF25-NA**
	NZMB1-AF30-NA	**NZMN1-AF30-NA**	**NZMH2-AF30-NA**
	NZMB1-AF35-NA	**NZMN1-AF35-NA**	**NZMH2-AF35-NA**
	NZMB1-AF40-NA	**NZMN1-AF40-NA**	**NZMH2-AF40-NA**
	NZMB1-AF45-NA	**NZMN1-AF45-NA**	**NZMH2-AF45-NA**
	NZMB1-AF50-NA	**NZMN1-AF50-NA**	**NZMH2-AF50-NA**
	NZMB1-AF60-NA	**NZMN1-AF60-NA**	**NZMH2-AF60-NA**
	NZMB1-AF70-NA	**NZMN1-AF70-NA**	**NZMH2-AF70-NA**
	NZMB1-AF80-NA	**NZMN1-AF80-NA**	**NZMH2-AF80-NA**
	NZMB1-AF90-NA	**NZMN1-AF90-NA**	**NZMH2-AF90-NA**
	NZMB1-AF100-NA	**NZMN1-AF100-NA**	**NZMH2-AF100-NA**
	NZMB1-AF110-NA	**NZMN1-AF110-NA**	**NZMH2-AF110-NA**
	NZMB1-AF125-NA	**NZMN1-AF125-NA**	**NZMH2-AF125-NA**
	NZMB2-AF150-NA	**NZMN2-AF150-NA**	**NZMH2-AF150-NA**
	NZMB2-AF175-NA	**NZMN2-AF175-NA**	**NZMH2-AF175-NA**
	NZMB2-AF200-NA	**NZMN2-AF200-NA**	**NZMH2-AF200-NA**
	NZMB2-AF225-NA	**NZMN2-AF225-NA**	**NZMH2-AF225-NA**
	NZMB2-AF250-NA	**NZMN2-AF250-NA**	**NZMH2-AF250-NA**
	–	**NZMN3-AEF300-NA**	**NZMH3-AEF300-NA**
	–	**NZMN3-AEF350-NA**	**NZMH3-AEF350-NA**
	–	**NZMN3-AEF400-NA**	**NZMH3-AEF400-NA**
	–	**NZMN3-AEF450-NA**	**NZMH3-AEF450-NA**
	–	**NZMN3-AEF500-NA**	**NZMH3-AEF500-NA**
	–	**NZMN3-AEF550-NA**	**NZMH3-AEF550-NA**
	–	**NZMN3-AEF600-NA**	**NZMH3-AEF600-NA**
	–	**NZMN4-AEF700-NA**	**NZMH4-AEF700-NA**
	–	**NZMN4-AEF800-NA**	**NZMH4-AEF800-NA**
	–	**NZMN4-AEF900-NA**	**NZMH4-AEF900-NA**
	–	**NZMN4-AEF1000-NA**	**NZMH4-AEF1000-NA**
	–	**NZMN4-AEF1200-NA**	**NZMH4-AEF1200-NA**
	NZMB1-S1,2-CNA	**NZMN1-S1,2-CNA**	–
	NZMB1-S2-CNA	**NZMN1-S2-CNA**	–
	NZMB1-S3-CNA	**NZMN1-S3-CNA**	–
	NZMB1-S5-CNA	**NZMN1-S5-CNA**	–
	NZMB1-S8-CNA	**NZMN1-S8-CNA**	–
	NZMB1-S12-CNA	**NZMN1-S12-CNA**	–
	NZMB1-S18-CNA	**NZMN1-S18-CNA**	–
	NZMB1-S26-CNA	**NZMN1-S26-CNA**	–
	NZMB1-S33-CNA	**NZMN1-S33-CNA**	–
	NZMB1-S40-CNA	**NZMN1-S40-CNA**	–
	NZMB1-S50-CNA	**NZMN1-S50-CNA**	–
	NZMB1-S63-CNA	**NZMN1-S63-CNA**	–
	NZMB1-S80-CNA	**NZMN1-S80-CNA**	–
	NZMB1-S100-CNA	**NZMN1-S100-CNA**	–
	NZMB2-S125-CNA	**NZMN2-S125-CNA**	–
	NZMB2-S160-CNA	**NZMN2-S160-CNA**	–
	NZMB2-S200-CNA	**NZMN2-S200-CNA**	–
	NZMB2-S250-CNA	**NZMN2-S250-CNA**	–

Auxiliary contacts				
Version	For use with	Max. number of auxiliary contacts per switch	Contacts	
			N/O = Normally open N/C = Normally closed	**Part no.**
Standard auxiliary contact (HIN) Switching with the main contacts Used for indicating and interlocking tasks		N(S)1, PN1, NZM1: 1 N(S)2, PN2, NZM2: 2 N(S)3, PN3, NZM3: 3 N(S)4, NZM4: 3		
With bolt connection 	NZM1(-4), 2(-4), 3(-4), 4(-4) PN1(-4), 2(-4), 3(-4) N(S)1(-4), 2(-4), 3(-4), 4(-4)		1 N/O – – 1 N/C	**M22-K10** **M22-K01**
With cage clamp connection.	NZM1(-4), 2(-4), 3(-4), 4(-4) PN1(-4), 2(-4), 3(-4) N(S)1(-4), 2(-4), 3(-4), 4(-4)		1 N/O 1 N/C 2 N/O – – 2 N/C	**M22-CK11** **M22-CK20** **M22-CK02**
Early-make auxiliary contacts For interlock and load-shedding circuits, as well as for early-make switching of the undervoltage release with main switch / emergency-Stop applications				
With clamp terminal on the left-hand switch side.	NZM1(-4) PN1(-4) N(S)1(-4)		2 N/O –	**NZM1-XHIV**
With clamp terminal on the right-hand switch side.	NZM1(-4) PN1(-4) N(S)1(-4)		2 N/O –	**NZM1-XHIVR**
With 3 m connecting cables instead of bolt connection.	NZM1(-4) PN1(-4) N(S)1(-4)		2 N/O –	**NZM1-XHIVL**
With bolt connection 	NZM2(-4), 3(-4) PN2(-4), 3(-4) N(S)2(-4), 3(-4)	N(S)1, NZM1: 1 N(S)2, NZM2: 1 N(S)3, NZM3: 1 N(S)4, NZM4: 2	2 N/O –	**NZM2/3-XHIV**
	NZM4(-4) N(S)4(-4)		2 N/O –	**NZM4-XHIV**
Trip indicating auxiliary contact (HIA)[1] General trip indication "+" with trip by voltage release, overload release or short-circuit release				
With bolt connection 	NZM1(-4), 2(-4), 3(-4), 4(-4) N(S)1(-4), 2(-4), 3(-4), 4(-4)		1 N/O – – 1 N/C	**M22-K10** **M22-K01**
With cage clamp connection.	NZM1(-4), 2(-4), 3(-4), 4(-4) N(S)1(-4), 2(-4), 3(-4), 4(-4)		1 N/O 1 N/C 2 N/O – – 2 N/C	**M22-CK11** **M22-CK20** **M22-CK02**

[1] not in conjunction with switch-disconnector PN

Release		Undervoltage release[1]		Overvoltage release[2]	
Version	For use with	Without auxiliary contact		Without auxiliary contact	
		Rated control voltage U_S V	**Part no.**	Rated control voltage U_S V	**Part no.**
With clamp terminal on the left-hand switch side. 	NZM1(-4), N(S)1(-4)	24 V 50/60 Hz 110 V – 130 V 50/60 Hz 208 V – 240 V 50/60 Hz 380 V – 440 V 50/60 Hz 12 V DC 24 V DC 110 V – 130 V DC 220 V – 250 V DC	**NZM1-XU24AC** **NZM1-XU110-130AC** **NZM1-XU208-240AC** **NZM1-XU380-440AC** **NZM1-XU12DC** **NZM1-XU24DC** **NZM1-XU110-130DC** **NZM1-XU220-250DC**	12 V AC/DC 24 V AC/DC 110 V – 130 V AC/DC 208 V – 250 V AC/DC 380 V – 440 V AC/DC	**NZM1-XA12AC/DC** **NZM1-XA24AC/DC** **NZM1-XA110-130AC/DC** **NZM1-XA208-250AC/DC** **NZM1-XA380-440AC/DC**
With 3 m connection cable instead of screw termination. 	NZM1(-4), N(S)1(-4)	24 V 50/60 Hz 110 V – 130 V 50/60 Hz 208 V – 240 V 50/60 Hz 380 V – 440 V 50/60 Hz 12 V DC 24 V DC 110 V – 130 V DC 220 V – 250 V DC	**NZM1-XUL24AC** **NZM1-XUL110-130AC** **NZM1-XUL208-240AC** **NZM1-XUL380-440AC** **NZM1-XUL12DC** **NZM1-XUL24DC** **NZM1-XUL110-130DC** **NZM1-XUL220-250DC**	12 V AC/DC 24 V AC/DC 110 V – 130 V AC/DC 208 V – 250 V AC/DC 380 V – 440 V AC/DC	**NZM1-XAL12AC/DC** **NZM1-XAL24AC/DC** **NZM1-XAL110-130AC/DC** **NZM1-XAL208-250AC/DC** **NZM1-XAL380-440AC/DC**
With clamp-type terminals 	NZM2(-4), N2(-4), NZM3(-4) N(S)3(-4)	24 V 50/60 Hz 110 V – 130 V 50/60 Hz 208 V – 240 V 50/60 Hz 380 V – 440 V 50/60 Hz 12 V DC 24 V DC 110 V – 130 V DC 220 V – 250 V DC	**NZM2/3-XU24AC** **NZM2/3-XU110-130AC** **NZM2/3-XU208-240AC** **NZM2/3-XU380-440AC** **NZM2/3-XU12DC** **NZM2/3-XU24DC** **NZM2/3-XU110-130DC** **NZM2/3-XU220-250DC**	12 V AC/DC 24 V AC/DC 110 V – 130 V AC/DC 208 V – 250 V AC/DC 380 V – 440 V AC/DC	**NZM2/3-XA12AC/DC** **NZM2/3-XA24AC/DC** **NZM2/3-XA110-130AC/DC** **NZM2/3-XA208-250AC/DC** **NZM2/3-XA380-440AC/DC**
With clamp-type terminals 	NZM4(-4), N(S)4(-4)	24 V 50/60 Hz 110 V – 130 V 50/60 Hz 208 V – 240 V 50/60 Hz 380 V – 440 V 50/60 Hz 12 V DC 24 V DC 110 V – 130 V DC 220 V – 250 V DC	**NZM4-XU24AC** **NZM4-XU110-130AC** **NZM4-XU208-240AC** **NZM4-XU380-440AC** **NZM4-XU12DC** **NZM4-XU24DC** **NZM4-XU110-130DC** **NZM4-XU220-250DC**	12 V AC/DC 24 V AC/DC 110 V – 130 V AC/DC 208 V – 250 V AC/DC 380 V – 440 V AC/DC	**NZM4-XA12AC/DC** **NZM4-XA24AC/DC** **NZM4-XA110-130AC/DC** **NZM4-XA208-250AC/DC** **NZM4-XA380-440AC/DC**

[1] non-delayed shut down of circuit-breaker NZM or switch-disconnector N with drop of the control voltage below 35 – 70% U_S.
For use with Emergency-Stop devices in conjunction with Emergency-Stop button.
[2] switches are tripped by a voltage pulse or by the application of uninterrupted voltage

Door coupling rotary handles		
Version	For use with	**Part no.**
Door coupling rotary handle Complete including rotary drive and coupling parts With the NZM...-XTVD... as well as NZM...-XTVD...60 types, an additional extension shaft is required. Degree of protection IP66/NEMA 4X Standard, black/grey 	NZM1(-4), PN1(-4), N(S)1(-4) NZM2(-4), PN2(-4), N(S)2(-4) NZM3(-4), PN3(-4), N(S)3(-4) NZM4(-4), N(S)4(-4)	**NZM1-XTVD** **NZM2-XTVD** **NZM3-XTVD** **NZM4-XTVD**
Lockable on handle and switch. Can be locked in 0 position, with adequate modification also in I position. Lockable door as additional feature, locking facility on circuit-breaker in 0 position. 	NZM1(-4), PN1(-4), N(S)1(-4) NZM2(-4), PN2(-4), N(S)2(-4) NZM3(-4), PN3(-4), N(S)3(-4) NZM4(-4), N(S)4(-4)	**NZM1-XTVDV** **NZM2-XTVDV** **NZM3-XTVDV** **NZM4-XTVDV**
Red-yellow for Emergency-Stop Lockable on handle and switch. Can be locked in 0 position, with adequate modification also in I position. Lockable door as additional feature, locking facility on circuit-breaker in 0 position. 	NZM1(-4), PN1(-4), N(S)1(-4) NZM2(-4), PN2(-4), N(S)2(-4) NZM3(-4), PN3(-4), N(S)3(-4) NZM4(-4), N(S)4(-4)	**NZM1-XTVDVR** **NZM2-XTVDVR** **NZM3-XTVDVR** **NZM4-XTVDVR**
Extension shaft 400 mm Max. mounting depth 600 mm Max. mounting depth 	NZM1(-4), PN1(-4), N(S)1(-4) NZM2(-4), PN2(-4), N(S)2(-4) NZM3(-4), PN3(-4), N(S)3(-4) NZM4(-4), N(S)4(-4) NZM1(-4), PN1(-4), N(S)1(-4) NZM2(-4), PN2(-4), N(S)2(-4) NZM3(-4), PN3(-4), N(S)3(-4) NZM4(-4), N(S)4(-4)	**NZM1/2-XV4** **NZM3/4-XV4** **NZM1/2-XV6** **NZM3/4-XV6**

Connection types






For use with	Conductor type	Conductor cross-section (applies for 3-pole and 4-pole switches)				Part no.
		mm²	AWG/kcmil	Cu-Band mm	Copper strip mm	O=fitted at top U=fitted at bottom
Box terminal						
NZM2, PN2, N(S)2 3-pole ≤ 160 A NZM2, PN2, N(S)2 200 A, 250 A	Cu cables Cu cable	1 x 4 – 185 2 x 4 – 70	1 x 12 – 350	≧ 2 x 9 x 0.8		+**NZM2-160-XKCO** +**NZM2-160-XKCU** +**NZM2-250-XKCO** +**NZM2-250-XKCU**
NZM2-4, PN2-4, N2-4 4-pole ≤ 160 A NZM2-4, PN2-4, N2-4 200 A, 250 A						+**NZM2-4-160-XKCO** +**NZM2-4-160-XKCU** +**NZM2-4-250-XKCO** +**NZM2-4-250-XKCU**
max. 500 A, and 400 A UL/CSA NZM3, PN3, N(S)3 3-pole	Cu cables Cu cable	1 x 35 – 240 2 x 16 – 120	1 x 2 – 500	min. 6 x 16 x 0.8 max. 10 x 24 x 1.0		+**NZM3-XKCO** +**NZM3-XKCU**
NZM3-4, PN3-4, N3-4 4-pole 630 A				10 x 24 x 1.0 + 5 x 24 x 1.0		+**NZM3-4-XKCO** +**NZM3-4-XKCU**
Shroud						
NZM2, PN2, N(S)2 3-pole NZM3, PN3, N(S)3						**NZM2-XKSA** **NZM3-XKSA**
NZM2-4, PN2-4, N2-4 4-pole NZM3-4, PN3-4, N3-4						**NZM2-4-XKSA** **NZM3-4-XKSA**
Screw terminal						
Standard equipment max. 1250 A NZM4, N(S)4 3- and NZM4-4, N4-4) 4-pole 1600 A	Cu lugs	1 x 120 – 185 4 x 50 – 185	1 x 250 – 350 4 x 0 – 350	(2 x) 10 x 50 x 1.0	(2 x) 50 x 10	
Module plate						
max. 1250A 1-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole	Cu lugs	1 x 120 – 300 2 x 95 – 300	1 x 250 – 600 2 x 000 – 600	(2 x) 10 x 40 x 1.0 (2 x) 10 x 50 x 1.0	(2 x) 40 x 10 (2 x) 50 x 10	**NZM4-XKM1** **NZM4-4-XKM1**
max. 1400A 2-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole	Cu lugs	2 x 95 – 185 4 x 35 – 185	2 x 000 – 350 4 x 2 – 350			**NZM4-XKM2** **NZM4-4-XKM2**
max. 1500A				(2 x) 10 x 50 x 1.0	(2 x) 50 x 10	
Module plate						
max. 1250A 2-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole	Cu lugs	2 x 95 – 300	2 x 000 –600			**NZM4-XKM2S-1250** **NZM4-4-XKM2S-1250**
1600A 2-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole				(2 x) 10 x 50 x 1.0	(2 x) 50 x 10	**NZM4-XKM2S-1600** **NZM4-4-XKM2S-1600**
Connection width extension						
630 A NZM3, PN3, N(S)3 3-pole NZM3-4, PN3-4, N3-4 4-pole	Cu-lugs Al lugs	2 x 300	2 x 500	(2 x) 10 x 50 x 1.0	(2 x) 10 x 50	**NZM3-XKV70** **NZM3-4-XKV70**
1600 A NZM4, N(S)4 3-pole	Cu lugs	4 x 300 6 x 95 – 240	4 x 600 6 x 000 – 500	max. (2 x) 10 x 80 x 1.0	max. (2 x) 80 x 10	**NZM4-XKV95** **NZM4-XKV110**
NZM4-4, N4-4 4-pole						**NZM4-4-XKV95** **NZM4-4-XKV120**

Residual-current protection module up to 250 A rated current

OC68EN

Online catalogue Quicklink
to www.moeller.net

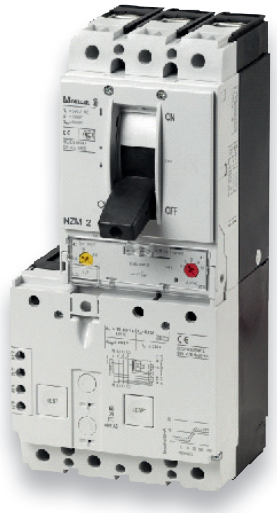
The residual-current protection modules can be connected to the bottom of the circuit-breaker NZM1 and NZM2, and on the NZM1 also on the right hand side with the same contour design. A compact and mounting-friendly solution. An external auxiliary voltage is not required. The residual-current protection module of the NZM2 is independent of the mains voltage and can thus be used for personnel protection in Germany. It is available in pulse current sensitive and also in AC/DC current sensitive devices. In almost every mains configuration 3-pole and 4-pole variants as well as rated fault currents from 30 mA to time-discriminating 3 A are on offer.
During a fault the rising fault current will initially be indicated by an LED on the RCCB for the NZM1. The circuit-breaker trips via the residual-current release only after the set fault current is exceeded, i.e. the main contacts will be opened. The cause of the fault is indicated mechanically on the device with the NZM1 and 2. Optional auxiliary contacts can be clipped on in order to remotely indicate the trip. The circuit-breaker and the residual-current release must be reset and switched back on in order to restore the power supply.

Fault current trip				**3-pole**	**4-pole**
Version		Rated uninterrupted current	Rated fault current delay time	**Part no.**	**Part no.**
Pulse current sensitive					
Mounted at side		max 160A	$I_{\Delta n}$ = 0.03 A	**NZM1-XFI30R**	**NZM1-4-XFI30R**
Mounted at bottom		max 100A		**NZM1-XFI30U**	**NZM1-4-XFI30U**
Mounted at side		max 160A	$I_{\Delta n}$ = 0.3 A	**NZM1-XFI300R**	**NZM1-4-XFI300R**
Mounted at bottom		max 100A		**NZM1-XFI300U**	**NZM1-4-XFI300U**
Mounted at side		max 160A	$I_{\Delta n}$ = 0.03 - 0.1 - 0.3 - 0.5 - 1 - 3 A tv = 10 - 60 - 150 - 300 - 450 ms	**NZM1-XFIR**	**NZM1-4-XFIR**
Mounted at bottom		max 100A		**NZM1-XFIU**	**NZM1-4-XFIU**
Mounted at bottom		max 250A	$I_{\Delta n}$ = 0.03 A	-	**NZM2-4-XFI30**
		max 250A	$I_{\Delta n}$ = 0.1 - 0.3 - 1 - 3 A tv = 60 - 150 - 300 - 450 ms	-	**NZM2-4-XFI**
AC/DC sensitive					
Mounted at bottom		max 250A	$I_{\Delta n}$ = 0.03 A	-	**NZM2-4-XFIA30**
		max 250A	$I_{\Delta n}$ = 0.1 - 0.3 - 1 A tv = 60 - 150 - 300 - 450 ms	-	**NZM2-4-XFIA**

NZM 2 with RCCB module for welding applications

OC69EN

Online catalogue Quicklink to www.moeller.net



- Suitable for use in three-phase systems
- Rated operational voltage 400V/ 50/60 Hz
- Rated fault current I_{Δ} n = 0.03 A
- Built-in power supply U_e = 50 – 400 V
- Pulse current sensitive
- Non-UL/CSA approved

The 3-pole circuit-breaker with residual-current release for equipment with power electronics such as inverters and frequency inverters is particularly suitable for welding applications. The RCCB module is pulse current sensitive and operates according to the core-balance principle in a range from 0 –100 kHz. Unwanted trips due to transient, pulse-shaped errors of the operating current are prevented. The function is mains voltage independent.

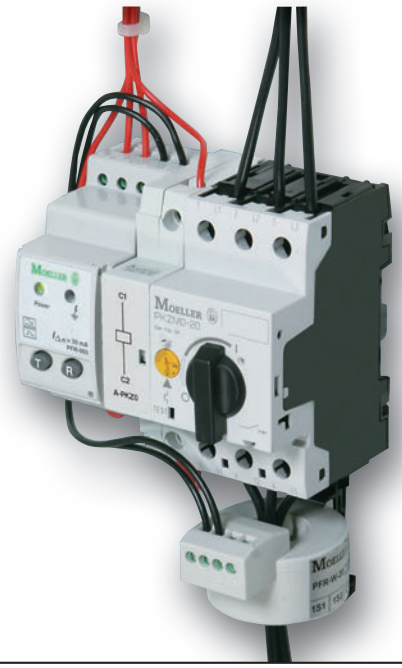
Circuit-breaker with residual-current release			
Rated current = rated uninterrupted current $I_n = I_u$ A	Overload release I_r A	Short-circuit release I_i A	**Part no.** Typical high switching capacity 150 kA at 415 V 50/60 Hz
160	125...160	960...1600	**NZMH2-A160-FIA30**
200	160...200	1200...2000	**NZMH2-A200-FIA30**
250	200...250	1500...2500	**NZMH2-A250-FIA30**

Circuit-breakers and switch-disconnectors for applications up to 1000 V

The special series for up to 1000 V 50Hz rated operational voltage further extends the area of application for circuit-breakers and switch-disconnectors. They are particularly suitable for use under special environmental conditions such as mines, street tunnels, refineries, chemical plants and electric railways. Typical applications include higher power drives and general industrial power supply with long power lines.
The switch-disconnectors also feature a snap-action mechanism for safe switch on and off and the additional installation of position and trip-indicating auxiliary contacts as well as shunt or undervoltage releases.

Circuit-breaker 3-pole for 1000 V							
With main switch characteristics to IEC/EN 60204 and isolating characteristics to IEC/EN 60947, VDE 660							
Switching capacity	**Protection of systems and cables**			**Selectively-opening circuit-breakers**		**Motor protection**	
1000 V kA/cos v I_{cu}	10 / 0.5	15 / 0.5	20 / 0.3	10 / 0.5	20 / 0.3	15 / 0.5	20 / 0.3
rated uninterrupted current I_u = rated current I_n	I_u	I_u	I_u	I_u	I_u	I_u	I_u
ambient temperature at 100% I_u min./max. -25 / +50	**A**	**A**	**A**	**A**	**A**	**A**	**A**
	NZMH2-A...-S1 20 - 250	**NZMH3-AE...-S1** 250 - 630	**NZMH4-AE...-S1** 630 - 1000	**NZMH2-VE...-S1** 100 - 250	**NZMH4-VE...-S1** 630 - 1600	**NZMH3-ME...-S1** 220 - 450	**NZMH4-ME...-S1** 550 - 1400

Flexible fault current protection up to 1800 A current rating



Protection against the dangers of electrical energy with insulation faults

The new Eaton Moeller relay/transducer combination covers operating currents in a range from 1 to 1800 A. The wide spectrum of applications ranges from general power distribution tasks to individual motor controls. The fault currents which are detected and processed by the relay range from 30 mA to 5 A. The adjustable relay provides a pre-warn function which alerts before the set fault current is exceeded. The pre-warning allows preventative action to be taken to prevent shutdown of the electrical energy.

The application range of the relay/transducer combinations extend – depending on the regulations which apply – from personnel protection to fire protection, and even extends up to protection of systems for 1 to 4 pole power grids. The current relay signals that the set fault current has been exceeded with a changeover contact. Depending on the application, the contact signal can be subsequently processed in the controls, as well as by the shunt or undervoltage releases of a circuit-breaker which initiate the trip. The relay and transducer can be combined with every circuit-breaker. The compact ring-type transducer with no particular space requirement is placed at a suitable position on the cable run. The relay simply requires a free electrical cable connection.

Compact, safe, adaptable ...

... just as it should be, the fault current protection which is particularly suited for cramped spaces such as for example in service distribution systems.
Ring-type transducers which are arranged in a space saving manner on the cabling run and the measuring relay which is simply snapped onto the DIN mounting rail, combine to form a functional unit.
After a critical fault current has been exceeded, the output signal can be optionally channelled to an acoustic/optical signalling device, upstream control or directly to the shunt or undervoltage release of a motor-protective circuit-breaker/circuit-breaker for instantaneous shutdown.
Three different relay variants are available for different protective tasks: 30 mA as well as 300 mA sensitivity with a fixed setting and 30 mA to 5 A adjustable in fixed steps, which can be combined with a time delay of 20 ms to 5 s.
The non-delayed standard devices are particularly suited for protection of systems. The time-delayed variants are intended for discriminative series connection of multiple switch/relay combinations. This ensures, that only the switch in the direct vicinity of the fault will trip.

Two colour LED's signal operating and fault states

Possible wiring faults between relay and transducers are indicated by illumination of both LED's. Diagnostics function with adjustable PFR-5 relay: If the set fault current is exceeded by more than 25, 50 or 75%, the red LED will flash at different frequencies. This alert feature ensures that trouble-shooting for the cause of the fault can commence before a critical state is reached.

Two pushbuttons enable test and reset of the relay

Test: The function of the relay electronics is tested and the trip signal can be used to control the shunt or undervoltage release of the connected circuit-breaker. This test checks the operation of the entire function chain comprised of measured value input, processing, signal routing as well as switch release.
Reset: The release signal is reset regardless of if it is received from a fault current or by operation of the test button.

Residual current relay with ring-type transducer

		Part no.	
Residual current relay Pulse current sensitive 	Rated control voltage: U_s = 230V A.C. (50/60 Hz) Integrated auxiliary switch (1 changeover contact)		
	Rated fault current $I_{\Delta n}$ = 0.03 A	**PFR-003**	
	Rated fault current $I_{\Delta n}$ = 0.3 A	**PFR-03**	
	Rated fault current $I_{\Delta n}$ = 0.03...5 A Adjustable fault current and delay time Fault current prewarning by flashing red LED	**PFR-5**	PFR-5: Adjustable fault current: 0.03 - 0.1 - 0.3 - 0.5 - 1 - 3 - 5 A Adjustable delay time: 0.02 - 0.1 - 0.3 - 0.5 - 1 - 3 - 5 s
Ring-type transducer 	Internal diameter 20 mm	**PFR-W-20**	PFR-W-20 and PFR-W-30 incl. attachment clip for DIN top-hat rail
	Internal diameter 30 mm	**PFR-W-30**	
	Internal diameter 35 mm	**PFR-W-35**	PFR-W-35 and all larger transducers incl. screw fitting
	Internal diameter 70 mm	**PFR-W-70**	
	Internal diameter 105 mm	**PFR-W-105**	*Engineering note:* The transducer diameter must be selected to be 1.5 times larger than the diameter of the conductor lead through (see Technical Data).
	Internal diameter 140 mm	**PFR-W-140**	
	Internal diameter 210 mm	**PFR-W-210**	

Versatile air circuit-breakers up to 6300 A for economically-optimised solutions.

The IZM from Eaton Moeller is a proven concept for air circuit-breakers that is successfully used today – worldwide. The modular design, the wide rated current range up to 6300 A, and adaptability guaranteed by a complete range of accessories including the communication capability allows universal application in almost all sectors and applications. Furthermore, the new compact IZM X16 saves installation space. Now with 5 different widths, each switch is better optimised to the respective rated current.

The IZM is ideal to utilise the most modern protection technology from the system engineering field.

xEnergy
up to 4000 A

MODAN
up to 6300 A

MODAN
two IZM X16s on
600 mm section

Employ robust safety with cost-optimised engineering

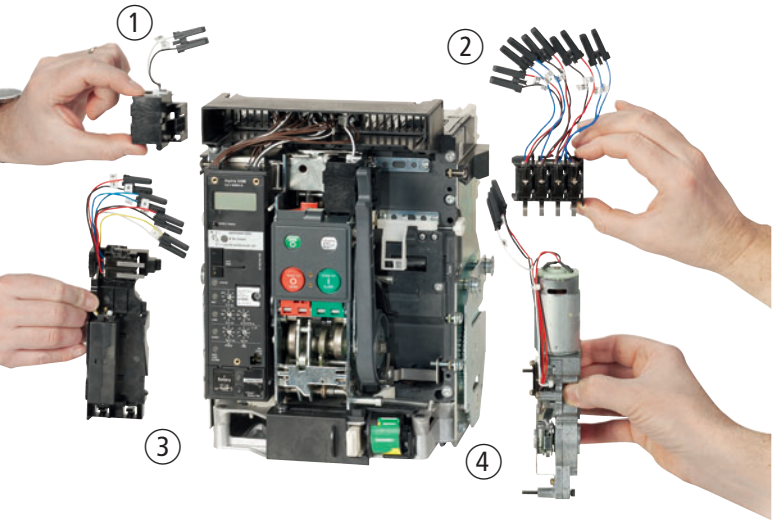
Eaton Moeller presents a complete range of air circuit-breakers (ACB) up to 6300 A with the new and unparalleled IZM 20 to 63 circuit-breaker. Four switch sizes enables the optimum choice of the most efficient circuit-breaker for every project. Together with the rated current, only the frame size increases so you can always choose the most compact and cost-efficient circuit-breaker.

The particularly space-saving variant: IZM X16

The new star is the IZM X16. The innovative concept makes it possible for two withdrawable circuit-breakers to be mounted side by side in a 600 mm wide section. It allows for a more efficient section layout and saves on precious space. More performance in such a small space is hardly possible.

The very robust switches are already in use in harsh industrial environments in hundreds of thousands of applications. High material strengths and high rated short-term current carrying capacity are proof of these facts.

Versatile configuration: IZM air circuit-breakers



We supply the circuit-breaker complete with all ordered functions ready to operate. Should additional functions / accessories be subsequently required, the prewired accessories can be easily installed.

Accessories displayed with example IZM X16:

1. Spring release
2. Right accessory support for
   a) 1 or b) 2 pairs of auxiliary contacts
3. Left accessory support for 4 accessories
   a) 1 shunt release and 1 undervoltage release or
   b) 2 shunt releases
   c) 1 or 2 trip indicating auxiliary contacts
4. Motor operator

Accessories not shown, e.g.:

5. Safe OFF key interlock
6. Lockable cover for ON and OFF buttons
7. Mutually exclusive mechanical interlock
8. Latch check switch
9. Operations counter
10. Drawer unit
11. Shutter
12. Door seal and/or IP54 protective cover

Easy and versatile installation

Horizontal or vertical connection by simply turning the adapters.

Or you can use a connection flange for a direct and smooth embedded connection of the copper busbar. That saves space for additional installation depth.

Frame sizes **Types to IEC60947**	**IZM X16** 630 A, 800 A, 1000 A, 1250 A, 1600 A
Maximum switching capacity **at:** U_e 415V/690V: I_{cu} (kA) I_{cs} (kA) I_{cw} (kA)	 65/42 50/42 42/42
Dimensions	
Fixed type	
Width 3-pole (mm)	210
Width 4-pole (mm)	280
Height (mm)	335
Depth (mm)	182
Drawer unit	
Width 3-pole (mm)	255
Width 4-pole (mm)	322
Height (mm)	360
Depth (mm)	272
Section width for xEnergy (up to 4000 A) and MODAN (up to 6300 A	
Fixed type	
Width 3-pole (mm)	400
Width 4-pole (mm)	600
Drawer unit	
Width 3-pole (mm)	400
Width 4-pole (mm)	600

Certified safety for our system partners

Our switchboard systems are type-tested switchgear combinations compliant to IEC/EN60439, which are composed of function modules. These modules – with internal partitioning up to form 4 – are customised for local installation standards and preferences such as DIN VDE, CEI, NF or UNE. They enable you to freely design your individual solutions – even on a supra-regional level.
Our system partners assemble your individual switchboard. Their experience with the applications allows that they can ensure the optimum realisation of your needs. We offer a broad range of different switchgear systems and solutions such as MODAN and xEnergy. Thanks to our long-standing know-how in the development and production of electro-technical components, all of our products and services are state-of-the-art.

ARMS™ world innovation offers more safety for maintenance staff

If the IZM is equipped with the new and patented ARMS system (Arcflash Reduction Maintenance System), in the event of an arc-fault the trip unit breaks instantaneously. The breaking is even faster than that of an instantaneous short-circuit trip. This function can be activated on the circuit-breaker or with an external switch, e.g. when maintenance staff enter a danger zone. The arc-fault protection system can be extended in stages through other components from the ARCON protection system in conjunction with the IZM range.




	IZM 20 800 A, 1000 A, 1250 A, 1600 A, 2000 A	IZM 32 800 A, 1000 A, 1250 A, 1600 A, 2000 A, 2500 A, 3200 A	IZM 40 4000 A	IZM 63 4000 A, 5000 A, 6300 A
	65/65 65/65 65/65	100/100 100/85 85/85	100/100 100/100 100/85	100/100 100/100 100/100
	318	410	640	887
	413	537	830	1120
	426			
	372			
	336	432	675	909
	432	559	870	1036
	525			
	475			
A) switchboards				
	600	600	1000	1200
	800	800	1000	1400
	600	600	1000	1200
	800	800	1000	1400

Connect to the future with xEnergy

xEnergy is a system with endless combination possibilities for power distribution boards. It is especially designed for the infrastructures of buildings and for industrial applications, up to 4000 A.

The xEnergy system offering from Eaton Moeller provides optimum reliability in power distribution. It comprises switching and protective devices, the associated mounting systems, the switchgear cabinet, and includes planning and calculation tools.

Excellent mechanical adaptation of the switchgear cabinet components to the Eaton Moeller switching devices achieves short fitting times and great flexibility. The complete units consisting of switching devices, mounting systems and switchgear cabinet furthermore, are type-tested to IEC/EN 60 439. This guarantees a high safety level.

Globe Trade Center (GTC), having built the Galeria Kazimierz on an area of 36 000 square metres of land in Krakow, Poland, is now running this combined shopping and leisure centre. Messrs. Hulanicki Bednarek Sp. z o.o., the system builders, are Eaton Moeller's partner for xEnergy and MODAN in this project. Hulanicki Bednarek and Eaton Electric Poland have long had a good business relationship, built to a large extent on the system builder's trust in Eaton Moeller's competent customer care in Poland.

The low-voltage main distribution centre designed for the Galeria Kazimierz includes 62 sections of xEnergy, approximately 50 metres long, and supplied by three main power distribution boards.
The main busbars transfer 2500 A, 3200 A and 4000 A.
In addition to the xEnergy sections, the installation includes circuit-breaker sections containing IZM and NZM 4 with mechanical interlocking and busbar trunking connections. xEnergy outgoing sections with NZM 1 to NZM 3 power outgoers are used for sub-distribution, as are combination motor-starters that include PKZ and DIL contactors. xEnergy sections with power factor correction and xEnergy corner sections complete the installation.

On call

Think of Eaton Moeller as your business partner – a partner who can support you in providing the highest levels of service to your customers, a partner who can advise you on how to get the results you want. Each module has been carefully designed and thought through to ensure complete consistency – from the device itself, the mounting system, the enclosure, right up to the software tools.

Partnering with Eaton Moeller gives you the competitive edge over your competitors: it means you can provide optimum added value in your own panel building designs, and can enjoy the reassurance of knowing that you are using type-tested systems that are always state-of-the-art. In short, you will be connecting to the future with xEnergy.

All products in the xEnergy range can be supplied either functionally grouped in flat packs, or as switchboards fully pre-assembled according to your specifications.

Enclosure components are supplied on demand, exactly matched to your individual requirements, including type tests.

xEnergy power distribution
expect progress, provide innovations

xEnergy product features

- Enclosure for side-by-side and stand-alone installation
- Degree of protection IP 31 or 55
- Main busbars up to 4000 A
- 2 main busbar systems can be installed per section
- Clear separation into functional areas form 1 to form 4b for enhanced protection of personnel and systems
- Widths of 425, 600, 800, 1000 and 1200 mm
- Height 2000 mm
- Colour RAL 7035 (further possible)
- Power grid systems TN-C, TN-C-S, TN-S, TT, IT
- Type-tested switchgear combinations (TTA) according to IEC/EN 60439-1
- Optimised for 3- and 4-pole switchgear from Eaton Moeller

Circuit-breakers IZM and NZM for xEnergy XPower sections

- Clear and symmetrical design with just one circuit-breaker per section reduces the number of busbar assemblies and saves mounting time
- Simple installation with cable connection system for connection on the section width without drill holes

Circuit-breakers NZM and PKZ for xEnergy XFixed sections

- High packing density with max. 38 modules in a section, featuring optimum device efficiency
- Flexible module installation to form 4 with swivelling cover plate
- Simple module installation to form 2 on a single level
- Multi-flexible combination features of the functional areas and the busbars according to IEC/EN 60439 and local installation habits

Power sections XP

Incomers, outgoers and bus-couplers up to 4000 A

- Cable connection from bottom and top
- Busbar position at the rear– bottom/top or top routed along the ceiling
- Section height 2000 mm / section depth 600 / 800 mm
- (internal partitioning up to form 4b)

Air circuit-breakers IZM 20 to 63

- Widths 425 / 600 / 800 / 1200 mm
- Fixed or withdrawable
- 3 or 4-pole
- With two main busbars for use as a coupling section
- 800 A - 4000 A
- Form4b
- IP31, IP55 with protective cover IZM-XDT
- Drill hole-free cable connection can be used, for top or bottom installation
- Can be externally operated
- Switchgear can be implemented with remote operators

Compact circuit-brealers NZM3/4 in Form 4b

- Widths 425 / 600 / 800 mm
- Fixed or withdrawable
- 3 and 4-pole
- With two main busbars for use as a coupling section
- 250 - 630 A (NZM 3)
- 630 - 1600 A (NZM 4)
- Form4b
- IP31/55
- Drill hole-free cable connection can be used, for top or bottom installation
- Can be externally operated
- Two switching devices are possible in a singlesection
- Switchgear can be implemented with remote operators

Compact circuit-breakers NZM 4 in Form 2b

- Widths 425 / 600 / 800 mm
- Fixed or withdrawable
- 3 or 4-pole
- With two main busbars for use as a coupling section
- 630 - 1600 A
- Form2b
- IP31/55
- Drill hole-free cable connection can be used, for top or bottom installation
- Operation behind section height door
- Switchgear can be implemented with remote operators

Outgoer sections XF

- Outgoers with circuit-breakers PKZ, NZM, FAZ, switch-fuse units and fuse-load switch units up to 630 A
- For busbar position at the rear – top/bottom or top routed under the ceiling
- Section height 2000 mm / section depth 600 / 800 mm

Outgoer sections for outgoers up to 630 A in form 2b

- Widths 800 / 1000 / 1200 mm
- Module widths 425 and 600 mm
- 3 or 4-pole
- Form2b
- IP31/55
- Universal switchgear installation height
- Circuit-breaker with socket base can be used
- Universal section door at 800 / 1000 mm, two-wing at 1200 mm
- Switchgear can be implemented with remote operators
- Can be operated behind the door
- Dropper bar selectable from 800 – 1600 A
- Split configuration in 2 separate sections possible, e.g. 600 mm / 600 mm. Component mounting area / cable coupling area

Outgoer sections for fixed installed outgoers up to 630 A in form 4b

- Widths 800 / 1000 / 1200 mm
- Module widths 425 and 600 mm
- Each module features its own front plate
- 3 or 4-pole
- Form4b
- IP31/55
- Circuit-breaker with socket base can be used – NZM3 w. socket base … in 800 mm sections
- Switchgear can be implemented with remote operators
- Independent doors for component mounting area / cable coupling area
- Transparent doors possible (glass doors)
- Dropper bar selectable from 800 – 1600 A
- Split configuration in 2 separate sections of component mounting area and cable coupling section possible, e.g. 600 mm / 600 mm.

Outgoer sections for switch-fuse units (switch-disconnector units) up to 630 A (SSL)

- Widths 600 / 800 / 1000 / 1200 mm
- Can be used with rear main busbar
- Horizontal and vertical position of the fuse-load switch units possible
- Installation when live (hot-swap)
- IP31
- Outgoer connection from bottom and top
- Form4b
- Can be externally operated
- Dropper bar selectable from 800 – 1600 A

Outgoer sections for fuse strips up to 630 A (SL)

- Widths 600 / 800 / 1000 mm
- Vertical position of the fuse strips
- Form2b
- IP31
- Can be externally operated
- Outgoer connection from bottom and top

Plug-in outgoer sections in form 2b

- Widths of 800 / 1000 / 1200 mm
- Module width 600 mm
- Form2b
- 3 or 4-pole
- IP31/55
- Universal switchgear installation height
- Universal section door at 800 / 1000 mm, two-wing at 1200 mm
- Switchgear can be implemented with remote operators
- Can be operated behind the door
- Plug-in empty module for installation of FI, FAZ …
- Dropper bar selectable from 800 A – 1600 A
- Split configuration in 2 separate sections possible, e.g. 600 mm / 600 mm component mounting area / cable coupling area.

Plug-in outgoer sections in form 4b

- Widths 800 / 1000 / 1200 mm
- Module width 600 mm
- 3 or 4-pole
- Form4b
- IP31/55
- Each module features its own front plate
- Independent doors for component mounting area and cable coupling area
- Transparent door possible (glass door)
- Plug-in empty module for installation of FI, FAZ …
- Can be operated behind the door
- Dropper bar selectable from 800 A - 1600 A
- Split configuration in 2 separate sections possible, e.g. 600 mm / 600 mm component mounting area / cable coupling area.

Box solution

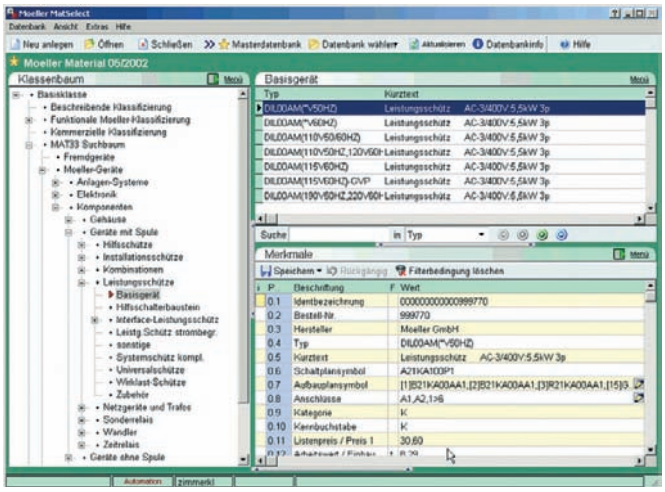
- Widths 800 / 1000 / 1200 mm
- Module width 425 / 600 mm
- Each module features its own component mounting area door
- 3 or 4-pole
- Fixed or withdrawable
- Switchgear can be implemented with remote operators
- Can be operated behind the door or with door-coupling rotary handle
- Dropper bar selectable from 800 A - 1600 A
- Empty plates, module plates for configuration of outgoers (FI, FAZ …)

Empty sections for customized components

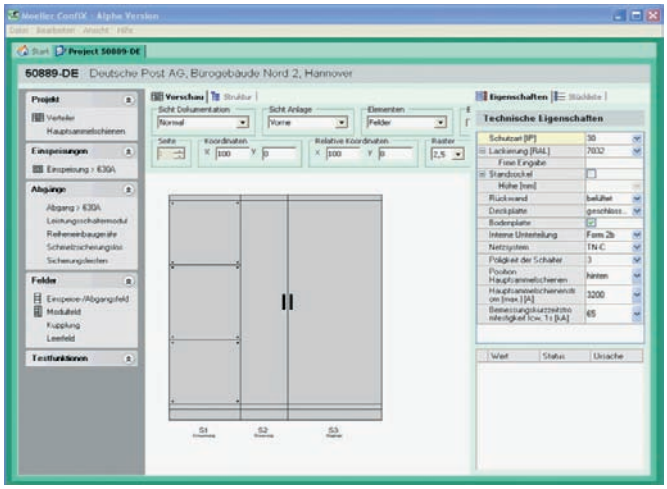
- Installation systems for modular installation devices (IVS, xBoard Pro….)
- Individual fixed installation modules on mounting panels
- Control engineering– section height or split mounting panels can be installed
- Section height 2000 mm
- Section depth 400 / 600 / 800 mm
- Section width 425 / 600 / 800 / 1000 / 1200 mm
- IP 31/55

Software Tools

Net*Plan*



MatSelect database



Configurator for *xEnergy*

Networked expertise, know-how as a competitive edge.

Eaton Moeller also offers a comprehensive set of tools. The software tools for planning, documentation and calculation provide all the support planners, panel builders and installation technicians need. The specially developed Eaton Moeller Toolbox includes tools for network calculations, configuration, quotations, engineering and ordering. Using Eaton Moeller tools, which have the system-specific data already built-in, means you can work faster and more efficiently.

Net*Plan*

Net*Plan* supports you in the reliable and problem-free planning of low-voltage networks (meshed and radial networks). It offers you tried and tested functions and is practical and flexible.

MatSelect database

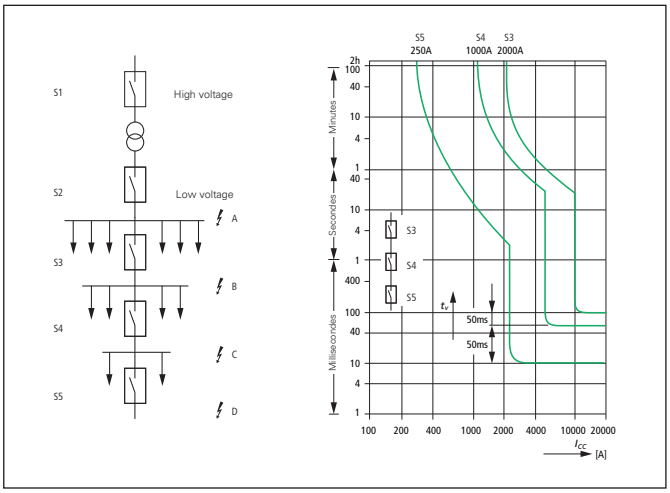
With MatSelect, you can manage all your product and material data in user-defined and standard classification.

Configurator for *xEnergy*

This software helps you configure the required xEnergy switchboard system simply and quickly. In this way, you can make your own quotations and generate accurate parts lists in no time at all and at the push of a button.

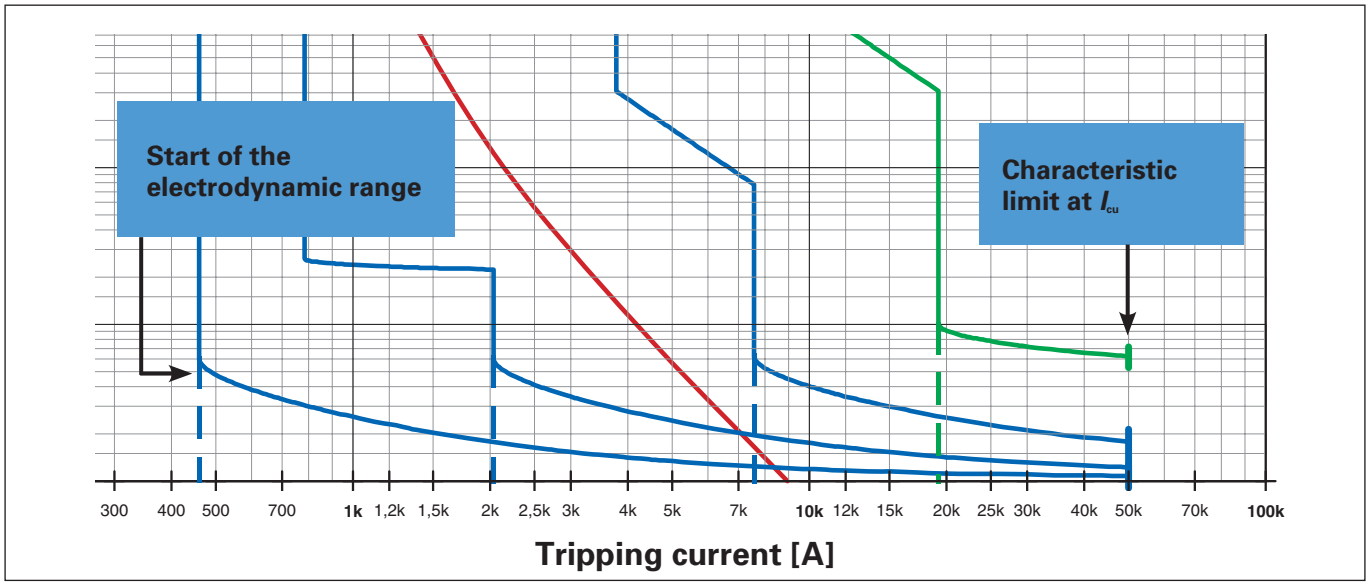
CurveSelect – The characteristic program for protective devices

Circuit-breakers are generally the most important switching and protective devices in electrical power distribution. At the critical nodes of a distribution system, on which may depend the power supply to entire factories or municipal areas, fuse-less protection using circuit-breakers with their short recovery time is of central importance. Selective protection can be designed for various levels within the network as a preventive measure to ensure a high level of accessibility to systems and processes. Selectivity ensures that only the protective device closest to the affected operating medium trips in the event of a fault.

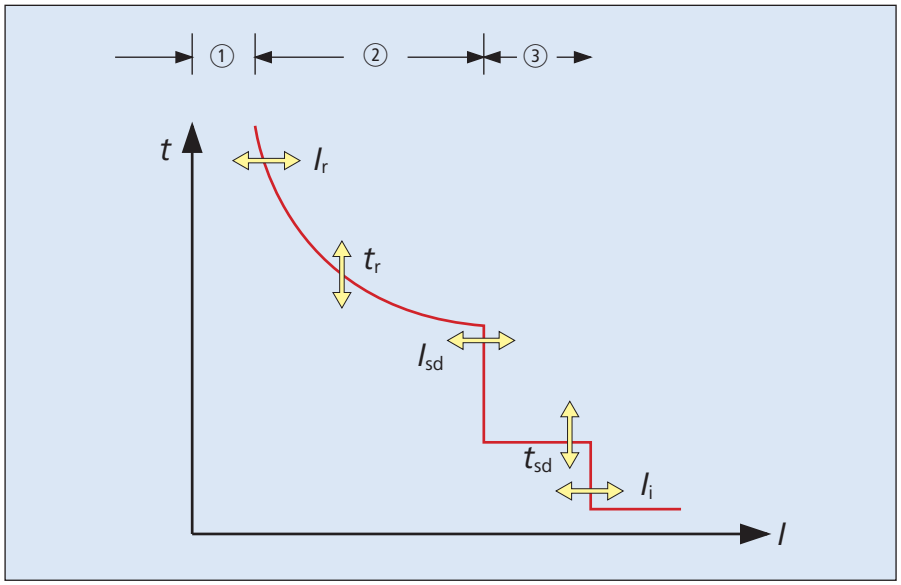


In many networks, several protective devices are arranged in series within the current path. The diagram at top right shows an example of a network with time-selectivity using short-time delayed circuit-breakers. The new "CurveSelect" software tool enables all the characteristic curves to be easily represented at the same time, thus allowing assessment of the particularly important matter of overload selectivity. This new software tool is available from Eaton Moeller free of charge. It consists of a booklet that explains the setting options for protective elements, selectivity itself and how to apply the tool.

Included in the booklet is a CD-ROM with the necessary Excel file and further information. The file is also downloadable free of charge from the Eaton Moeller website. Since the Microsoft Office Excel® program is used for representation of the tripping characteristics and *individual switch settings*, it is necessary for this program to be already installed on the computer. No software installation is necessary for the tripping characteristics program, therefore the tool can be used without the requirement for administrator rights to the computer.



Due to the complexity of the electrodynamic properties of the current-limiting contacts and the arc-quenching apparatus, short-circuit tripping times can not be calculated using this simple tool. In the characteristic curves of this program, a vertical broken line for the response value of the instantaneous overload trip represents the electrodynamic limit. Where selectivity for the short-circuit range is a matter for consideration, the selectivity tables in the Eaton Moeller Main Catalogue must be consulted as well. The values therein are verified by testing.

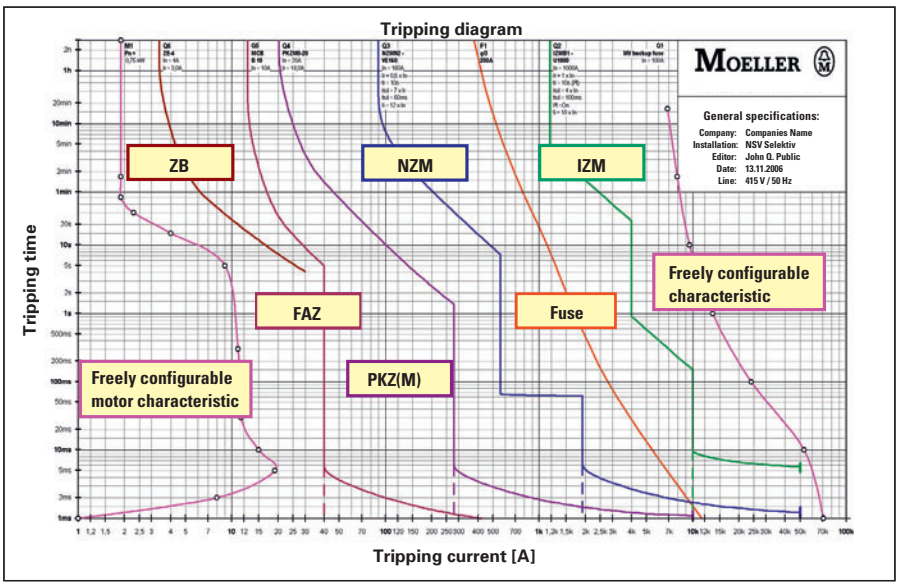


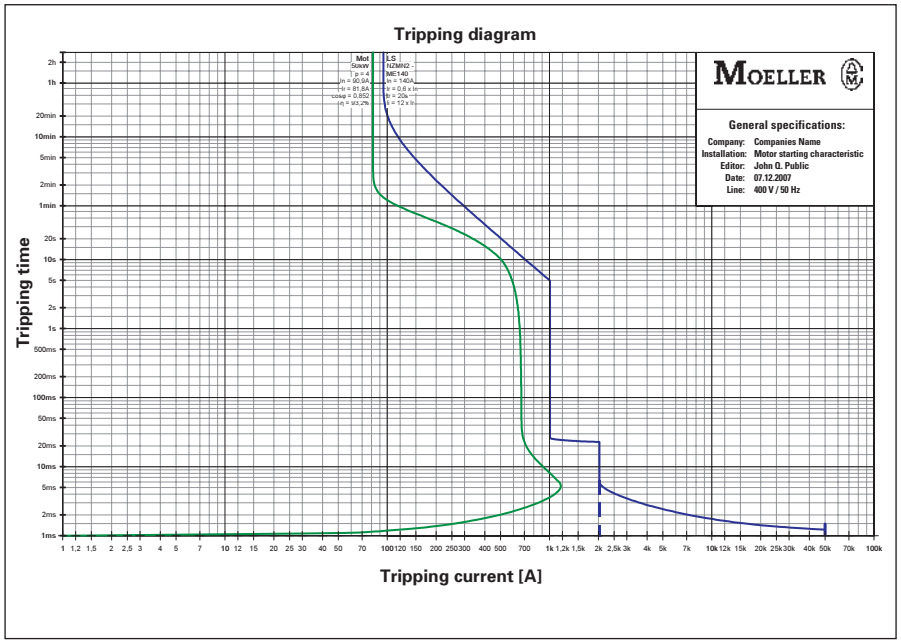
The diagram shows the possibilities of influencing the properties of the curve. Not all of the above mentioned options are available for every protective element. To find the equipment available on individual elements it is necessary to consult the Main Catalogue. These details are also shown in the input masks of the software tool.

Degrees of freedom in

① **Non-trip range**
② **Overload range**
③ **Short-circuit range**

The example shows a representation of several characteristic curves sharing the same scale in terms of current and time. The individual switch settings input in the program are also taken into account. The curves for the different groups of protective elements are shown in different colours. It is possible to input identification for individual protective elements thus creating valuable documentation, for example, concerning the supply status of a new switchgear system. The finished chart can then be copied into other documents as well.





Motor starting characteristics:
As a further option "CurveSelect" provides the representation of the motor starting characteristics of three-phase asynchronous motors in order to simplify and verify the selection of overload relays / motor-protective circuit-breakers. The envelope of the starting current relative to the effective value is represented taking the maximum expected inrush current into consideration. After entering factors such as the motor rating, number of poles, the expected start-up time as well as the average capacity utilization in rated operation, an initial approximation based on internal data from commercially available standard motors is generated. This allows a preliminary selection of the motor protective device even when the exact motor data is still unknown.

Why separate tripping curves?

Simple protective elements such as fuses or miniature circuit-breakers have fixed tripping curves (characteristics), i.e. they cannot be altered.

On motor-protective relays or circuit-breakers and on circuit-breakers, the *setting current I_r of the overload release* and in some cases also the *setting current I_i of the instantaneous short-circuit release* are adjustable.

Circuit-breakers NZM and *IZM* with *electronic releases* offer the most flexible options of adaptation to various operating media and operational situations.

They allow selection of differing *delay times*, t_r or t_{sd}, in addition to the current settings. As a result of inputting the individual data, the tool produces a set of curves. These must of course be adjusted to conform as closely as possible to the operating medium to be protected.

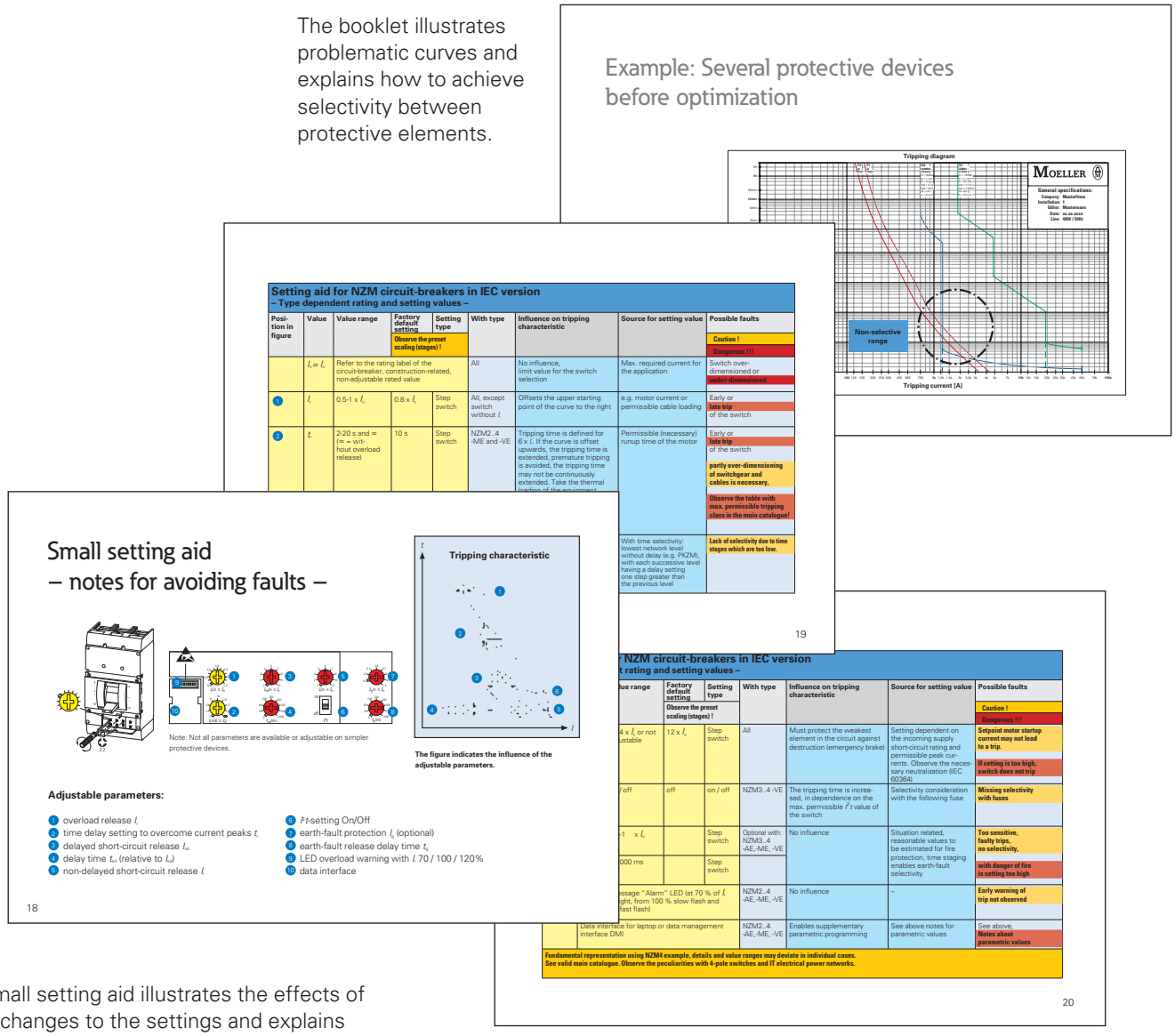
A small setting aid

Several pages in the booklet show the setting errors to be avoided. For example, to ensure selectivity in the overload area, the curves in the diagrams of the circuit-breakers must neither touch nor intersect with one another nor with the fuse characteristics.

Consider the tolerances of the curves which are ± 20 % in the overload range. At any points of contact or intersection of the curves, the limit of overload selectivity between the chosen devices is reached or exceeded.

The user often does not realise what effect the settings on the switch may have or where to find information regarding the parameters to be set. The booklet contains fold out pages that explain these relationships.

The booklet illustrates problematic curves and explains how to achieve selectivity between protective elements.



A small setting aid illustrates the effects of any changes to the settings and explains the guiding values to be followed for a selectivity setting.

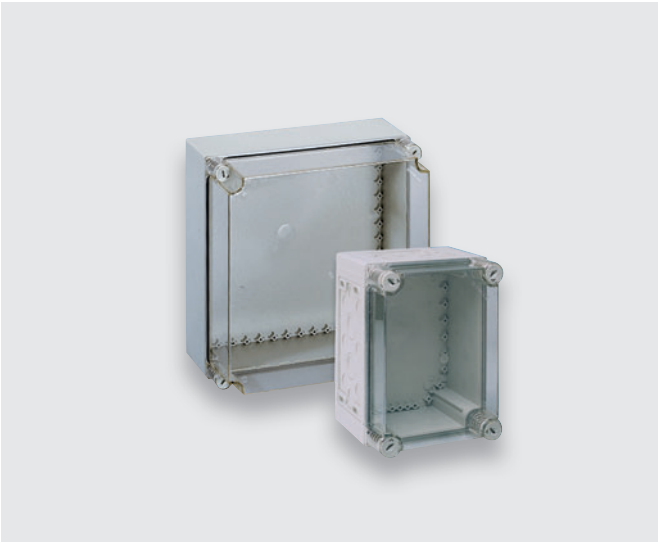
www.moeller.net/curves

xBoard – the comprehensive distribution board range from Eaton Moeller, adapted to industrial applications

The pace in the industrial world has increased. Flexibility, speed and consistency are in high demand when it comes to keeping up with progress.
On the one hand products should be adaptable in the shortest time to new demands, and on the other hand must permanently withstand mechanical loading. An advanced requirement which control and energy distribution systems must master. No problem for the xBoard distribution board range from Eaton Moeller. Whether its an application in industry or in a building, the high level of mechanical stability of the xBoard, a range of enclosure variants and quick to install installation units makes it the right choice. Whatever needs to be done – the Eaton Moeller range fits into your plans and new demands.

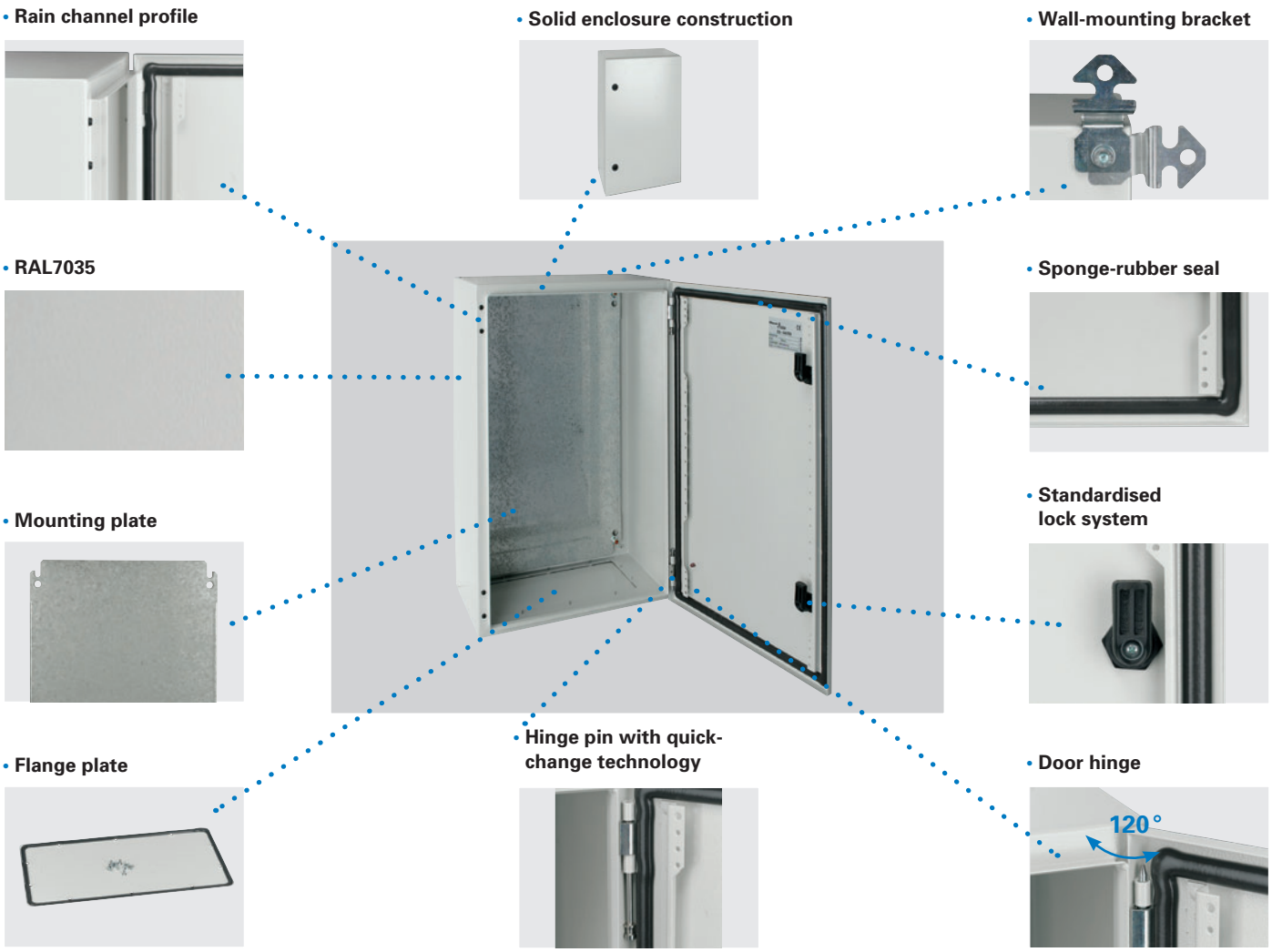
The wall-mounting enclosure CS is very rugged and is used wherever effective protection is necessary. Whether it is effective protection against direct contact with active components or protection for the installed equipment against harmful environmental conditions, such as liquids. The high degree of protection IP65 – guaranteed by a continuous sponge-rubber polyurethane seal – assures that water, oil and dirt have no chance to penetrate the housing and damage the internal equipment.

The new member of the xBoard family boasts a variety of options that were not available at Eaton Moeller in this application class until now. According to requirements, the side-by-side mountable XVTL can be easily transformed into a control enclosure for industrial purposes, or into an energy distributor for functional buildings. Its most impressive properties: it is available in 55 different dimensions; it is stable and easy to disassemble.



The CI system demonstrates its flexibility during assembly. Whether as individual enclosures, wall mounted enclosures or floor-standing enclosures of different sizes, the CI distribution units in box-type assembly up to 630 A always provide the optimum solution.
Production processes – regardless or whether they are in a mine or steel mill, in the food or chemical industry – stand and fail with the distribution of energy. Low-voltage power distribution systems must always function reliably – a safe bet with the Eaton Moeller CI system insulated enclosures.

The IVS has been developed for service distribution boards up to 630 A and impresses as both a safe and economic unit for power distribution in industrial applications, commercial applications and buildings.
The range features both wall mounted and floor-standing enclosures each with degree of protection IP30 and IP55. The high level of enclosure standardisation enables a particularly fast installation: the installation space of the control panel is subdivided into common sections of size 250 x 375 mm. Accordingly, the planning of the control panel and ordering of the parts is easy to manage.



Sheet steel wall-mounting enclosure CS – Stability with a high level of protection

From 250 x 200 x 150 mm to 1200 x 1200 x 250 mm, 45 different enclosure sizes are available to choose from. The rugged enclosure series CS made of solid sheet steel is used wherever effective protection against direct touch of the active parts is necessary. The high degree of protection IP65 protects the installed equipment from damaging ambient conditions. Degree of protection IP65 guarantees full security under most ambient conditions. Sealing is guaranteed by a continuous sponge-rubber polyurethane seal. A surrounding rain channel profile protects against the ingress of liquids such as water or oil as well as dirt when the door is opened. The components inside the enclosure are also protected against mechanical impact damage by the categorisation to external mechanical impact code IK09 complaint to EN 62262. CS enclosures can be installed as wall-mounting enclosures. A structured paint finish applied using the powder coating process provides abrasion-proofed corrosion protection. The enclosure door can be removed with little effort for further mechanical processing. Internally hidden hinges can be easily released and the door hinges can be quickly changed from right to left or vice versa.

Product features

- Degree of protection IP55 guarantees full security for the installed equipment under most ambient conditions. This is assured for example by the continuous sponge-rubber polyurethane seal.
- A stable enclosure construction made of quality sheet steel offers effective protection against direct touch of the active parts. Wall mounting is facilitated by 10 mm diameter bore holes on the rear of the enclosure. Including 2 x M6 internal threaded welded bolts for connection of the protective earth conductors.
- The components inside the enclosure are effectively protected against mechanical impact damage by the categorisation to external mechanical impact code IK10 complaint to EN 62262.
- 45 enclosure sizes from 250 x 200 x 150 mm to 1200 x 1200 x 250 mm are available.
- The pre-mounted mounting plate made of galvanized sheet steel enables safe installation of the switchgear as well as EMC protection. Oblong drill hole for easy insertion of the assembled mounting plated into the control panel.
- Mounting plate from enclosure dimension 600 x 400 with canted edges for higher levels of stability when heavy installed devices are used.
- Sheet steel base plated for customized application. The enclosure can be turned by 180° for introduction of the cables from top or bottom. Flange plate apertures are located on the rear of the enclosure to facilitate ease of wiring on the mounting plate.
- Right door hinge, door opening angle 120°. Door including M6 threaded welded bolts for connection of the protective earth conductors.
- Standardised locking system with sash fastener.
- Internally concealed door hinge pins with quick-change technology for quick door removal for further processing or exchange of the door hinge.
- Door profile rail with perforations at 25 mm intervals. For the attachment of DIN rails or attachment of cable ducts and wiring.
- Rain channel profile protects against the ingress of water, oil or dirt when the door is opened.
- Internal and external powder coated surface provides an abrasion and corrosion resistant protection (structured surface) in the colour RAL 7035.
- Useful additional equipment for flexible use of the wall-mounting enclosure CS.

Items supplied

- Mounting plate with attachment sundries
- Dummy flange plate with mounting material
- Stoppers for sealing the wall-mounting drill holes
- Attachment material for connection of protective earth connectors
- 1 key

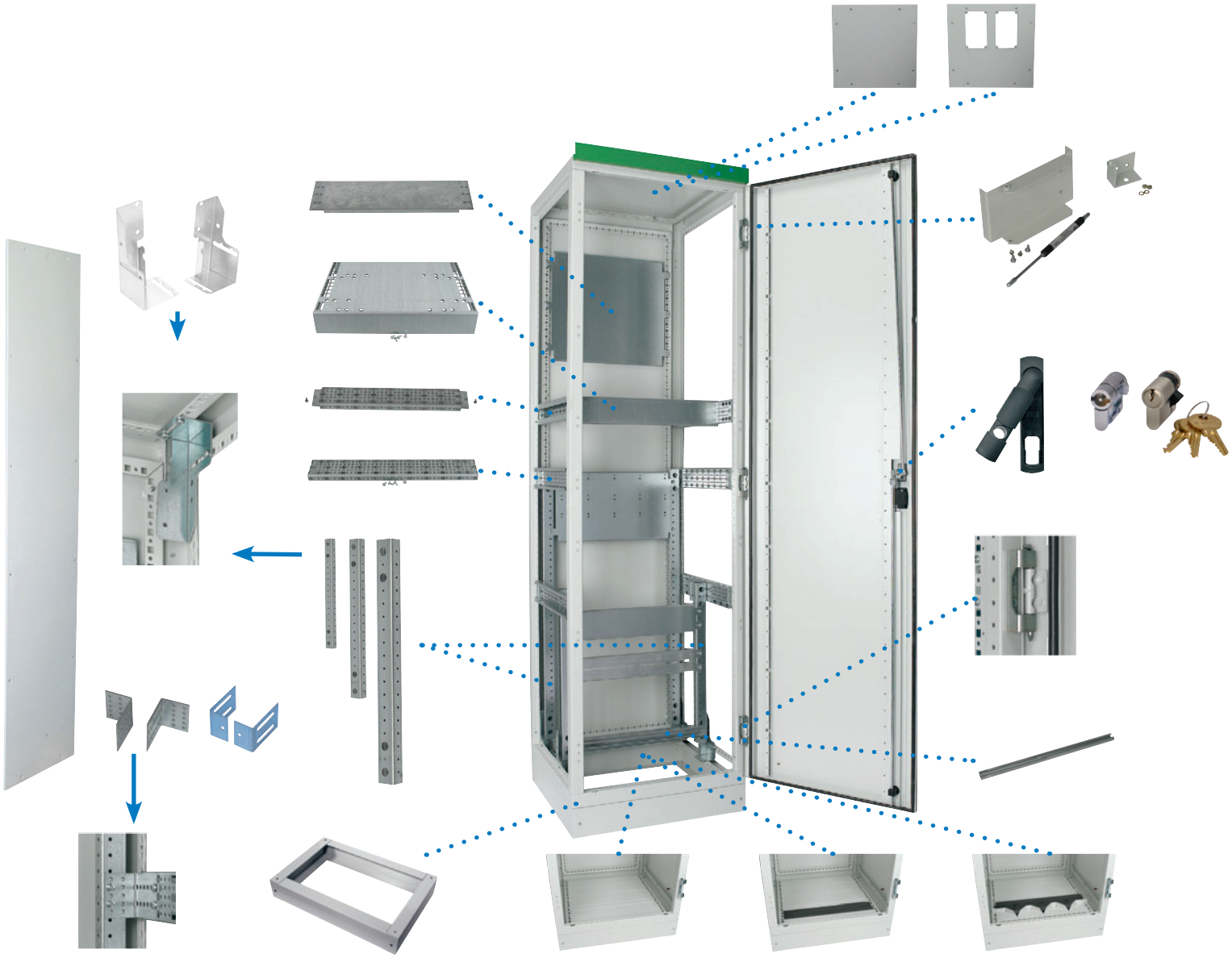
Customized solutions on request

- Other RAL colours
- Cut-outs and drill holes to specification
- Further dimensions between 250 x 200 x 150 mm to 1200 x 1200 x 250 mm

Sheet steel wall-mounting enclosure with mounting plate

	Dimensions [mm]			Locks	Hinges	Part no.
	Height	Width	Depth	Quantity	Quantity	
	250	200	150	1	2	CS-2520/150
	300	200	150	1	2	CS-32/150
	300	300	150	1	2	CS-33/150
	300	300	200	1	2	CS-33/200
	300	400	200	1	2	CS-34/200
	400	300	150	1	2	CS-43/150
	400	300	200	1	2	CS-43/200
	400	400	150	1	2	CS-44/150
	400	400	200	1	2	CS-44/200
	400	600	200	1	2	CS-46/200
	400	600	250	1	2	CS-46/250
	400	600	300	1	2	CS-46/300
	500	400	150	2	2	CS-54/150
	500	400	200	2	2	CS-54/200
	500	400	250	2	2	CS-54/250
	500	500	250	2	2	CS-55/250
	600	400	150	2	2	CS-64/150
	600	400	200	2	2	CS-64/200
	600	400	250	2	2	CS-64/250
	600	500	150	2	2	CS-65/150
	600	500	200	2	2	CS-65/200
	600	500	250	2	2	CS-65/250
	600	600	200	2	2	CS-66/200
	600	600	250	2	2	CS-66/250
	600	600	300	2	2	CS-66/300
	600	800	300	2	2	CS-68/300
	700	500	200	2	2	CS-75/200
	700	500	250	2	2	CS-75/250
	800	400	200	2	3	CS-84/200
	800	400	250	2	3	CS-84/250
	800	600	200	2	3	CS-86/200
	800	600	250	2	3	CS-86/250
	800	600	300	2	3	CS-86/300
	800	800	200	2	3	CS-88/200
	800	800	300	2	3	CS-88/300
	1000	600	250	3P	3	CS-106/250
	1000	600	300	3P	3	CS-106/300
	1000	800	250	3P	3	CS-108/250
	1000	800	300	3P	3	CS-108/300
	1200	600	250	3P	3	CS-126/250
	1200	800	300	3P	3	CS-128/300
	Wall-mounting angle set					WFB-SET-CS
	Locks with inserts					LCM3-CS
						LCM5-CS
						LCMZ-CS

3P: 3-Point-Locking-System



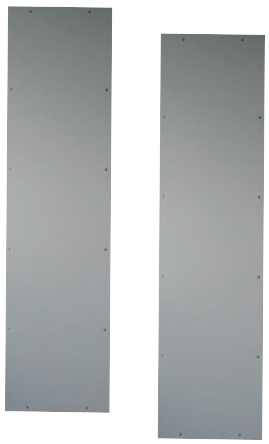
Side-by-side mountable distribution board XVTL – The universal genius from Eaton Moeller

The side-by-side mountable distribution board XVTL is the newest member of the xBoard family from Eaton Moeller. As a stand-alone enclosure it is ideally suited for control and energy distribution in industrial and functional buildings. The degrees of protection IP40 and IP55 are available.
The absolute highlight of the side-by-side mountable distribution board is the vast number of possible variants up to 2500 A unknown up to now. With 55 enclosure dimensions available – heights from 1400 to 2000 mm, widths from 425 to 1200 mm as well as depths from 300 to 800 mm – the right enclosure is available for every application.

XVTL-BF basic equipment fragment consisting of frame, rear panel, door and top cover

Dimensions [mm]			Part no.		Dimensions [mm]			Part no.	
Height	Width	Depth	IP40	IP55	Height	Width	Depth	IP40	IP55
1400	600	300	XVTL-BF-6/3/14	XVTL-MP/BF-6/3/14	2000	425	300	XVTL-BF-4/3/20	XVTL-MP/BF-4/3/20
1600	425	300	XVTL-BF-4/3/16	XVTL-MP/BF-4/3/16	2000	425	400	XVTL-BF-4/4/20	XVTL-MP/BF-4/4/20
1600	600	300	XVTL-BF-6/3/16	XVTL-MP/BF-6/3/16	2000	425	500	XVTL-BF-4/5/20	XVTL-MP/BF-4/5/20
1600	600	400	XVTL-BF-6/4/16	XVTL-MP/BF-6/4/16	2000	425	600	XVTL-BF-4/6/20	XVTL-MP/BF-4/6/20
1600	600	600	XVTL-BF-6/6/16	XVTL-MP/BF-6/6/16	2000	425	800	XVTL-BF-4/8/20	XVTL-MP/BF-4/8/20
1600	800	300	XVTL-BF-8/3/16	XVTL-MP/BF-8/3/16	2000	600	300	XVTL-BF-6/3/20	XVTL-MP/BF-6/3/20
1600	800	400	XVTL-BF-8/4/16	XVTL-MP/BF-8/4/16	2000	600	400	XVTL-BF-6/4/20	XVTL-MP/BF-6/4/20
1600	800	600	XVTL-BF-8/6/16	XVTL-MP/BF-8/6/16	2000	600	500	XVTL-BF-6/5/20	XVTL-MP/BF-6/5/20
1600	1000	300	XVTL-BF-10/3/16	XVTL-MP/BF-10/3/16	2000	600	600	XVTL-BF-6/6/20	XVTL-MP/BF-6/6/20
1600	1000	400	XVTL-BF-10/4/16	XVTL-MP/BF-10/4/16	2000	600	800	XVTL-BF-6/8/20	XVTL-MP/BF-6/8/20
1600	1000	600	XVTL-BF-10/6/16	XVTL-MP/BF-10/6/16	2000	800	300	XVTL-BF-8/3/20	XVTL-MP/BF-8/3/20
1600	1200	300	XVTL-BF-12/3/16	XVTL-MP/BF-12/3/16	2000	800	400	XVTL-BF-8/4/20	XVTL-MP/BF-8/4/20
1600	1200	400	XVTL-BF-12/4/16	XVTL-MP/BF-12/4/16	2000	800	500	XVTL-BF-8/5/20	XVTL-MP/BF-8/5/20
1600	1200	600	XVTL-BF-12/6/16	XVTL-MP/BF-12/6/16	2000	800	600	XVTL-BF-8/6/20	XVTL-MP/BF-8/6/20
1800	600	300	XVTL-BF-6/3/18	XVTL-MP/BF-6/3/18	2000	800	800	XVTL-BF-8/8/20	XVTL-MP/BF-8/8/20
1800	600	400	XVTL-BF-6/4/18	XVTL-MP/BF-6/4/18	2000	1000	300	XVTL-BF-10/3/20	XVTL-MP/BF-10/3/20
1800	600	500	XVTL-BF-6/5/18	XVTL-MP/BF-6/5/18	2000	1000	400	XVTL-BF-10/4/20	XVTL-MP/BF-10/4/20
1800	600	600	XVTL-BF-6/6/18	XVTL-MP/BF-6/6/18	2000	1000	500	XVTL-BF-10/5/20	XVTL-MP/BF-10/5/20
1800	800	300	XVTL-BF-8/3/18	XVTL-MP/BF-8/3/18	2000	1000	600	XVTL-BF-10/6/20	XVTL-MP/BF-10/6/20
1800	800	400	XVTL-BF-8/4/18	XVTL-MP/BF-8/4/18	2000	1000	800	XVTL-BF-10/8/20	XVTL-MP/BF-10/8/20
1800	800	500	XVTL-BF-8/5/18	XVTL-MP/BF-8/5/18	2000	1200	300	XVTL-BF-12/3/20	XVTL-MP/BF-12/3/20
1800	800	600	XVTL-BF-8/6/18	XVTL-MP/BF-8/6/18	2000	1200	400	XVTL-BF-12/4/20	XVTL-MP/BF-12/4/20
1800	1000	300	XVTL-BF-10/3/18	XVTL-MP/BF-10/3/18	2000	1200	500	XVTL-BF-12/5/20	XVTL-MP/BF-12/5/20
1800	1000	400	XVTL-BF-10/4/18	XVTL-MP/BF-10/4/18	2000	1200	600	XVTL-BF-12/6/20	XVTL-MP/BF-12/6/20
1800	1000	500	XVTL-BF-10/5/18	XVTL-MP/BF-10/5/18	2000	1200	800	XVTL-BF-12/8/20	XVTL-MP/BF-12/8/20
1800	1000	600	XVTL-BF-10/6/18	XVTL-MP/BF-10/6/18					
1800	1200	300	XVTL-BF-12/3/18	XVTL-MP/BF-12/3/18					
1800	1200	400	XVTL-BF-12/4/18	XVTL-MP/BF-12/4/18					
1800	1200	500	XVTL-BF-12/5/18	XVTL-MP/BF-12/5/18					
1800	1200	600	XVTL-BF-12/6/18	XVTL-MP/BF-12/6/18					

Side panel XVTL-S – including screws



		IP 40	IP 55
For depth (mm)	For height (mm)	Part no.	Part no.
300	1400	XVTL-S-3/14	XVTL-MP/S-3/14
300	1600	XVTL-S-3/16	XVTL-MP/S-3/16
300	1800	XVTL-S-3/18	XVTL-MP/S-3/18
300	2000	XVTL-S-3/20	XVTL-MP/S-3/20
400	1600	XVTL-S-4/16	XVTL-MP/S-4/16
400	1800	XVTL-S-4/18	XVTL-MP/S-4/18
400	2000	XVTL-S-4/20	XVTL-MP/S-4/20
500	1800	XVTL-S-5/18	XVTL-MP/S-5/18
500	2000	XVTL-S-5/20	XVTL-MP/S-5/20
600	1600	XVTL-S-6/16	XVTL-MP/S-6/16
600	1800	XVTL-S-6/18	XVTL-MP/S-6/18
600	2000	XVTL-S-6/20	XVTL-MP/S-6/20
800	2000	XVTL-S-8/20	XVTL-MP/S-8/20
Also available for order in pairs. Simply extend the type designation by "-pair" (e.g. XVTL-S-3/14-PAIR)			

Snap fit fastener

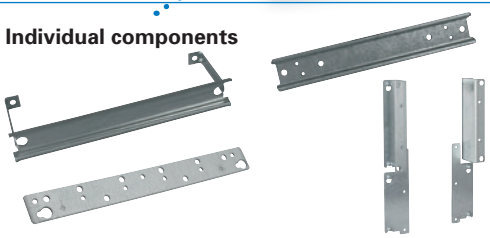
Insulated covers
Different insulated covers for covering of device mounts or reserve slots for 1, 2 or 4 installation sections.

Base enclosure
The range of types incorporates the industrial enclosure series with degree of protection IP54 or IP55 and a series with IP30 for residential and functional buildings.

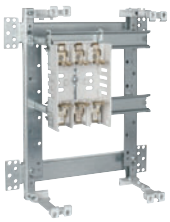
Support system

Insulated support brackets

Individual components



Mounting accessories



GSTA00 Clip mounting unit

Terminal mounting unit

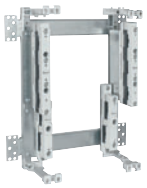
Side by side terminal mounting unit

M.C.B. mounting unit

Top hat rail mounting unit

Meter mounting unit

Mounting panel mounting unit



SASY60i busbar system

The service distribution board IVS for those in a hurry

The IVS service distribution system is designed for power distribution up to 630 A and stands out as a safe and economic power distribution in industry, in buildings and in commercial applications.
The range features wall mounted and floor-standing enclosures each with degree of protection IP30 and IP54/ IP55. The high level of enclosure standardisation enables a particularly fast installation: The installation space of the control panel is subdivided into common sections of size 250x375 mm. Particularly well arranged is the planning of the control panel and ordering the parts.
The electrical specialist has full flexibility in the design of the distribution system. The link between the enclosure and the mounting units is the support system with insulated support brackets. After removing the covers and opening the quick coupling, the support system can be easily removed without intricate removal of the screw connections.
Insulated covers protected against accidental contact close off the mounting unit safely.
A whole range of mounting units – which are designed to accommodate original Eatoen Moeller switching and protection devices - can be quickly and easily fitted. Here too the IEC EN 60439-1 "Type-tested low-voltage switchgear assemblies" standard applies in the manufacture.

Cabinets for IVS distribution boards

Overview

Panel	Wall	Standing	Side-by-side	Rated operational current I_e [A]	SK I	IP30	IP54 [1] IP55 [2]	RAL 7035	RAL 9016
BP-O	■			630	■	■		■	■
BPM-O	■			630	■		■ [1]	■	
BP-F		■		630	■	■		■	■
BPM-F		■		630	■		■ [1]	■	
XVTL-MP			■	630	■		■ [2]	■	

The standard which applies for manufacture: IEC EN 60439-1 "Type-tested low-voltage switchgear assemblies"
For compliance to protection class I (grounded) the appropriate standards for the manufacture of switchgear combinations must be observed!

Sheet steel wall-mounting distribution boards

Width / external height / depth (mm)	Part no.	
Light grey	IP30	IP 54
600 / 510 / 262	BP-O-600/4,5-IVS	BPM-O-600/4,5-IVS
600 / 1060 / 262	BP-O-600/10-IVS	BPM-O-600/10-IVS
600 / 1260 / 262	BP-O-600/12-IVS	BPM-O-600/12-IVS
830 / 1060 / 262	BP-O-830/10-IVS	BPM-O-830/10-IVS
830 / 1260 / 262	BP-O-830/12-IVS	BPM-O-830/12-IVS
Traffic white IP30 has the supplement "-W" for the type designation (e.g.: BP-O-600/4,5-IVS-W)		
Wall-mounting bracket (set consisting of 4 pcs.)	BPZ-WAB	

Sheet steel floor-standing distribution board

Width / external height / depth (mm)	Part no.	
Light grey	IP30	IP 54
400 / 1760 / 300	BP-F-400/17/3-P-IVS	BPM-F-400/17/3-P-IVS
400 / 2060 / 300	BP-F-400/20/3-P-IVS	BPM-F-400/20/3-P-IVS
600 / 1760 / 300	BP-F-600/17/3-P-IVS	BPM-F-600/17/3-P-IVS
600 / 2060 / 300	BP-F-600/20/3-P-IVS	BPM-F-600/20/3-P-IVS
830 / 1760 / 300	BP-F-830/17/3-P-IVS	BPM-F-830/17/3-P-IVS
830 / 2060 / 300	BP-F-830/20/3-P-IVS	BPM-F-830/20/3-P-IVS
1200 / 1760 / 300	BP-F-1200/17/3-P-IVS	BPM-F-1200/17/3-P-IVS
1200 / 2060 / 300	BP-F-1200/20/3-P-IVS	BPM-F-1200/20/3-P-IVS
Traffic white IP30 has the supplement "-W" for the type designation (e.g.: BP-F-400/17/3-P-IVS-W)		

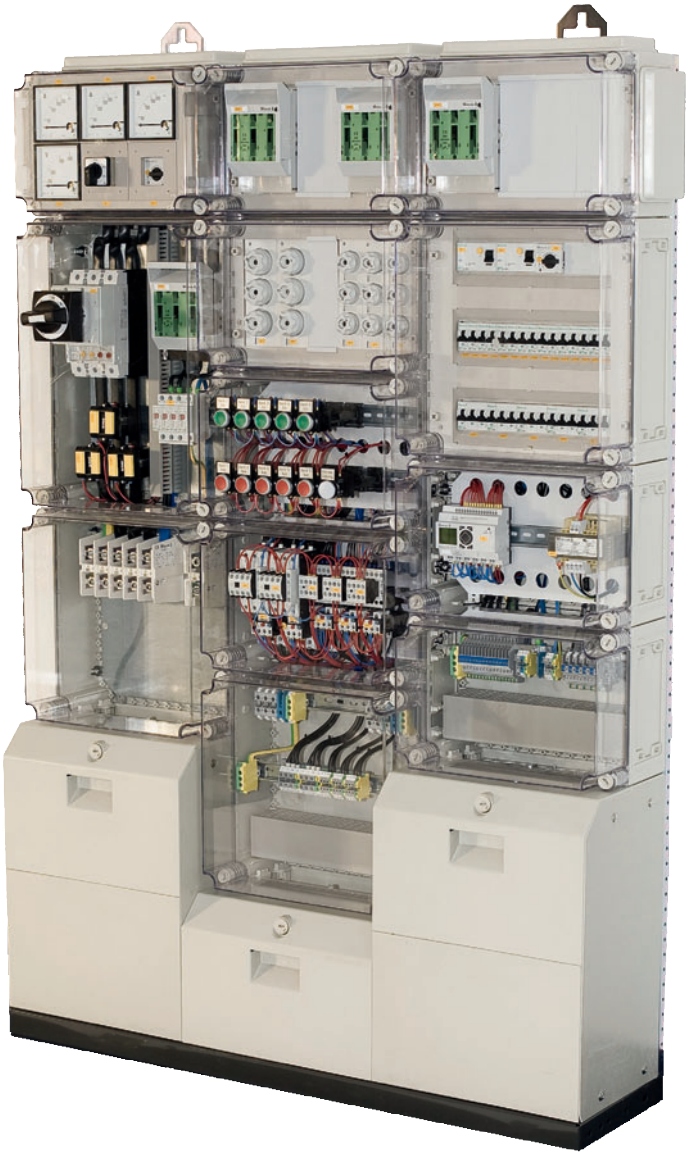
Sheet steel side-by-side mountable distribution board – for industrial applications – IP55

Width / external height / depth (mm)	Part no.
425 / 1600 / 300	XVTL-MP/BF-4/3/16-IVS
425 / 2000 / 300	XVTL-MP/BF-4/3/20-IVS
600 / 1600 / 300	XVTL-MP/BF-6/3/16-IVS
600 / 2000 / 300	XVTL-MP/BF-6/3/20-IVS
800 / 1600 / 300	XVTL-MP/BF-8/3/16-IVS
800 / 2000 / 300	XVTL-MP/BF-8/3/20-IVS
1200 / 1600 / 300	XVTL-MP/BF-12/3/16-IVS
1200 / 2000 / 300	XVTL-MP/BF-12/3/20-IVS
425 / 1600 / 400	XVTL-MP/BF-4/4/16-IVS
425 / 2000 / 400	XVTL-MP/BF-4/4/20-IVS
600 / 1600 / 400	XVTL-MP/BF-6/4/16-IVS
600 / 2000 / 400	XVTL-MP/BF-6/4/20-IVS
800 / 1600 / 400	XVTL-MP/BF-8/4/16-IVS
800 / 2000 / 400	XVTL-MP/BF-8/4/20-IVS
1200 / 1600 / 400	XVTL-MP/BF-12/4/16-IVS
1200 / 2000 / 400	XVTL-MP/BF-12/4/20-IVS

Mounting accessories IVS

Mounting units IVS	Part no.
M.c.b. mounting unit	AE3-1F-45-IVS
Top hat rail mounting unit	CE3-1F-110-IVS
Side by side terminal mounting unit	RKE2-1F-110-IVS
Mounting panel mounting unit	MPE3-1F-V-IVS
Mounting panel mounting unit	MPE-2FW-170-IVS
Klemmstein mounting unit	KLE-1F-110-IVS
Klemmstein mounting unit	KLE-1F-140-IVS
GSTA00 Clip mounting unit	CL00-1F-110-IVS
Meter mounting unit	ZPE-1F-IVS
Bus mounting base mounting unit	SASY-RSLTS-IVS
NH00 mounting unit	SASY-GST00-IVS
NH1 mounting unit	SASY-GST1-IVS
NH2 mounting unit	SASY-GST2-IVS
3-pole support plate kit	Z-IVS-TPSET/3P
2-pole support plate kit	Z-IVS-TPSET/2P
3-pole busbar support	BBS-3/FL
2-pole busbar support	BBS-2/FL

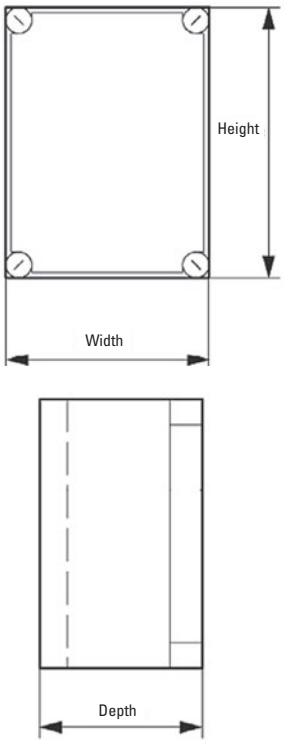
Side panel XVTL-MP/S (IP55) 1 pair – including screws **see page 259**

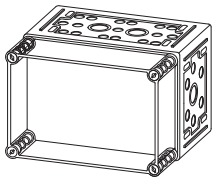


CI insulated distribution boards – insulated distribution boards for the most harsh ambient conditions

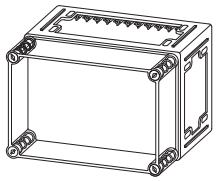
The CI system demonstrates its flexibility during assembly. Whether as individual enclosures, wall mounted enclosures or floor-standing enclosures of different sizes, the CI distribution units in box-type assembly up to 630 A always provide the optimum solution.
Production processes – regardless or whether they are in a mine or steel mill, in the food or chemical industry – stand and fail with the distribution of energy. Low-voltage power distribution systems must always function reliably – a safe bet with the Eaton Moeller CI system insulated enclosures. Total isolation ensures optimum protection of persons and operational reliability: This prevents direct touching of active parts and simultaneously prevents external damaging influences, such as water jets, dust or aggressive vapours.

CI enclosure components are especially suited to exposed areas thanks to their high degree of protection (IP 65) and their glass-fibre-reinforced carbonate composition.
Some of its special features are a cover that is lifted via spring-loaded master pins for pressure release, a transparent cover for an optimum view, and a base cover to interconnect, attach, and cover large cable cross-sections in the floor-standing distribution box.
CI totally insulated moulded-case distributors are type-tested switchgear combinations (TSK) pursuant to DIN VDE 0660 part 500, or type-tested assemblies (TTA) to IEC 60 439. For all popular applications, the CI program from Eaton Moeller offers pre-assembled enclosures as type-tested functional units.

Enclosure dimensions	Dimensions [mm]			Enclosure wall	Part no. enclosure	Part no. mounting plate
	Width	Height	Depth			
	187.5	250	150	E	**CI23E-125**	**M3-CI23**
			175		**CI23E-150**	**M3-CI23**
			150		**CI23-125**	**M3-CI23**
			175		**CI23-150**	**M3-CI23**
	375	250	150	E	**CI43E-125**	**M3-CI43**
			175		**CI43E-150**	**M3-CI43**
			225		**CI43E-200**	**M3-CI43**
			150		**CI43-125**	**M3-CI43**
			175		**CI43-150**	**M3-CI43**
			225		**CI43-200**	**M3-CI43**
	375	375	150	E	**CI44E-125**	**M3-CI44**
			175		**CI44E-150**	**M3-CI44**
			225		**CI44E-200**	**M3-CI44**
			275		**CI44E-250**	**M3-CI44**
			150		**CI44-125**	**M3-CI44**
			175		**CI44-150**	**M3-CI44**
			225		**CI44-200**	**M3-CI44**
			275		**CI44-250**	**M3-CI44**
	375	500	225	E	**CI45E-200**	**M3-CI45**
			225		**CI45-200**	**M3-CI45**
	375	750	225		**CI48-200**	**M3-CI48**
			275		**CI48-250**	**M3-CI48**

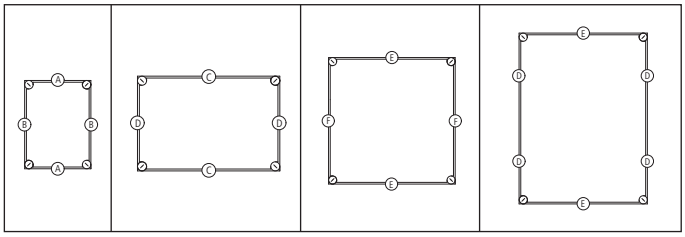


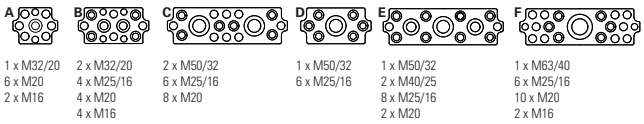
Individual enclosure (CI…E-..)
– Metric knock-outs in all side panels
– All side panels can also be knocked out over a large area
– Quick conversion of individual enclosures in the distribution enclosure



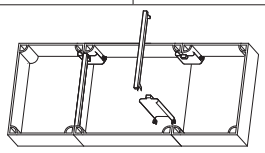
Distribution enclosure CI…-…
– Open horizontal enclosure panels
– Vertical enclosure panels can be knocked out over a large area
– Suitable to implementing CI distribution systems

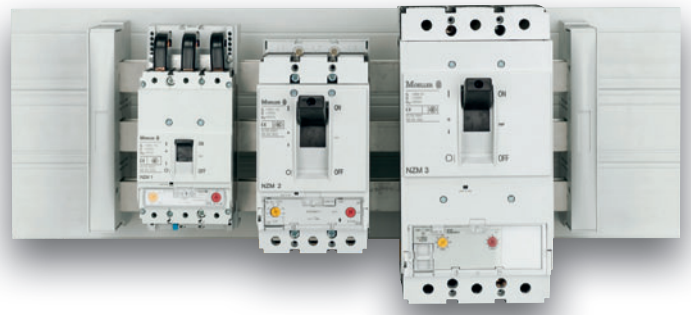
Side panels





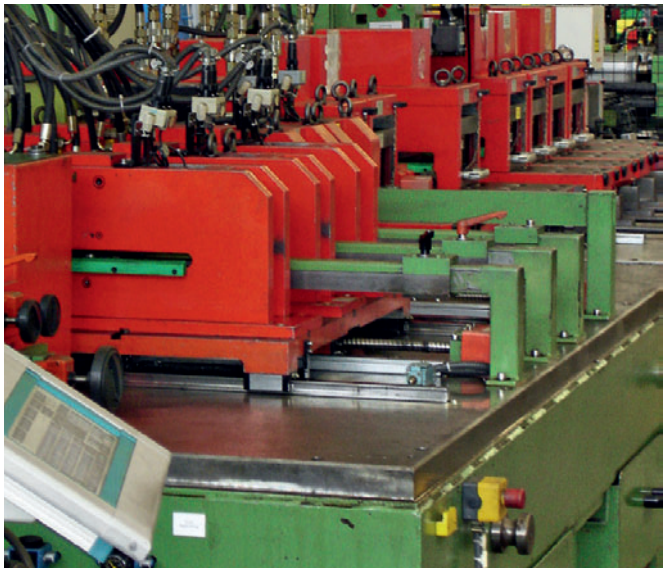
Accessories

Flange	Enclosure dimensions	375 mm			250 mm	187,5 mm
	Part no.	**FL4-X**			**FL3-X**	**FL2-X**
Connection kits for interconnection of enclosures to one another, including wedging	Enclosure dimensions	187.5 mm	250 mm	500 mm	375 mm	750 mm
	Part no.	**BS2-CI**	**BS3-CI**	**2 x BS3-CI**	**BS4-CI**	**2 x BS4-CI**
Cross-strut kits enables the insertion of cables or busbars from the front	Enclosure dimensions	250 mm		375 mm		
	Part no.	**STB3-CI**		**STB4-CI**		
Fixing strap kits • For the direct attachment of CI enclosures to the wall • Max. 4 enclosures CI43…	One kit contains 4 straps.					
	BL-CI					
Spacers • For raising the installation system • Required 4 off for mounting plate, 2 off for mounting rail	Clearance	25 mm		50 mm	10 mm	15 mm
	Part no.	**HS25-CI**		**HS50-CI**	**ADT200-190**	**ADT125-110**



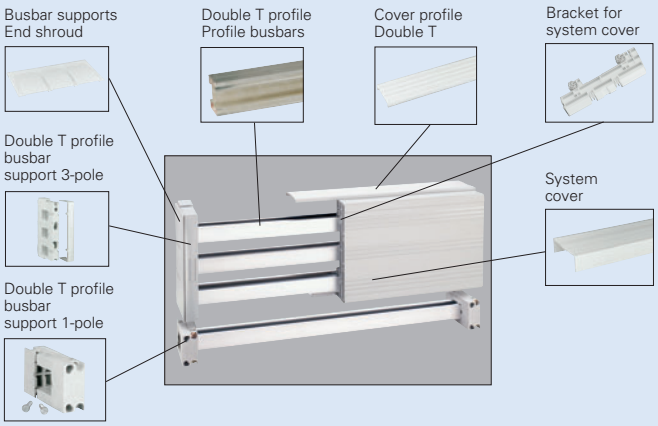
Innovative busbar system SASY60i

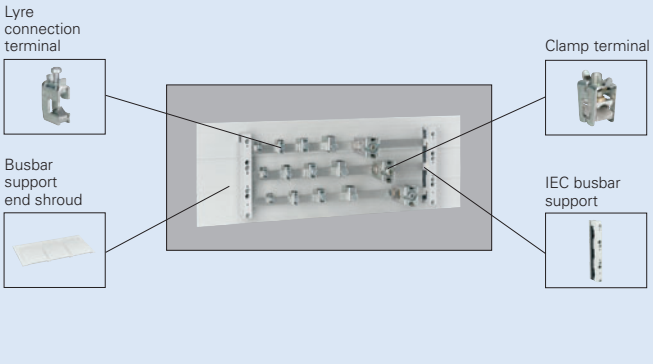
The SASY 60i busbar system including its system components is designed for worldwide use in switch cabinets in machine and system building. Its design has even taken into account the greater clearance and creepage distances that must be observed in the U.S. for compliance to UL 508A.
For busbar applications that have not been type-tested UL508A allows an ampacity of 1000 A/Inch^2 (1.55 A/mm^2). This value may be higher if the product or the application has been tested accordingly. Eaton Moeller has conducted extensive tests for the user's maximum benefit in using SASY 60i busbar systems. The advantage of such tests is that one can use busbar systems designed for higher rated currents than the default value allows. Busbar assembly of size 30 x 10 mm for example can be charged with 630 A instead of just 465 A.
Since SASY 60i requires fewer system components, the need to stock parts and to place orders is diminished with the new Eaton Moeller busbar system.
When it comes to power distribution up to 630 A in control panels, the SASY60i has shown us what an optimum solution it is.

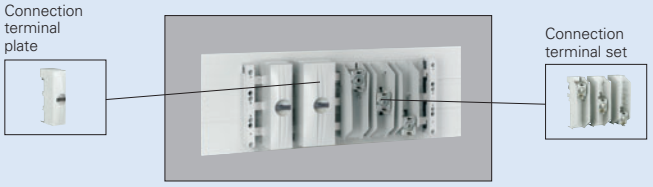


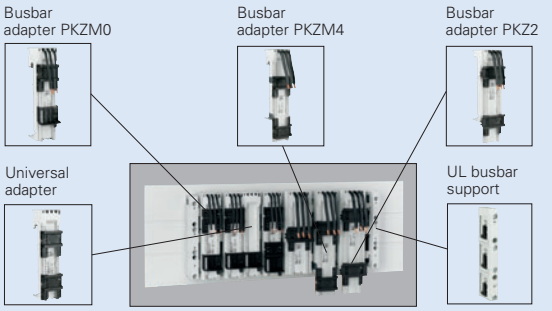
SASY60i for punching and profiling machines

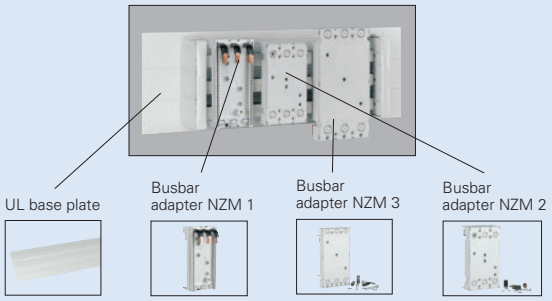
STS Steuerungstechnik Schmidt uses Eaton Moeller's SASY60i modular busbar system because of the quality and the customer acceptance. The modular busbar system offers many advantages. For example, the SASY60i uses double T profiled busbar and thus reduces the effort required for preparing the contact points.
At an extremely high impulse withstand current I_{pk} the profile only requires a few busbar supports and optimally uses limited space in the switching cabinet. The large surface of the busbar profile allows optimum heat dissipation. Thanks to the standard rail to rail spacing of 60 mm, the system is compatible with other mounted components such as busbar mounting fuses or LV h.b.c fuse switch disconnectors.

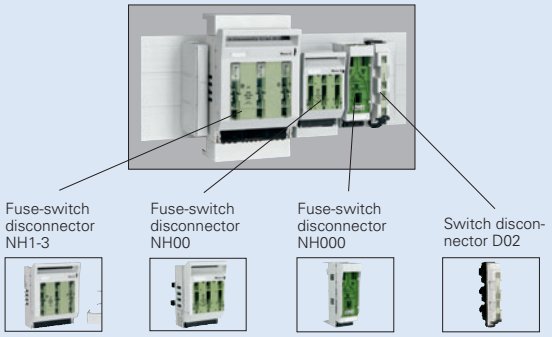












Innovative SASY 60i busbar system provides highest

The benefits of SASY60i at a glance

- World-wide application in control panels in machines and systems

- Double T supports: Almost free positioning options for the design components as a very high peak withstand current requires less supports – Compatible to other design components through the use of market standard interval between busbar centres of 60 mm

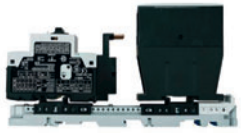
- Optimum protection against direct contact through modular system shrouds for maximum safety

- Very safe establishment of contacts and low mounting effort and expense using comfortable connections on the rear

- Pre-mounted complete units save mounting times and costs – The reduction of the adapter width simplifies the some combinations and saves space in the control panel

- Double T profiled busbars: Reduced effort for the preparation of contact points – Good conduction of dissipated heat along large surface of the busbars

- Low assembly costs through matching to Eaton Moeller combination enclosures (e.g. XVTL) – Adapters are connected to motor protection and circuit-breakers comfortably and without the need to drill holes up to 630 A directly on the busbars



- Special functionality's with the component adapter – Mounting ability on variable busbar thickness' and profiles

Busbar supports					
	Number of poles	**Max. rated operational current I_e (A)**	**Special features**	**Use**	**Part no.**
	3	630	With slider to adapt to the respective busbar size	12 x 5/10 15 x 5/10 20 x 5/10 25 x 5/10 30 x 5/10	**BBS-3/FL**
	3	630	With slider to adapt to the respective busbar size	12 x 5/10 20 x 5/10 30 x 5/10	**BBS-3/FL-NA**
	2	630	With slider to adapt to the respective busbar size	12 x 5/10 15 x 5/10 20 x 5/10 25 x 5/10 30 x 5/10	**BBS-2/FL**

efficiency in the control panel

Busbar supports					
	Number of poles	Max. rated operational current I_e (A)	Special features	Use	Part no.
	3	1600	Suitable as outside and centre support	Double T profile	**BBS-3/PR**
		1250	Tinned cross-section 500 mm²	For support BBS-3/ PR and BBS-1/PR	**CU-BAR-500/T**
		1600	Tinned cross-section 720 mm²	For support BBS-3/ PR and BBS-1/PR	**CU-BAR-720/T**

Busbar shrouds		
	Use	Part no.
	12 x 5 15 x 5 20 x 5 25 x 5 30 x 5	**BBC-FL5**
	12 x 10 15 x 10 20 x 10 25 x 10 30 x 10	**BBC-FL10**
	For double T profile	**BBC-CU-BAR/PR**

Connection terminal plate					
	Number of poles	Max. rated operational current I_e (A)	Conductor type	Use	Part no.
	3	80	1.5 - 16 mm² AWG 16 - AWG 6. stranded round conductor with professionally crimped ferrule Stranded round conductor	12 x 5/10 15 x 5/10 20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**BBA-TP3/16**
	3	300	6 - 50 mm² AWG 10 - AWG 2/0. stranded round conductor with professionally crimped ferrule Stranded round conductor Cu bar 6x9x0.8	12 x 5/10 15 x 5/10 20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**BBA-TP3/50**
	3	440	35 - 120 mm² AWG 2 - MCM 250. stranded round conductor with professionally crimped ferrule Stranded round conductor Cu bar 10x16x0.8	12 x 5/10 15 x 5/10 20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**BBA-TP3/120**

Connection set					
	Number of poles	**Max. rated operational current I_e (A)**	**Conductor type**	**Use**	**Part no.**
	3 x 1	560	120 - 300 mm² MCM300 - MCM600. stranded round conductor with professionally crimped ferrules Stranded round connector Stranded sector conductor	20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**BBA-TP3/300**
	3 x 1	800	Cu bar 10x32x1 Cu busbar 30x25	20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**BBA-TP3/ CU-BAND**
	3 x 1	1600	Up to Cu bar (2x)10x50x1 Cu busbar (2x)50x10	30 x 10 Double T profile	**BBA-TP3/1000**

Clamp terminal					
	Max. rated operational current I_e (A)	**Conductor type**	**Special features**	**Use**	**Part no.**
	500	95 - 185mm² AWG3/0 - MCM350. stranded round conductor with professionally crimped ferrules directly connected Stranded round conductor Stranded sector conductor	Drill hole free connection technology on busbars	20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**AKS185**
	600	150 - 300 mm² MCM300 - MCM600 stranded round conductor with professionally crimped ferrules directly connected Stranded round conductor Stranded sector conductor	Drill hole free connection technology on busbars	20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**AKS300**
	800	Cu-bar 3x20x1 up to 2x(10x32x1) Cu busbar 32x25	Drill hole free connection technology on busbars	20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**AKS-CU-BAND**
	1600	Up to Cu bar (2x)10x50x1 Cu busbar (2x)50x10	Drill hole free connection technology on busbars	20 x 5/10 25 x 5/10 30 x 5/10 double T profile	**AKS1000**

Busbar adapter xStart 25 A							
	Max. rated operational current I_e (A)	**Max. rated operational voltage U_e (V)**	**Conductor cross-section**	**Adapter width**	**Adapter length**	**Use**	**Part no.**
	25	690	AWG12	45	200	PKZM0+ contactor DIL M 7 contactor DIL M 9 contactor DIL M 12 contactor DIL M 15 MSC-D-0,25-M7… to MSC-D-16-M15…	**BBA0-25**

Busbar adapter NZM						
	Max. rated operational current I_e (A)	**Max. rated operational voltage U_e (V)**	**Adapter width**	**Adapter length**	**Use**	**Part no.**
	160	690	90	200	NZM1 PN1 N1 NS1	**NZM1-XAD160**
	250	690	106	190	NZM2 PN2 N2 NS2	**NZM2-XAD250**
	630	690	140	300	NZM3 PN3 N3	**NZM3-XAD630**

Terminal shroud NZM				
	Max. rated operational current I_e (A)	**Max. rated operational voltage U_e (V)**	**Use**	**Part no.**
	250	690	NZM2 PN2 N2 NS2	**NZM2-XKR4**
	550	690	NZM3 PN3 N3	**NZM3-XKR13**

Fuse material							
		Max. rated operational current I_e (A)	**Max. fuse base with 500V/690V in A**	**Size**	**Use**	**Part no.**	
	LV h.b.c fuse switch disconnectors	160	160/100	NH00	20x5/10 25x5/10 30x5/10 double T profile	**GST00-160-40-60-AOU**	
	Touch protection set GST00				GST00...	**BS-SET-GST00**	
	Fuse monitoring GST00	**Rated voltage**	**Size**	**Use**	**Part no.**		
		400-690 V / 50-60 Hz	NH00	GST00...	**GST00-DSI**		

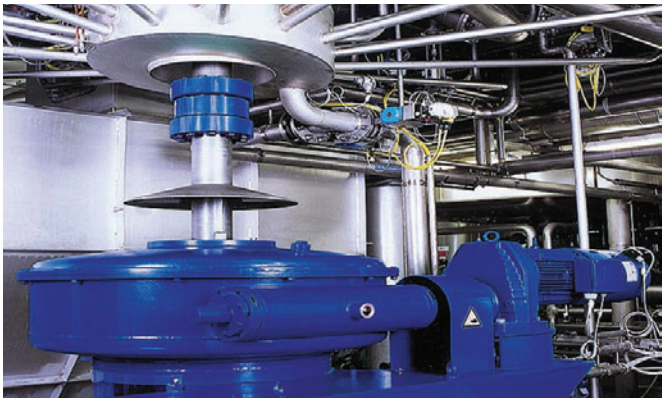
15 kA

to IEC / EN 60947

Protection for All Applications – Safety up to 125 A

Industry, system builders and the trade sector worldwide place their trust in Eaton Moeller products and solutions. Tested quality, approvals and shipping register classifications vouch for the functional scope and reliability of xPole Industrial protective switches being suitable for worldmarkets.

In conjunction with the versatile complete range of modular installation devices and accessories, the user is provided with more options for solving complex technical problems.



When it comes to protection and switching, industry in many countries relies on Eaton Moeller products

Optimum product quality and tested reliability and safety stand for optimum protection of personnel, installations and plant. Approvals in many countries confirm that Eaton Moeller builds its products to comply with the latest national and international Regulations. The high IEC/EN 60947 switching capacity of 15 kA with FAZ and 15 to 25 kA with AZ, as well as effective current limitation and selectivity provide optimum system protection and maximum availability.

Powerful range for machine and system builders

The xPole Industrial FAZ is available with B, C and D characteristic to IEC/EN 60898. An additional special characteristic has become necessary for effective protection, due to the growing proportion of sensitive electronics. The Z characteristic with a short-circuit response current of 2 to 3 x I_n offers a quick-reaction overload protection for this purpose. The K characteristic with a high short-circuit response current of 8 to 12 x I_n prevents nuisance tripping during connection of three-phase loads. The S characteristic with a limited response current of 13 to 17 x I_n has become established in system building.

Flexibility by using modular installation devices

Eaton Moeller offers a broad range of modular installation devices for the control circuit and for switching, as well as for signalling and alarms. All these devices are suitable for DIN-rail mounting and offer tangible installation and wiring benefits for industrial applications.

Lightning and surge protection

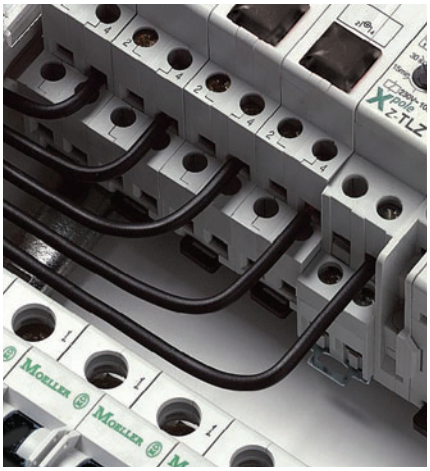
The lightning and surge arrester device SPB-12/280 is a combined lightning and surge arrester (arrester class B+C) in just one space unit.
This world's first complies with required lighting surge currents of protection classes III and IV of the IEC 62305 and thus achieves the required minimum lightning surge current of 12.5 kA per protection circuit compliant to the installation standard IEC 60364-5-53. The overvoltage protection is achieved with a nominal impulse discharge current of 25 kA that greatly exceeds the minimum requirement of 5 kA per protected circuit.

A practical and complete product range

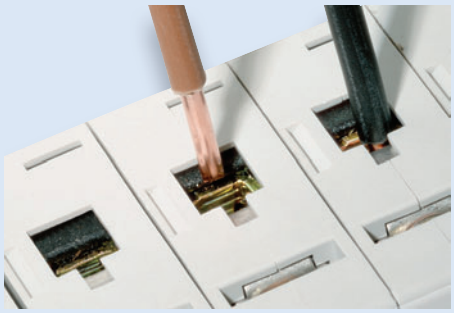
The comprehensive range is complemented by equipment required in industrial installations, such as DIN-rail mounting Schuko sockets, ammeters and voltmeters, power consumption and operational hours counters, as well as analog and digital timers, staircase timers, light intensity switches, buzzers and bells.
Eaton Moeller thus offers the extensive product range for the perfect installation, all from a single source.

All the Benefits for Fitting and Installation from a Single Source

Simpler, quicker, and more wiring space
Particularly in switchgear panel building and in volume production, speed, safety and reliability are of the essence. The components xPole Industrial FAZ from Eaton Moeller with their tried and tested clamping and connection facilities excel in this field. Their compact size of only 80mm height brings clear advantages for wiring, because even with greater conductor cross-sections, here the fitter has additional space at his disposal.



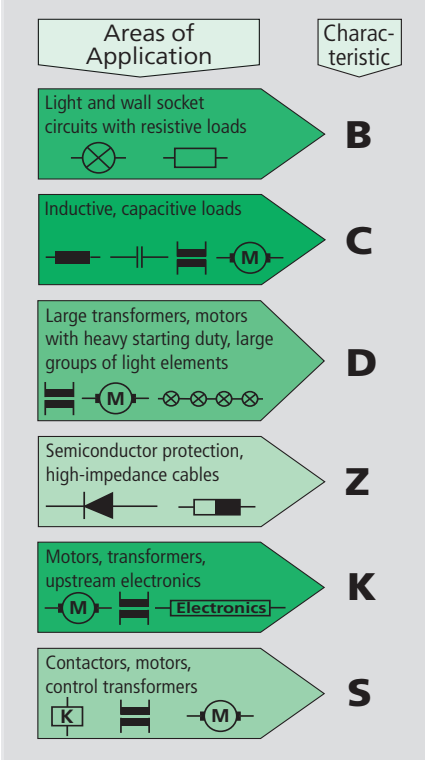
Generous wiring space due to compact 80mm dimension



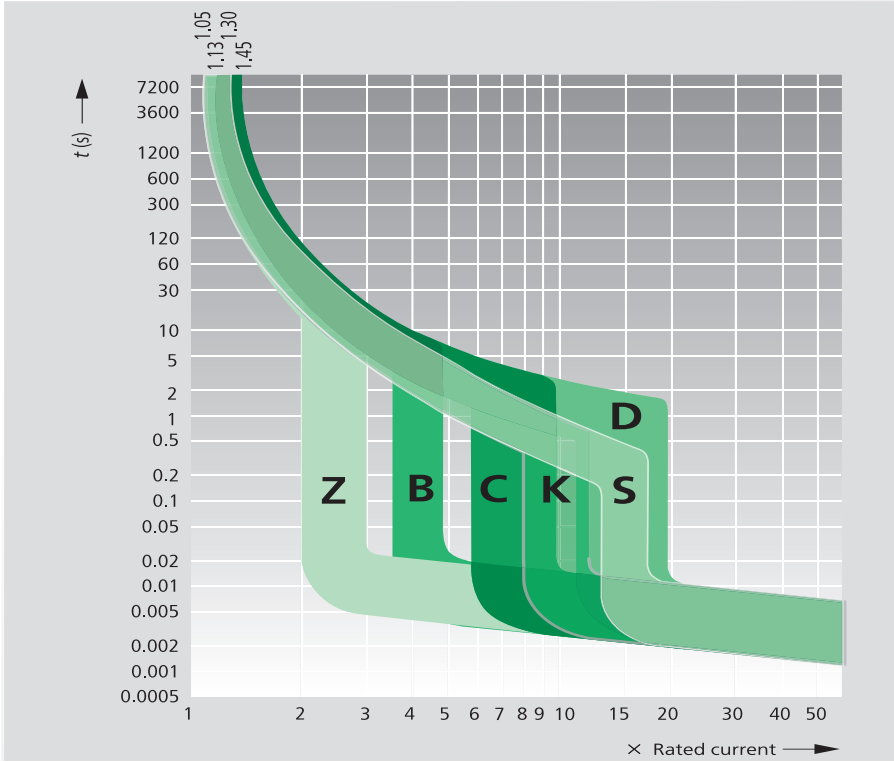
Greater installation security
The new miniature circuit-breakers xPole Industrial FAZ are notably convenient to connect.
The 25mm² lifting terminals have an insulated protector that increases the wiring safety.

Easy to remove from the assembly
The protective switches xPole FAZ are equipped with a special DIN-rail clip that enables the simple removal of individual components from the busbar-mounted assembly without the need to unscrew the whole group of devices. This saves valuable time.

Simple snap-fitting
Auxiliary contact modules, trip-indicating auxiliary contacts or shunt releases can be snap-fitted to the side of the protective devices easily and without tools.



Areas of application



Tripping characteristics of the xPole Industrial FAZ minature circuit-breaker

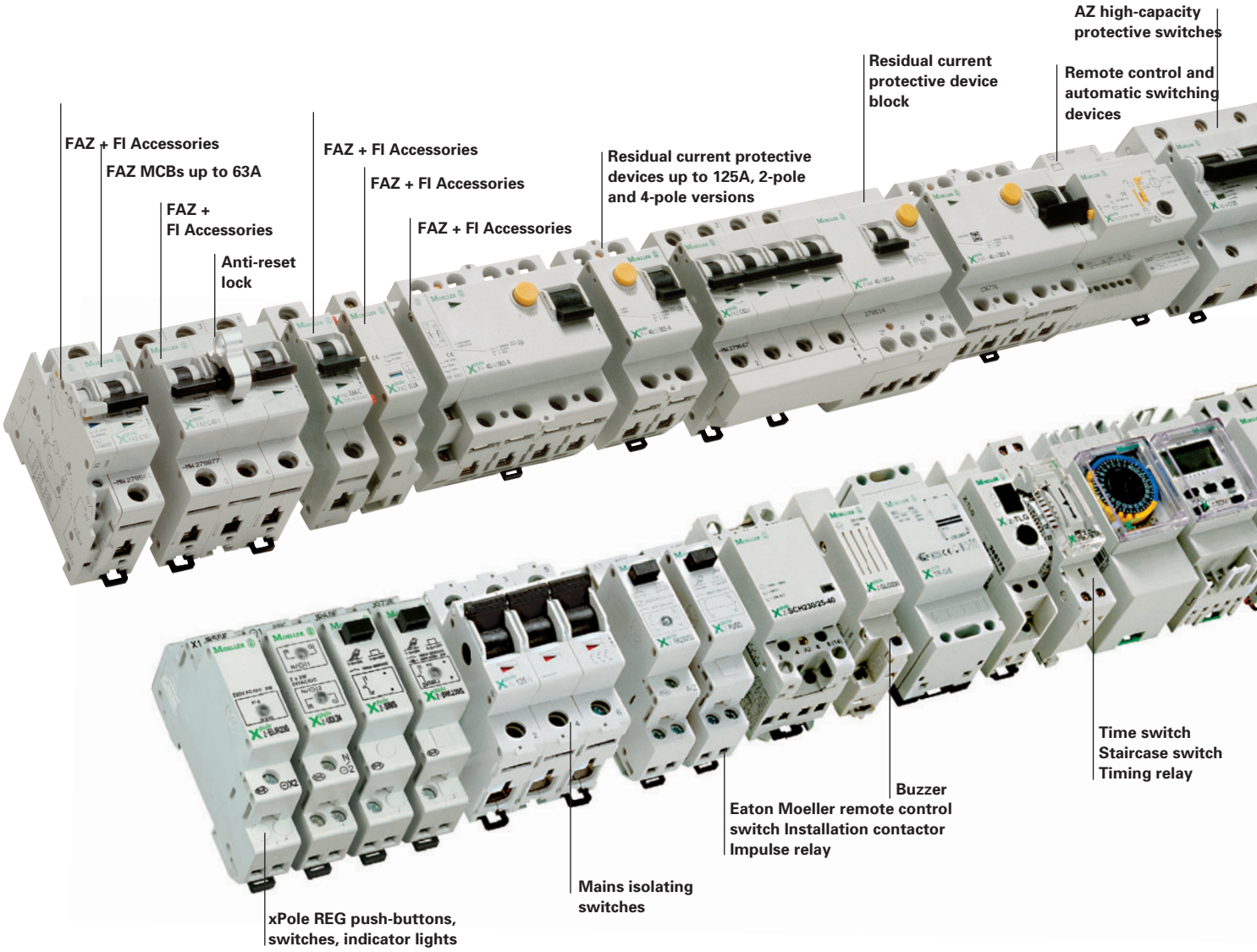
The versatile, individual tripping characteristics offer cable protection, individual device protection and protection in the control circuit.
The high levels of rated switching capacity from 10 to 25 kA, as well as effective current limitation and selectivity ensure optimum system protection and availability.
The B characteristic is utilised in the protection of light and wall socket circuits.
The C characteristic is utilised wherever operational current peaks and other surges occur that must not lead to tripping.
For large transformers, motors with heavy starting duty or extensive groups of light elements, the D characteristic is the correct solution.
The characteristics are available on single- and multi-pole component versions in all the ratings up to 63 A.

Enhanced cable protection at high operational continuity
The K characteristic trips out at short circuits of 8 to 12 times rated current and is utilised wherever operational current peaks and other current surges can occur, but must not cause tripping. Thus it lies in the upper reach of the C and in the lower reach of the D characteristic. This allows motors, capacitors, welding transformers and electronically controlled upstream devices to be connected in the optimum way. The K characteristic from Eaton Moeller offers enhanced cable protection due to its narrower bimetal tripping range for overload protection.

Safety for control circuits
The control circuit protective switch with S characteristic is designed for the protection of control circuits with high inrush currents. At 13 to 17 x I_n, the magnitude of the short-circuit current here lies in a limited band of the D characteristic above the starting peak of the typical control transformer. Thus, unintentional tripping is prevented by the S characteristic device, which is tested to IEC/EN60947-2. Compliant with this Standard, the control circuit protective switch only permits an overload of between 5 and 30%.

Rapid-response protection for electronics
Electronic components and devices can be destroyed by even small current surges. The protective switches xPole Industrial FAZ with Z characteristic trip out instantly even at surges of 2 to 3 times rated current. This property also renders these protective circuitbreakers suitable for the protection of high-impedance cables.

Distribution, Protection, Control: Everything From Power Distribution to the Motor Circuit – All From a Single Supplier



Comprehensive short-circuit and overcurrent protection

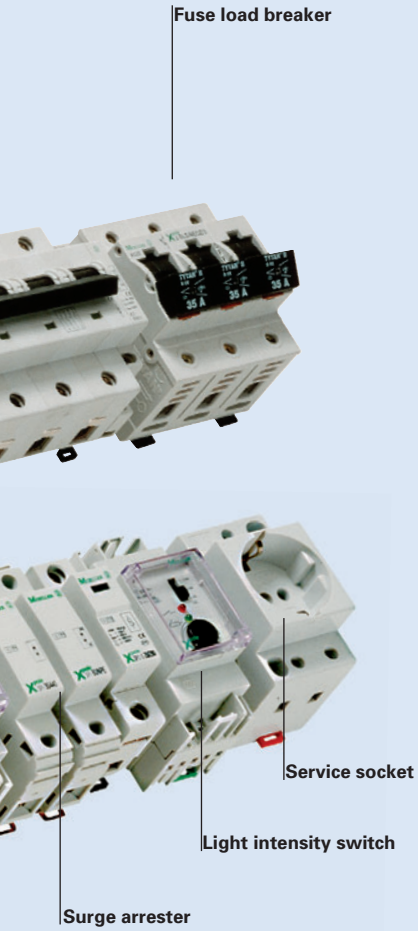
The xPole generation of protective switches meets the stringent demands in terms of switching capacity and range of products. This includes the high-capacity miniature circuit-breaker AZ with a rated current up to 125 A and a switching capacity up to 25 kA as well as the xPole industrial circuit-breaker FAZ with a switching capacity of 15 kA in single and multi-pole versions.
They are armed with all the required test marks and shipping classification certificates necessary for worldwide use. In addition to the Standard tripping characteristics B, C and D, they are also available with the special characteristics Z, K and S.

Comprehensive residual current protection

The range of two-pole and four-pole residual current protective devices for alternating current (Type AC), residual pulsating DC (Type A), AC/DC (Type B) and selectively operating circuit-breakers (Type S) covers virtually all applications of personnel and object protection. A short-time delayed RCCB (type G or KV) also protects against unwanted spurious tripping. Increasing popularity is also enjoyed by application-specific devices, especially for frequency inverters (type U) or X-ray equipment (type R). New to the market is the digital RCCB. Eaton Moeller residual current protective devices are available with rated fault currents from 30 up to 500 mA. Compact two- and four-pole residual current protective switches with rated fault currents from 16 to 125 A allow space-saving installation. In addition, a range of two- and four-pole residual current protective device blocks with rated currents from 63 to 125 A can be fitted retrospectively, enabling combined RCD/MCB devices to be precisely matched to systems and applications.

A comprehensive range of modular installation devices

The availability of devices for remote switching, timing, signalling, protection from overloads, as well as practical wiring accessories, ensures great flexibility.



Type	AC	A	B	S	U
Standard	IEC/ EN61008/61009	IEC/ EN61008/61009 VDE 0664 Part 10	IEC 62423 VDE 0664 Teil 100/Part 200	IEC/ EN61008/1009 VDE 0664 Part 10	IEC/EN61008
Characteristic	AC sensitive	Pulse-current sensitive	sensitive for AC fault currents	Selectively-operating	Inverter-proof
Application range	for AC fault currents	for AC fault currents and pulsating DC fault currents 250A surge withstand current	as well as smooth (to VDE 0664 Part 10) DC fault currents that can occur in 6B bridge circuits, in inverters an medical instruments	Tripping delay: 40 ms 5000A surge withstand current	Are not influenced by leakage currents from main filters in inverters,cause neither nuisance tripping nor failure to trip, selectivity characteristic, 5000A surge withstand current
Regulation	VDE 0100 no	VDE 0100 Part 410 and 700 ff	VDE 0100 Part 410 and 700 ff		
Comment	For export except Germany, Netherlands, Switzerland, Denmark	Mandatory in Germany, Netherlands, Switzerland, Denmark. In other countries for spezial applications, e.g. laboratories, medical instruments, etc.			

Pulse-current sensitive RCCB
The RCCB of Type A to IEC/EN 1008/ 1009 recognises AC fault currents as well as the pulsating DC fault currents occurring in the vicinity of rectifier installations. These switches have a surge withstand strength of 250 A and can be employed in ambient temperatures down to as low as –25°C. Type A is mandatory in Germany.
For systems due to be used in other countries, Type AC is suitable.
It recognises only AC fault currents.

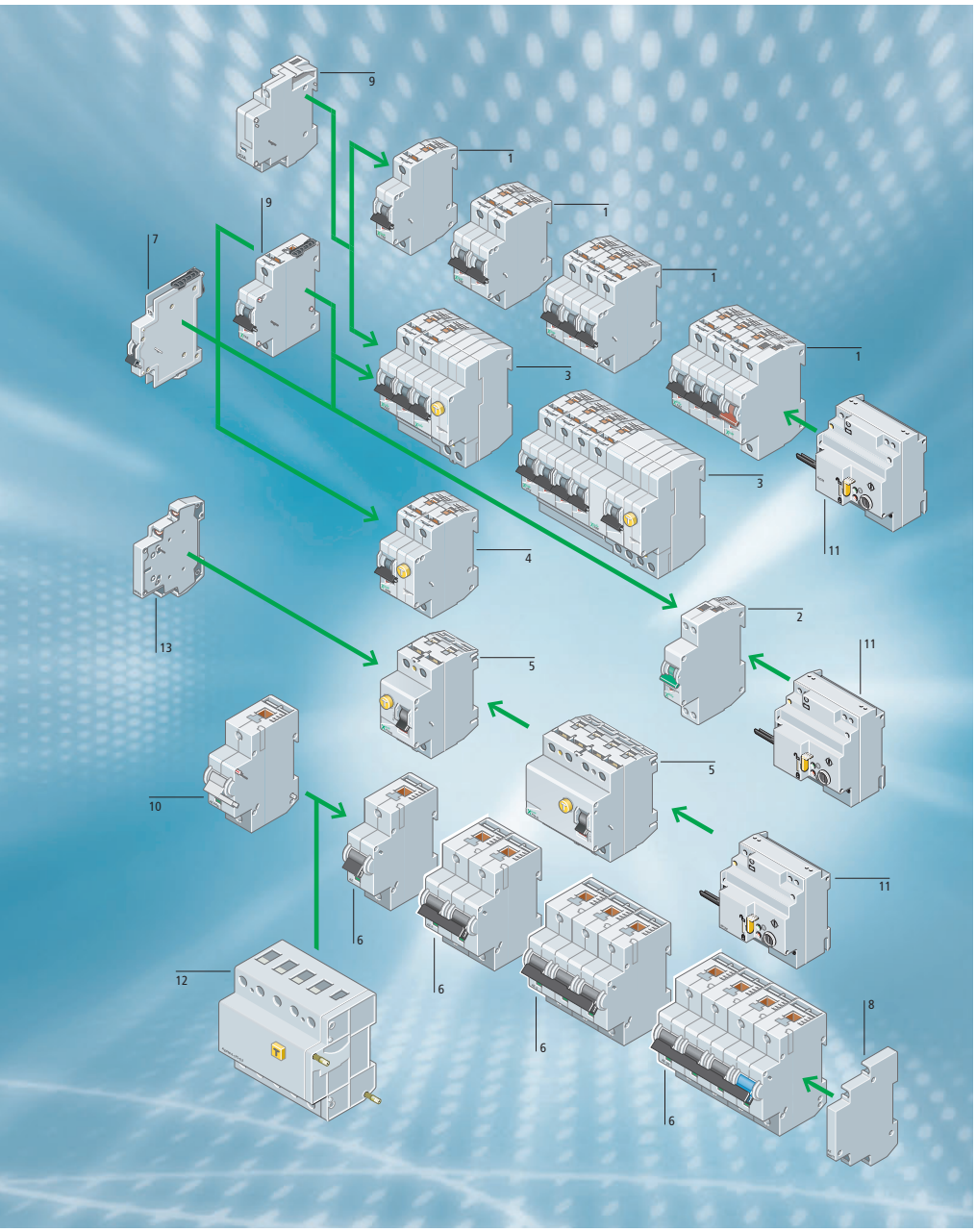
Selectively-operating RCCB
S type RCCBs to IEC/EN 1008/ 1009 offer the option of designing time-selective systems in which only the switch immediately upstream of the fault trips out, while the selective circuit-breaker further up the line does not respond. The operation of neighbouring system parts adjacent to the fault therefore is not interrupted. Selectively-operating switches have surge withstand strength of 5 kA.

Frequency inverter-proof RCCB
U type RCCBs remain unaffected by leakage currents from filters, for example in inverter circuits. Such leakage currents are typically of a frequency range of 100 to 300 Hz and often cause nuisance tripping of RCCBs. While the U type RCCB trips properly in the frequency range around 50 Hz, it is significantly less sensitive in the critical frequency range and thus contributes to better system availability. The U type RCCB has a selective characteristic with surge withstand strength of 5 kA.

AC/DC sensitive RCCB
RCCBs with B characteristic to VDE 0664 Part100 are capable of recognising not only the fault currents of A characteristic components, but also smooth DC fault currents, as well as fault currents of higher frequencies up to 2 kHz. Smooth DC fault currents can occur wherever loads with 6B bridge circuits such as inverters or medical instruments are being used.

Digital – RCCB
Eaton Moeller retains its position as the technology leader and goes even one step further with the digital RCCB. The revolutionary LED display directly on the RCCB issues a warning, before a fault current disables the electrical system. Digital switchgear also communicates with the environment via floating switching contacts. It is not absolutely necessary to go to the service distribution board to obtain information about the respective system status, as for example, an automatic warning is issued at $I_{\Delta} > 0{,}3\ I_{\Delta n}$.

xPole Industrial – a Complete System



1. Miniature circuit-breakers FAZ
2. Miniature circuit-breakers FAZ-PN
3. Residual-current protective modules for fitting to FAZ
4. PKNM combined RCD/MCD device
5. Residual-current circuit-breakers
6. Miniature circuit-breakers AZ
7. Auxiliary contacts FAZ
8. Auxiliary contacts AZ
9. Voltage releases FAZ
10. Voltage releases AZ
11. Remote switching module
12. Trip-indicating auxiliary contacts
13. Residual-current protective modules for fitting to AZ
14. Rail-mounted service installation devices
15. Auxiliary contacts FI

Miniature circuit-breakers

Charac-teristic	Num-ber of poles	Rated current	Part no.
B	1	6 A	**FAZ-B6/1**
B	1	10 A	**FAZ-B10/1**
B	1	16 A	**FAZ-B16/1**
C	1	2 A	**FAZ-C2/1**
C	1	4 A	**FAZ-C4/1**
C	1	6 A	**FAZ-C6/1**
C	1	10 A	**FAZ-C10/1**
C	1	16 A	**FAZ-C16/1**
D	1	6 A	**FAZ-D6/1**
D	1	10 A	**FAZ-D10/1**
D	1	16 A	**FAZ-D16/1**
Z	1	2 A	**FAZ-Z2/1**
Z	1	4 A	**FAZ-Z4/1**
Z	1	6 A	**FAZ-Z6/1**
Z	1	10 A	**FAZ-Z10/1**
K	1	2 A	**FAZ-K2/1**
K	1	4 A	**FAZ-K4/1**
K	1	6 A	**FAZ-K6/1**
K	1	10 A	**FAZ-K10/1**
K	1	16 A	**FAZ-K16/1**
B	2	6 A	**FAZ-B6/2**
B	2	10 A	**FAZ-B10/2**
B	2	16 A	**FAZ-B16/2**
C	2	2 A	**FAZ-C2/2**
C	2	6 A	**FAZ-C6/2**
C	2	10 A	**FAZ-C10/2**
B	3	6 A	**FAZ-B6/3**
B	3	16 A	**FAZ-B16/3**
C	3	16 A	**FAZ-C16/3**

Accessories	**Part no.**
Auxiliary contact for min. circuit-breaker,1M + 1B	**FAZ-XHIN11**
Lock for MCB, RCD, main switch	**IS/SPE-1TE**
Wiring material	
1-phase/12 modules	**EVG-1PHAS/12MODUL**
3-phase/12 modules	**EVG-3PHAS/12MODUL**
1-phase/1000 mm long	**Z-GV-10/3P-3TE**




Residual-current circuit-breakers

Version	Number of poles	Rated current	Part no.
30 mA / VDE	2	25 A	**FI-25/2/003-A**
30 mA / VDE	4	25 A	**FI-25/4/003-A**
30 mA / VDE	4	40 A	**FI-40/4/003-A**
30 mA / VDE	4	63 A	**FI-63/4/003-A**
300 mA*	4	40 A	**FI-40/4/03-U**
300 mA*	4	63 A	**FI-63/4/03-U**
300 mA / AC/DC	4	40 A	**FI-40/4/03-B**
300 mA / AC/DC	4	63 A	**FI-63/4/03-B**
30 mA / digital	4	40 A	**dRCM-40/4/003-G/A+**
300 mA / digital, selective	4	63 A	**dRCM-63/4/03-S/A+**

Combined RCD/MCB switches

Characteristic 30 mA / VDE version	Number of poles	Rated current	Part no.
B	2	10 A	**PKNM-10/1N/B/003-A**
B	2	16 A	**PKNM-16/1N/B/003-A**

Surge arresters

Arrester class	Number of poles	Version	Part no.
B	1	100 kA	**SPB-100/NPE**
B+C	1	12.5 kA	**SPB-12/280**
B+C	3	12.5 kA	**SPB-12/280/3**
B+C	3+1		**SPB-3+1**
C	1	280 V	**SPC-S-20/280/1**
C	4	280 V	**SPC-S-20/280/4**

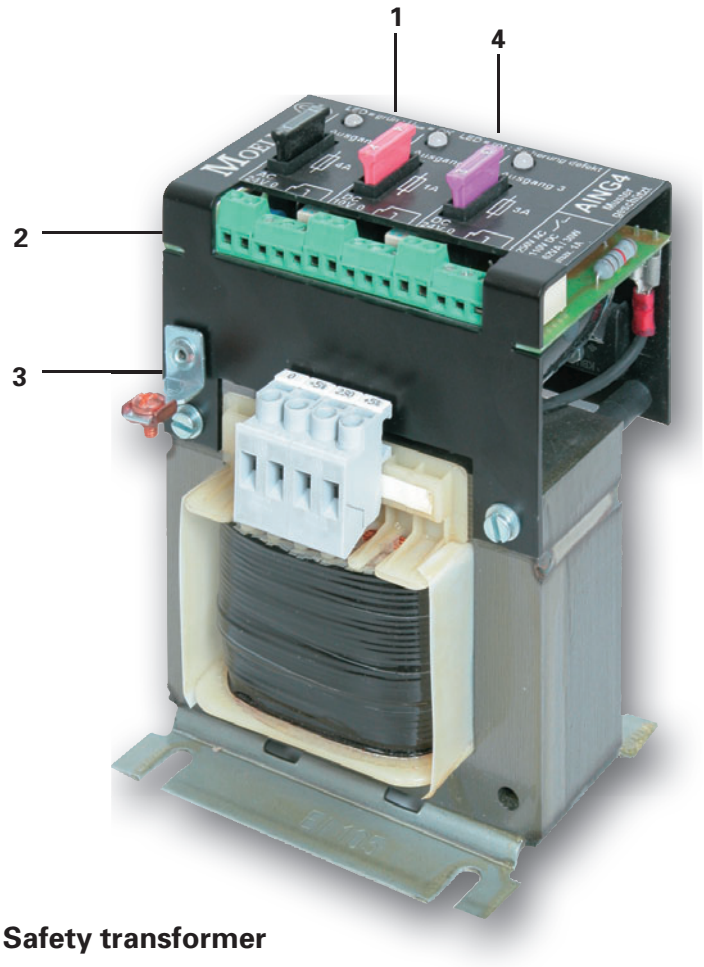
Rail-mounted service installation devices

Type reference	Version	Part no.
Main switch	63 A / 3-pole	**IS-63/3**
On/Off switch	16 A / 1 N/O	**Z-SW/S**
	16 A / 1 N/O Signal lamp	**Z-SWL230/S**
	16 A / 1 CO	**Z-SW/W**
Pushbuttons	16 A / 1 N/O	**Z-PU/S**
	16 A / 1 N/O + 1N/C	**Z-PU/SO**
Signal lamps	Signal lamp clear	**Z-EL/OR230**
	Signal lamp red	**Z-EL/R230**
	Signal lamp green	**Z-EL/G230**
Impulse relays	230 V / 1 N/O	**Z-S230/S**
	12 V / 1 N/O	**Z-S12/S**
Relays	230 V / 16 A / 1 N/O	**Z-R230/S**
	230 V / 16 A / 2 N/O	**Z-R230/SS**
Installation contactors	230 V / 25 A / 4 N/O	**Z-SCH230/25-40**
	230 V / 40 A / 4 N/O	**Z-SCH230/40-40**
	230 V / 63 A / 4 N/O	**Z-SCH230/63-40**
Staircase timers	TLE: with prewarning function and Stop function	**TLE**
	TLK: same as TLE, additional control input for central control, zero-voltage safe	**TLK**
Time switches	Syncronous/Day/1 channel	**SU-TS/1W-TA**
	Digital/Week/1 channel	**Z-SDM/1K-WO**
	Digital/Week/2 channel	**Z-SDM/2K-WO**
Astronomical time switch	Digital/Day/1 channel	**SA-TD/1W**
Multi-function timing relay	230 V / 1 CO	**ZRMF1/W**
Hours-run counter	230 V / 50 Hz	**BSZ/230**
Light intensity switch	230 V / 1 N/O	**DS-TA/1S**
Bell	230 V / 50 Hz	**Z-GLO230**
Plug socket	Schuko	**Z-SD230**
		Z-SD230-BS
Bell transformers	8 V / 1A	**TR-G/8**
	4-8-12 V / 2 A	**TR-G3/18**

Uncompromising Quality: More Reliability for Single-Phase and Three-Phase Supply Networks

This is where quality counts twice as much. No wonder, since low-voltage miniature transformers are indispensable components for both the safety of persons and the availability of machines and installations. As safety is so important, quality must not be compromised. Eaton Moeller's integrated quality management system to DIN ISO 9001 ensures optimum quality for all products. Each transformer is tested and inspected before it is shipped to the customer. It goes without saying that Eaton Moeller's transformers meet the requirements of all international standards and regulations. Furthermore, customers benefit from the prompt delivery of Eaton Moeller products and from its closely-knit global service network.

Universal power supplies AING for the clever control voltage supply



Safety transformer

1. fuse elements for every secondary voltage

2. three output voltages (24 V AC, 10 V DC, 24 V DC)

3. all connections on one side

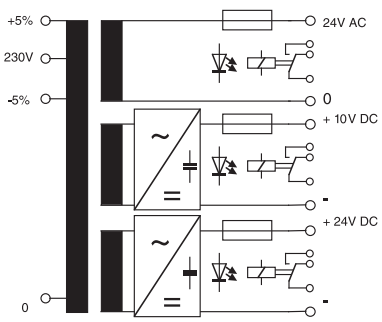
4. illuminated displays and signalling contacts for every voltage

Everything from a single source: transformer protection with PKZM0-...-T

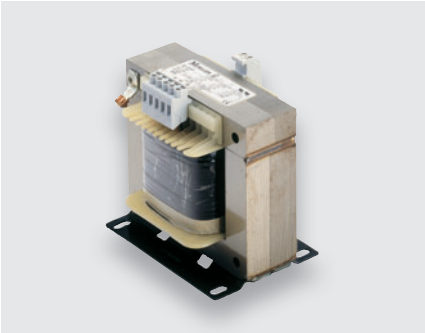
Eaton Moeller can supply exactly the ideal motor-protective circuit-breaker for protecting its transformers. Thanks to its high-speed short-circuit release it can withstand virtually any inrush current. For example, a suitable protective device and the primary current required by the relevant standards are specified on the isolating and safety transformers. This makes it easy to find the correct motor-protective circuit-breaker PKZ from our selection lists. Yet another way of serving our customers.

Several typical voltages are now established as control voltages in the control panel. The most commonly used are 24 V AC as well as 10 V and 24 V DC. Up to now several power supply units which had to be separately mounted and wired were required. The power supply units AING provide all three output voltages from a single device. Each voltage has its own LED, a changeover contact for signalling purposes, an integrated fuse and is pre-wired. This assures significant savings in time and space as well as additional safety. Thus, the economic efficiency of you installation is significantly enhanced.

The power supplies are open, non-stabilized transformer power supplies with galvanically isolated windings conform to EN 61558-2-6, with the connection area in fingerproof design to VBG 4. They feature three isolated outputs to supply power to electrically systems, e.g. in the HVAC field. All outputs are protected against short-circuit with conventionally available and attractively priced automobile fuses (Size/type FK2). A potential free relay contact (changeover contact) is featured for monitoring and signalling of the individual output voltages. In addition, an LED indicates the "Power on" state of each output (LED green) and "Fuse defective" (LED red).



Controlling, Isolating, Protecting: Flexible Solutions for Worldwide Use



Control transformers: for the right voltage

Eaton Moeller control transformers ensure reliable operational voltage for control and auxiliary circuits in power distribution and automation applications, offering total reliability all the time. Control transformers allow machines and plants to be adapted to the different supply voltages and voltage types found all over the world. Standard additional tappings of +/- 5% of the primary voltage increase the operational safety of electrical control systems when the mains supply is subject to continuous overvoltages and undervoltages. Control transformers reduce the short-circuit current in the event of a fault and enable the unearthed operation of auxiliary current circuits.

Isolating transformers: reinforced insulation

The isolating transformers are provided with reinforced insulation between the primary and secondary windings. In this way, these transformers meet the most rigorous safety requirements, and are suitable for the „safe“ isolation of current circuits in hazardous areas with an electrically conductive environment.

Safety transformers: increased all over protection

Safety transformers offer a high degree of protection for use in rugged applications such as wet grinding machines, concrete vibrators etc. The safety transformers are a type of isolating transformer with a maximum secondary voltage of ≤ 50 V.

3 in 1 – three in one

STI, STZ, DTZ and UTI control, isolating and safety transformers offer maximum safety for your machines and installations. Worldwide use is guaranteed by the wide range of approvals available and compliance with international standards.

Terms and definitions with transformers

Rated values
Rated values are rated voltage, nominal current (r.m.s. values), VA rating, rated frequency and rated transformation ratio, which the transformers feature and for which they are rated.

Rated input voltage
The rated input voltage is the supply voltage of a transformer for defined operating conditions.

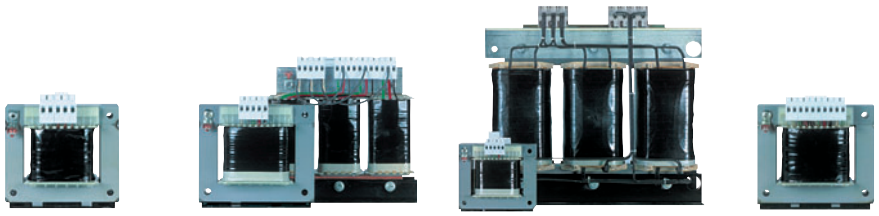
Rated output voltage
The rated output voltage is the voltage on the output of a transformer at the rated input voltage, rated output current and rated power factor.

No-load voltage
No-load voltage is the output voltage of an unloaded transformer at rated frequency.

No-load current
No-load current is the current on the input of an unloaded transformer at rated input voltage and rated frequency.

VA rating
VA rating is the power on the output side of the transformer. It is the product of rated output voltage and rated output current. If the secondary side of the transformer features additional tappings, the VA rating is the sum of

The Range: The Complete Programme for Flexible Solutions



	Control transformers	Control, isolating and safety transformers		
Single-phase transformers Rating	**STN** 0.06 to 4.0 kVA	**STI** 0.06 to 4.0 kVA	**STZ** 0.06 to 13.3 kVA	**UTI** 0.1 to 1.0 kVA
Three-phase transformers Rating	– –	– –	**DTZ** 0.1 to 25 kVA	– –
Standards	EN 61558-2-2 VDE 0570-2-2 UL 506 CSA 22.2no66	EN 61558-2-2 and EN 61558-2-4 or -2-6 VDE 0570 UL 506 CSA 22.2no66	EN 61558-2-2 and EN 61558-2-4 or -2-6 VDE 0570 UL 506 CSA 22.2no66	EN 61558-2-2 and EN 61558-2-4 or -2-6 VDE 0570 UL 506 CSA 22.2no66
UL/CSA approvals	•	•	•	•
Insulation class	B	B	B	B
Reinforced insulation	–	•	•	•

Insulation class B = highest permissible continuous temperature of 130 °C
Insulation class F = highest permissible continuous temperature of 155 °C to IEO '85 and IEO 216

Online catalogue Quicklink
to www.moeller.net

OC80EN

the products of the rated output voltage and the rated output current of all simultaneously loaded circuits.

Short-time rating
The short-time rating is the rating on the output of a control transformer at a cos phi = 0.5 and voltage drop of maximum 5% compared to the rated output voltage.

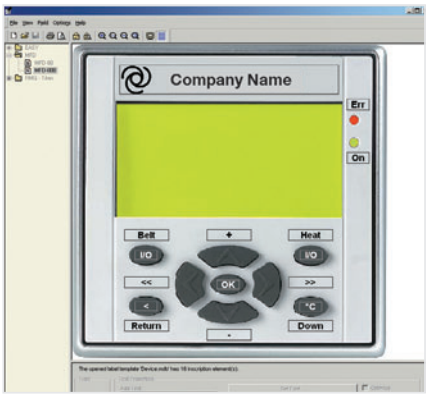
Short-circuit voltage
The short-circuit voltage is the voltage which is applied to the input windings, so that rated output current flows (windings at room temperature) when the output windings are short-circuited. It is stated in % of the rated input voltage.

No-load loss = iron losses
Consumed active power, if the rated input voltage at rated frequency is applied to the input winding and the output winding is unloaded.

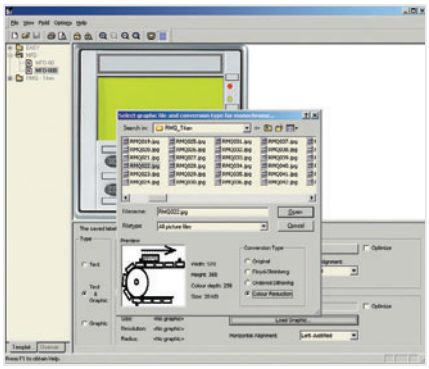
Short-circuit losses = copper losses
Consumed active power, if the output side is short-circuited and nominal output current is flowing.

Flexible Laser Inscriptions and Symbols with Labeleditor Software

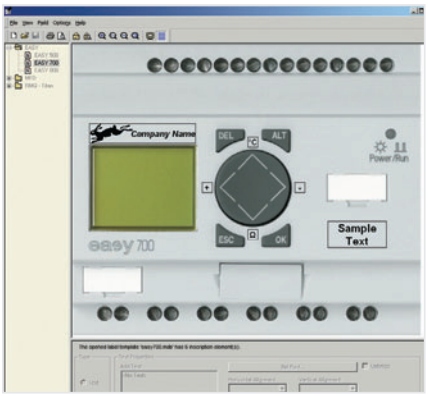
Eaton Moeller's Labeleditor is a flexible and inexpensive solution for labelling control circuit devices RMQ-Titan, RMQ 16, control relays easy and the multi-function display MFD-Titan quickly and to perfection. The Labeleditor software enables you to create your own company and project-related inscriptions as well as symbols and images, and also supports the use of special characters. The Labeleditor software offers you accurate user-guidance for creating texts and adding symbols. With a few clicks of the mouse you can simply send your inscription data to Eaton Moeller, where it is used in our factories for laser etching the required inscriptions or selected symbols on the device.



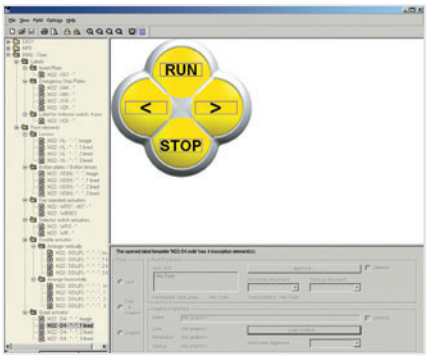
Advertise with company names and logos
As well as providing the function keys and LEDs with clear markings, the software also enables you to provide your company logotype and emblem on devices. You create the logotype and/or emblem as a black and white template, which is then integrated in standard graphic format via the Labeleditor software.
The on-screen appearance of how the inscription texts and symbols will actually look like on the device can be seen on the monitor. The MFD-80-B unit displayed on screen shows the rectangular areas available for inscriptions or for adding symbols.



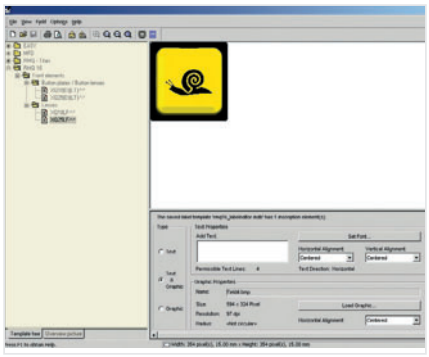
Free text entry and adding of standard or user-defined symbols
The first step in creating a label template in the Labeleditor software is to select the device required. You then provide the selected fields with inscriptions or the required symbols. You can either add the symbols available from the large symbol database supplied or those you have created yourself. The symbols provided include useful images such as arrows, conveyor belts, hare and snail symbols, and many more.
With a few clicks of the mouse you simply send your completed label template to our factory.



Control relay easy... with flexible laser inscriptions
You can also provide laser inscribed texts and symbols on control relays easy... in the same way as on the multifunction display MFD-Titan, and the selected fields are also made available for this purpose. The software shows a 1:1 on-screen image of the laser inscription on the easy device.

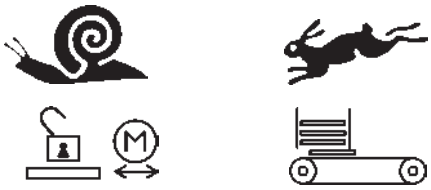


Operational safety thanks to clear and unambiguous inscriptions and symbols
The clear allocation and arrangement of display and operating elements is a key factor in operational safety when operating and controlling systems and machines. The labels and symbols used with these elements are particularly important. In addition to the wide range of standard inscriptions and symbols for the RMQ-Titan range of control circuit devices, the Labeleditor allows you to create your own laser etched texts and symbols on Emergency-stop labels, insert label, button plates, illuminated indicator lenses and button lenses for illuminated pushbuttons.

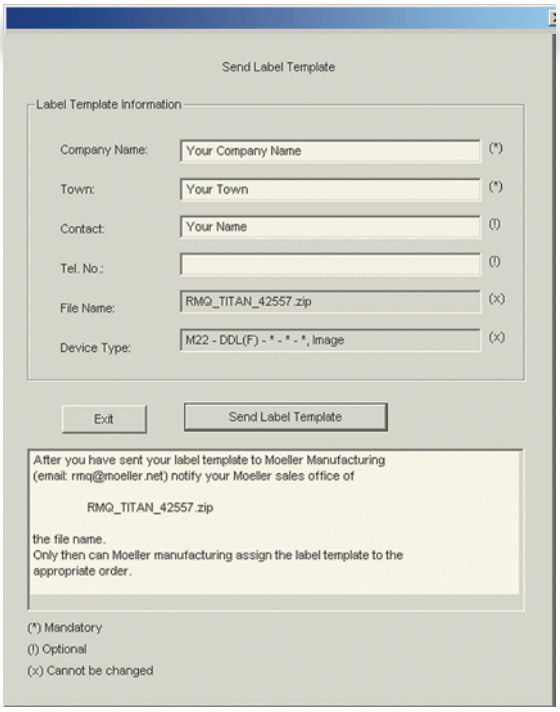


Enter texts, add symbols and check the result immediately
The Labeleditor software enables you to select all RMQ-Titan and RMQ 16 labels to be laser inscribed as well as display and operating elements. These elements are displayed on screen. The result, your inscription or symbol, can then be seen and checked immediately.

Here are some of the symbols contained in the Labeleditor file:



Create flexible and practical customized solutions



Sending your label template to Eaton Moeller with a few clicks of the mouse

Once you have created your label template you simply send it to the appropriate Eaton Moeller factory with a few clicks of the mouse. The email address is automatically set by the program according to the product selected. Labeleditor generates an appropriate filename on saving or sending your label template. For example, the screen may show the filename: "EASY_10688.zip".
This filename cannot be changed and is used for the unique identification and assignment of your template, and must be stated with any order to Eaton Electric GmbH or to an electrical wholesaler. The filename becomes part of the article ordered.

The following basic articles can be selected:
- MFD Combination
- EASY Combination
- M22 Combination
- M16 Combination

Ordering examples:

MFD-Titan ordering example: one MFD-80-B multi-function display with "company name" to be ordered.
Make the following order:

1x MFD Combination
plus:
1x MFD-80-B
1x Filename "MFD_xxxxx.zip"
(Filename generated by Labeleditor)

easy ordering example: one easy719-DC-RC with "company logo" ordered.
Make the following order:

1x EASY Combination
plus:
1x EASY719-DC-RC
1x Filename"EASY_xxxxx.zip"
(Filename generated by Labeleditor)

Ordering example RMQ-Titan: One double pushbutton actuator with white button plates and "Hare" and "Snail" special symbols to be ordered.
Make the following order:

1x M22-DDL-*-*-*; white button plates
1x Filename "RMQ_Titan_xxxxx.zip"
(Filename generated by Labeleditor)

Ordering example RMQ 16: A yellow indicator light lens 25 x 25 mm with special inscription should be ordered.
Make the following order:

1x XQ25LF-*-*; yellow lens
1x Filename „RMQ_16_xxxxx.zip
(Filename generated by Labeleditor)

The Label editor software is available free on the Internet. Furthermore, the software is a part of the EASY-SOFT-BASIC or EASY-SOFT-PRO from version 6.10.

www.moeller.net/en/support/index.jsp
Search term: Labeleditor

Download Center
Information and documentation

http://www.trainingscenter.moeller.net

Online training center

The online training center from Eaton Moeller offers a web-based information and training platform for the control relay easyRelay, the multi-function display MFD-Titan, the compact PLC easyControl and more recently: the safety relay easySafety. The online training center is divided into different areas: Under "Products" you can find information about the easy product range. The "Functions" area provides programming examples and explanation for each individual function block. In the "Basics" section the easy programming is presented and explained step-by-step using animation sequences, and provides those who are new to the easy world with a fast and simple introduction. The comprehensive "Applications" section offers a whole range of fully programmed and documented applications from different industries. Of course, all programming example can be simply and quickly downloaded. The online training center is available in: German, English, French, Dutch, Polish, Czech and now: in Russian.

Input / output simulators for easyRelay and easyControl

The new input / output simulators for **easyRelay**, **easyControl** and **easySafety** support the programmer in the simulation of its application in a simple manner directly on the device.

Simply tighten the screws on the simulators, plug in the accompanying plug-in power supply unit and your ready to go!

All digital and analogue inputs and outputs can be simulated with the simulators. The simulators can be used for the 24 V DC variants and can be switched between the relay and transistor outputs.

The simulators are the optimum solution for both educational and training purposes.

Part no.	
EASY412-DC-SIM	easy500
EASY800-DC-SIM	easy700, easy800, easyControl
ES4P-221-DMX-SIM	easySafety

http://www.trainingscenter.moeller.net

Approvals and certification

National approval or certification is required in many countries as well as on ships for world-wide use of industrial switchgear. The approvals are partly associated with special technical data. Comprehensive information can be found in the main catalogue in the switchgear for world markets section. Eaton Moeller provides the knowledge required for export compliance for foreign directives and guidelines in the main catalogue and in special publications.

Important information for selection of switchgear and switchgear systems for export of machines and systems to international target markets.

Raccourci pour le ID:
563en at www.moeller.net

Almost all industrial switchgear from Eaton Moeller feature all the most important approvals. These include North America, China and the approvals for the classification societies.

In the last few years, Eaton Moeller has successfully tackled the comprehensive approvals process, e.g. for China, Eastern European markets and South Africa. The approvals for the American market always played a significant role for Eaton Moeller as this market segment has always been successfully served in the past. It must be taken into consideration that the North American guidelines vary significantly from the IEC guidelines which apply in most other parts of the world.

Approval requirement in North America

In the USA, the OSHA and the NEC demand approvals of devices and systems to the standards which apply locally, such as the UL. In Canada all electrical equipment must adhere to the demands of the CEC which demands that all devices and systems are CSA approved.

The mandatory approval in North America is connected with a mandatory marking with the approval mark (Table 1). In the USA, a binding registration of the approved product in the "Electrical Constructions Materials Directory" or in the "Recognized Component Directory" is mandatory; in Canada the registration is performed in the "List of certified Electrical Equipment".

After the approvals which used to be required in some European countries for industrial switchgear had been removed as a result of harmonisation of the standards, other countries discovered the economic opportunities presented by "Approvals and Certification" particularly with regard to protection of the markets for their local manufacturers, as well as for earning foreign currency. Products developed, manufactured and tested in accordance with the strict IEC guidelines will not be improved by any means through approvals. All countries with large export shares are forced to submit to these constraints in order to guarantee uncomplicated export of their products. The same applies for the approvals with the shipping classification societies. However, a few tests relevant to shipping are applied here.

Eaton Moeller **type suffix** for order type	**Type of existing approval**	**Approval mark**	
-NA	This device is an individual device *UL* and *CSA* approved	UL®	CSA®
FORM CDN	The device is approved as a *CSA* approved single device.		CSA®
FORM USA	The device is approved as a *UL* approved single device.	UL®	
-CNA	The device has components approved to *UL*, the conditions of approval (Table 2) must be observed during use. The device is approved as a *CSA* approved single device.	cULus	CSA®

Table 1:
The approval variants commonly used by Moeller and their markings on the nameplates of the devices. See Table 2 also.

Two different product-dependent solutions have resulted for Eaton Moeller from this mandatory approval requirement:

- If the North American demands comply with the demands made by other countries and can be combined to a single product version, Eaton Moeller offers "devices for world markets" which incorporate all the necessary approvals in a single device and can thus be used around the world.
  Examples include contactors, overload relays or control circuit devices,

- If the North American demands do not comply with the demands made by other countries and cannot be combined to a single product, or if charges dependent on the quantity of devices manufactured are levied for monitoring ongoing production, Eaton Moeller introduces two or more separate product versions (examples include circuit-breakers). Special types are modified here to correspond with the North American standards. These products are marked with the "-NA" or "-CNA" type suffix. These devices usually do not vary or only vary slightly from the devices in the IEC versions.

In the USA a differentiation is made according to usage – as shown in Table 2 – into "Listed Industrial Control Equipment" and "Recognized Component Industrial Control Equipment" and the devices are marked accordingly.

Listed Industrial Control Equipment **without limitations**	Recognized Component Industrial Control Equipment **partly with limitation**
• Device approved for "field wiring" • "factory wiring" is included in "field wiring" i.e. - for installation in controls, which are fully wired ex-factory or in workshops - sale of single devices is permitted in the USA	• Devices are approved as modules for "factory wiring" i.e. - devices chosen to suit the operational conditions and selected by qualified personnel - for installation in controls, which are completely wired and tested ex-factory or in workshops by suitably qualified personnel
Marking: 	Marking: 

Table 2:
In the USA a distinction is made with industrial switchgear to UL 508 between "Listed Industrial Control Equipment" and "Recognized Component Industrial Control Equipment"

Participation of the processor and operator of approved components

In Europe there is a general awareness of the use of so-called installation standards – for example such as the IEC/EN 60 204-1 (electrical equipment of machines) – which contain application dependent obligations which the component manufacturer (alone) cannot guarantee. Design engineers, panel builders, electricians or system operators all act in fulfilling the demands. An assignment of responsibility of this nature is also to be observed with the North American approvals. A motor-protective circuit-breaker PKZM 0 is UL and CSA approved as a component. This is important, but it is not the only prerequisite for successful use in North America. Motor-protective circuit-breakers may not be used for all applications in North America, even though they have been proven millions of times in the IEC world.

- **Export from IEC countries to North America**
  The export of many Eaton Moeller components occurs indirectly in conjunction with machines and systems, which are build for example, in Germany and Europe. Usually, the exporting machine manufacturers are only interested in manufacturing standard machines with identical electrical equipment, which can be used around the whole world or which only require very minor modifications in a few minor details before being exported to the USA. American machine purchasers do not just prize European mechanical engineering know-how, but also the benefits of European electrical equipment. A particularly important feature here is the fuseless solutions. Switchgear is recommended for export when it is available in a version which can be

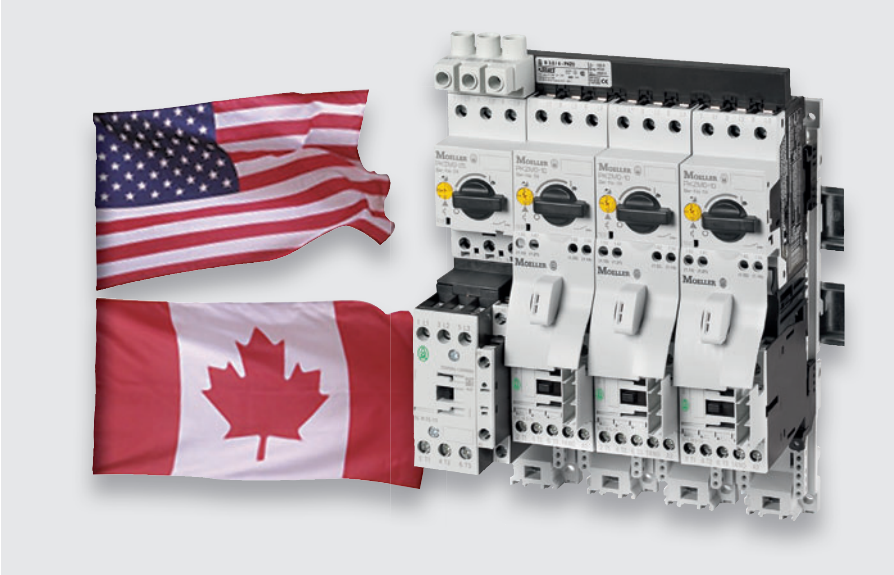


Figure 1:
With a UL 508 approved "Type F" motor starter, the North American and IEC guidelines are fulfilled using the same space requirement.

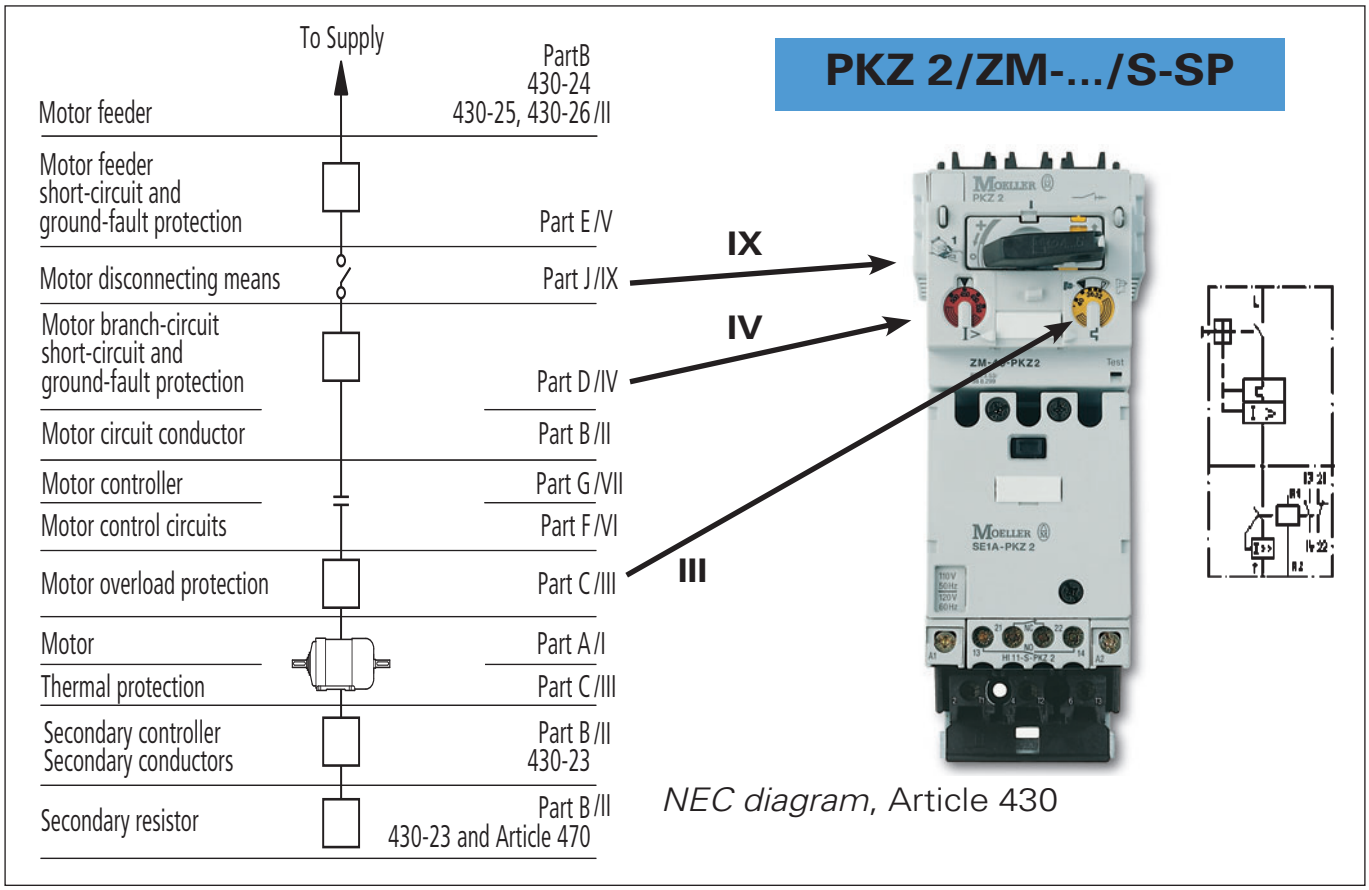


Figure 2:
The electrotechnical guidelines in North America exhibit the greatest differences to the IEC guidelines applied in most countries. Eaton Moeller can advise you with special knowledge concerning export to North America.

operated on 50 Hz and 60 Hz power networks. Differences in voltage can be overcome using a matching transformer. The comprehensive and traditional Eaton Moeller know-how in the approvals field is highly prized for exports. The expertise involved ensures that the electrotechnical equipment built with European know-how is commissioned in North America without reasons for complaint from the inspectors.
Eaton Moeller can perform service in North America and can also supply spare parts if required.

- **The simple motor starter solutions for Export to North America**
  The main cause for many misunderstandings is the American demand as well as the habit of placing a separate upstream protective device conform to the stringent UL 489 or CSA-C22.2 No. 5-02 before industrial switchgear to UL 508 or CSA-C22.2 No.14. The UL 489 and the CSAC22.2 No. 5-02 demand much larger air gaps and creepage distances than the IEC / EN guidelines.

For exporting machine and system builders, the following fuseless solution variants are available for "Combination Motor Starters":

- Type E Self-Protected Combination Motor Controller Type E
  – PKZ2/ZM-.../S-SP Self-Protected Combination Starter (Figure 2)
  – PKZM0-.. Manual Motor Controllers with BK25-..-E incoming terminal and
- Type F Combination Starter (Figure 1)

solutions which can also be used in the IEC world if the exporters only desire a single version of the electrical equipment of their machines or systems. In this case compliance with all North American demands placed on the switchgear systems, such as the use of approved wiring materials must be assured.

The presented solutions significantly simplify the use of two separate variants of electrical equipment for North America and the IEC world, as the geometric design of the switchgear systems is almost identical. Fuseless switchgear systems are particularly recommend for export to North American in order to avoid problems presented by the regional differences in fuse systems and their dimensions. Further information is available at www.moeller.net with the following Quicklink-IDs: 928en, 950en and 951en and in the „Switchgear for world markets" section in the main catalogue.

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