

„Reliable Switchgear from  
One Proven Supplier.“

**xCommand**



**xSystem**



**xStart**



**xEnergy**



**MOELLER** 

We keep power under control.

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# Moeller – Electrifyingly Efficient



Life can be just so easy – especially life at work because, Moeller can offer you efficient and comprehensive solutions in the area of electrical energy – for machines, systems or buildings.

- Complete solutions from a single source
- Guaranteed maximum in safety
- International solutions and support
- Extensive sales network and availability
- Combination features to suit applications



**Always a step ahead – for more than 100 years**

Electrical energy – perhaps the fascination stems from its intangibility. Moeller’s motivation from the very outset was to master, guide and control its direction and to form and to give it a purpose. And this since 1899. Today, the exceptional quality of Moeller products provide for functional and economic solutions – regardless of if they are in the design of electrical systems in industrial applications, buildings or in the automation of production processes and machines.

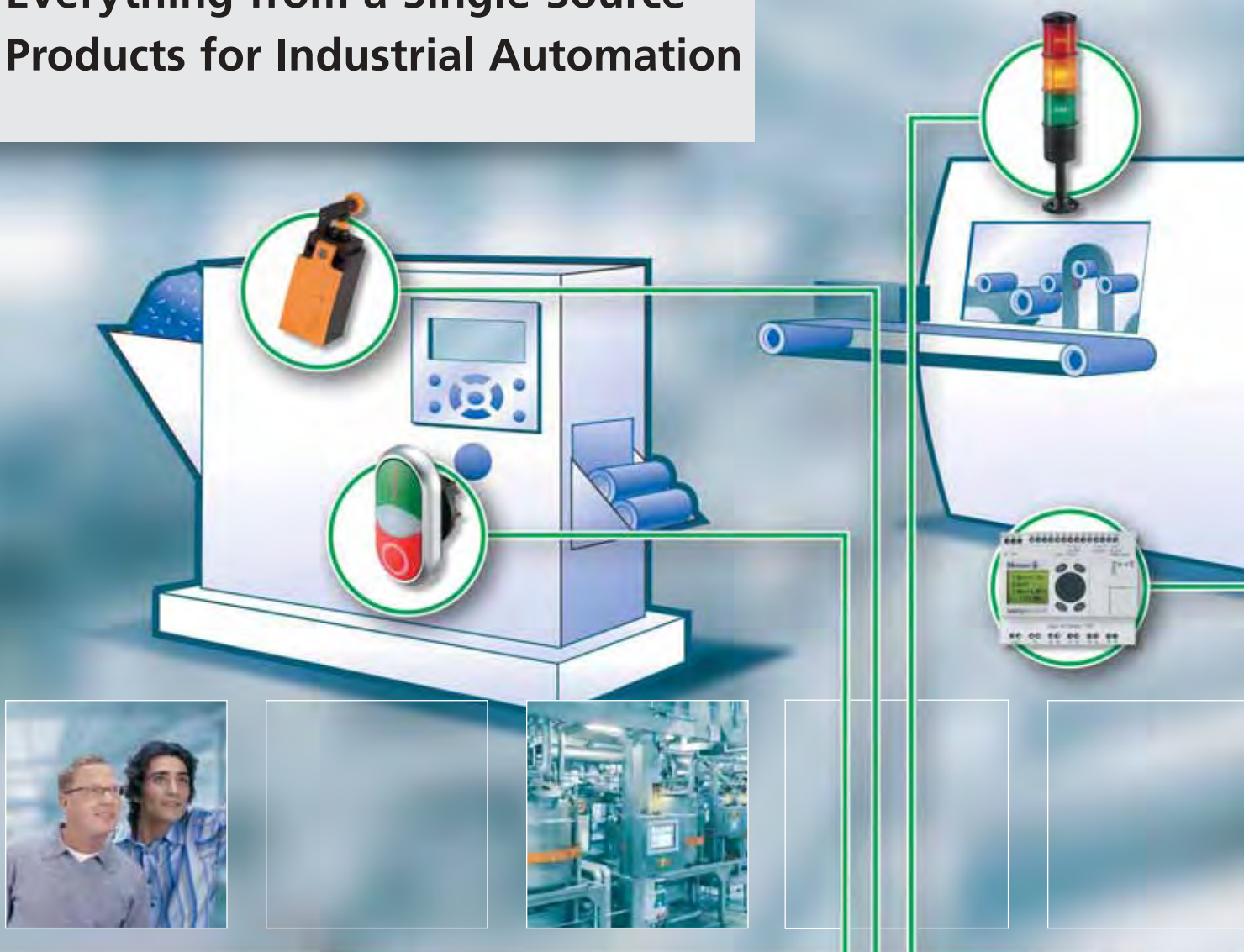
**Xtra Combinations: cleverly combined and automated**

Power distribution and automation? No problem with Xtra Combinations. Xtra Combinations offers holistic solutions for switching and protection, command and control, signalling and visualisation – all guaranteed from a single source. Your benefit: the compatibility. The mechanical, electrical and digital combination possibilities of the products do not just provide exceptional levels of flexibility, but also exceptionally high levels of economic efficiency. In other words: fast, individual and cost-effective solutions. The products don’t just have an attractive design, they also guarantee a high level of operating continuity as well as a high level of safety – for persons, machines, systems and buildings.

**Moeller – fast, individual and international**

The world is a village – at least from the point of view of our customers. Moeller products are always there where you need them as quickly as possible – world-wide – thanks to our dealer network and perfect logistics. This is guaranteed by our 350 representatives and subsidiaries in more than 80 countries around the globe.

# Everything from a Single Source – Products for Industrial Automation



System builders wish to obtain as many products as possible from a single supplier in order to reduce the effort and expense. That's why more and more companies are using the complete range offered by Moeller – because the quality and service are what they expect.

- Ergonomic commanding and signalling. Safe switching of control currents.
- Automation and visualization with scalable solutions.
- Switching, protecting and controlling motors efficiently.
- Power reliably available and safely under control.

## **xCommand**

Command and signalling – ergonomic shape, attractive design. Switching control circuit currents reliably and precisely.

Control circuit devices RMQ

Foot and palm switches FAK

Signal towers SL

Fingerprint system

Position switches LS-Titan

Rotary switches T/P

Timing relays ETR

Measuring relays EMR

Safety relays ESR



### **xSystem**

Automation products, system solutions and services. The recognised brand name all around the PLC, enhancing the performance of machines and systems.

- PC based HMI-PLC und PLC
- Embedded HMI-PLC
- Modular PLC
- Compact PLC
- HMI
- Remote I/O
- Operating and control relays

### **xStart**

The complete range of contactors, efficient motor-starters and variable speed drives for the motor circuit. New simple to install solutions based on clever communication.

- Contactors DIL
- Motor-protective circuit-breakers PKZ
- Motor-starters MSC
- Softstarters DS/DM
- Frequency inverters DF/DV
- Rapid Link

### **xEnergy**

Reliably and safely controlling, switching and managing power. In industry, in buildings and in machine construction. Innovative protection concepts. With built-in diagnostics and communication functions. Housed in modern switchboard systems.

- Circuit-breakers NZM
- Circuit-breakers IZM
- Switchboard systems

## Moeller products and solutions

### xCommand



### xSystem



### xStart




### xEnergy



### Xpole

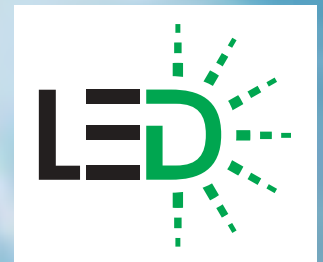


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## The New Control Circuit Devices RMQ-Titan® are in Great Shape

New for ATEX use  
See pages 26/27

**xCommand**



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. The LED elements in RMQ-Titan do not then suddenly fail, however, the strength of their light is simply reduced. 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 units

Ready-to-use complete units are available for standard solutions such as ON, ON/OFF, Emergency-Stop with and without a keyswitch etc. They can be supplied for front mounting and in surface mounting enclosures. The foot and palm switch FAK offers special features. Created for particularly rugged applications with extremely high protection to IP 69 K, this device stands out with its impressive design, and is often seen in TV quiz shows.



### Always well enclosed

The surface mounting enclosure for eight control circuit devices RMQ 16 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.

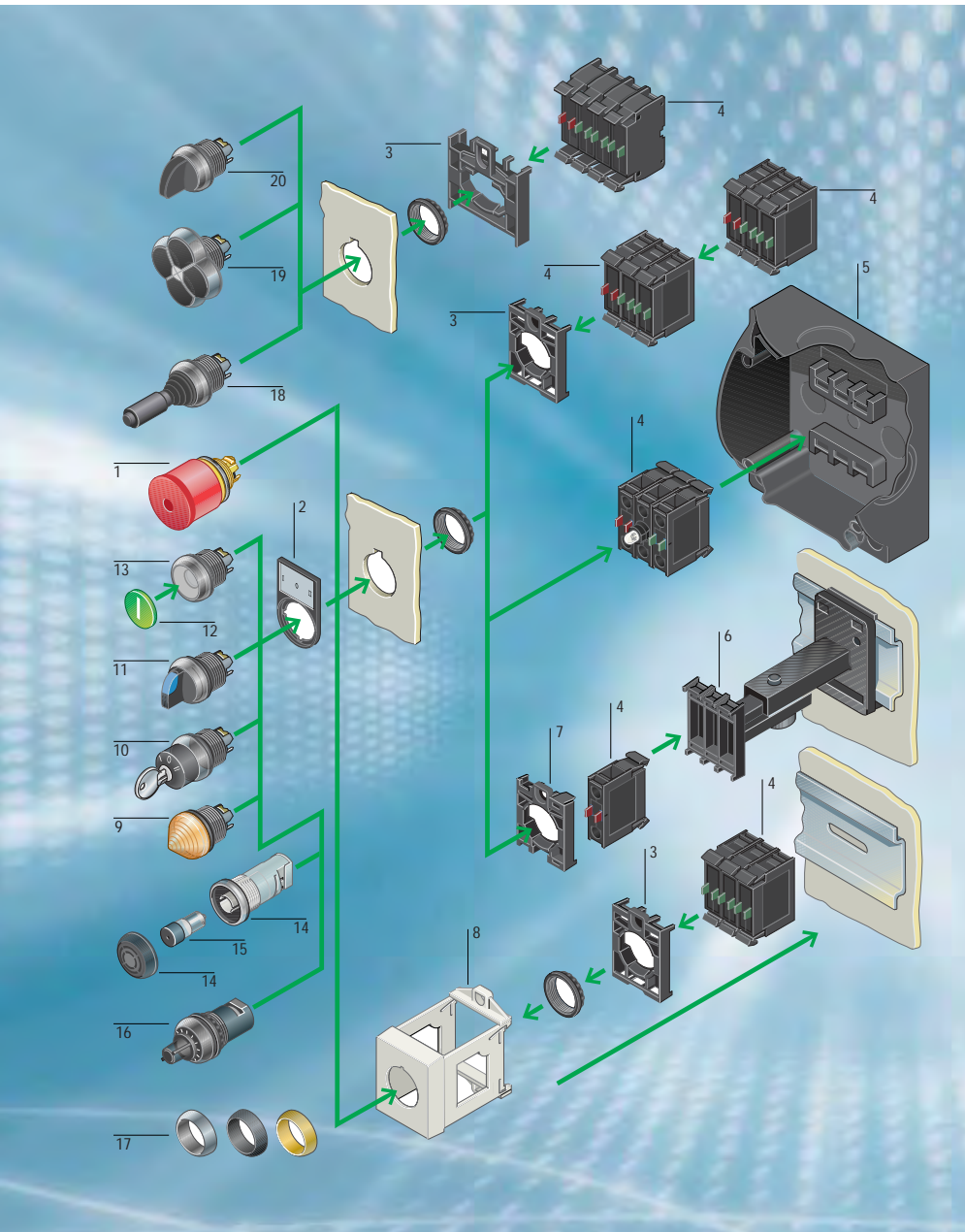


### Finger identification

Lost your keys, misplaced your ID card or forgotten your PIN code? In addition to the annoyance caused by these everyday problems, the "conventional" access systems cost companies a vast amount in administration costs. Fingerprints on the other hand are unique and cannot be lost. The devices detect the temperature differences between the furrows of the finger, and can thus identify each finger accurately. The M22-ESA meets all the requirements for easy-to-use, reliable and flexible access control.

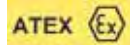
# System Overview

## RMQ-Titan®



### Push-button actuators, flush

NEMA 4X, 13  
IP 67, 69K



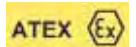
Front ring black: M22S...

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	M22-DG-X	
With guard ring		



### Push-button, extended

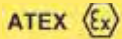
NEMA 4X, 13  
IP 67, 69K



Front ring black: M22S...

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

- 1 Emergency-stop button
- 2 Label plate
- 3 Fixing adapter
- 4 Contact element
- 4 LED elements
- 5 Enclosure
- 6 Telescopic clip
- 7 Centring adapter
- 8 Distribution board rail adapter
- 9 Indicator light
- 10 Key switch
- 11 Selector switch
- 12 Button plate/button lens
- 13 Push-button
- 14 Acoustic indicator
- 15 Buzzer
- 16 Potentiometer
- 17 Frontring Titanium M22  
Black M22S  
(add S to types if necessary)  
Gold: see page 12
- 18 Joystick
- 19 4 position button
- 20 4 position selector switch actuators



"The order is placed exclusively via M22-COMBINATION-\* with the specification M22-ATEX or FAK-COMBINATION-\* with the specification FAK-ATEX"

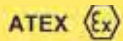


Mushroom actuators				Selector switch actuators			Key-operated actuators	
NEMA 4X, 13 IP 67, 69K ATEX Ex Front ring black: M22S...				NEMA 4X, 13 IP 66 ATEX Ex Front ring black: M22S... ↳ = stay-put    ↳ = spring-return			NEMA 4X, 13 IP 66 ATEX Ex Front ring black: M22S...	
Button plate	Mushroom	spring-return	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		<b>3 positions</b>	<b>3 positions</b>	<b>3 positions</b>	<b>3 positions</b>
●	●	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	
①	●	M22-DP-W-X1	M22-DRP-W-X1	↔		M22-WRK3-2		
Without	●	M22-DP-S-X	M22-DRP-S-X		<b>4 positions</b>	<b>4 positions</b>		
Without	●	M22-DP-R-X	M22-DRP-R-X	⊛	M22-WR4	M22-WRK4	Protective diaphragm for use with	
Without	●	M22-DP-G-X	M22-DRP-G-X				M22-WS ...	M22-XWS
Without	●	M22-DP-Y-X	M22-DRP-Y-X					



Illuminated push-button actuators					Indicator light lens assemblies	
NEMA 4X, 13 IP 67, 69K ATEX Ex Front ring black: M22S...					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 Ex
○	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-DLH-X	M22-DRLH-X	M22-L-X	M22-LH-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		
①	M22-DL-W-X1	M22-DRL-W-X1	M22-DLH-W-X1	M22-DRLH-W-X1		

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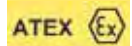


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### Double actuator

NEMA 4X, 13  
IP 67, 69K



Front ring black: M22S...

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



### Illuminated selector switch actuators

NEMA 4X, 13  
IP 66



### Selector switch actuators

NEMA 4X, 13  
IP 66

Front ring black: M22S...

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)

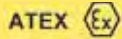


Joystick		Selector switch actuators		
2 and 4 positions IP 66		NEMA 4X, 13 IP 66		
Front ring black: M22S...		Front ring black: M22S...		
Function	Part no. Front ring titanium Front ring black	Function	Rotary button, 4 positions	Thumb-grip 4 positions
<b>Spring-return</b>			M22-WR4	M22-WRK4
in 2 positions horizontal	M22-WJ2H			
in 2 positions vertical	M22-WJ2V			
in 4 positions	M22-WJ4			
<b>Stay-put</b>				
in 2 positions Horizontal	M22-WRJ2H			
in 2 positions vertical	M22-WRJ2V			
in 4 positions	M22-WRJ4			



4 position push-button			
IP 66			
Front ring black: M22S...			
Function	Inscription	Colour	Part no.
<b>Buttons not mechanically interlocked</b>			
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-*-*
<b>Opposing buttons mechanically interlocked</b>			
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 selector 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-*



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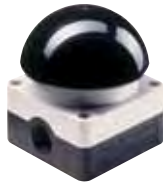


Emergency-Stop actuators			Contact elements		
NEMA 4X, 13 IP 66, 69K 1) Pull to release 2) Turn to release IP 67			ATEX Ex IP 20		
Function	Tamper proof		Function	Screw terminal	Cage Clamp <sup>3)</sup>
Non-illuminated	●	M22-PV <sup>1)</sup> M22-PVT <sup>2)</sup>	Front fixing \' 7 ⊕ 7 ⊕	M22-K10	M22-CK10
Non-illuminated	●	M22S-PV <sup>1)</sup>		M22-K01	M22-CK01
illuminated	●	M22-PVL <sup>1)</sup> M22-PVLT <sup>2)</sup>	Base fixing \' 7 ⊕	M22-K01D	M22-CK01D
illuminated	●	M22S-PVL <sup>1)</sup>		M22-KC10	M22-CKC10
With key-telease MS1 individual lock mechanism		●		M22-KC01	M22-CKC01
With key-telease MS2-20 individual lock mechanism		●		⊕ = Positive opening safety function to IEC/EN 60947-5-1	
Sealable shroud	Protective collar for Emergency-Stop push-buttons	Emergency-Stop labels	Front fixing	Screw terminal Cage Clamp <sup>3)</sup>	Note
M22-PL-PV	M22-XG-PV	see current Industrial Switchgear main catalogue	Base fixing	M22-A M22-A4	max. 3 contact elements max. 4 contact elements (only for 4-way switch and Joystick)
				Built into the enclosure	max. 3 contact elements



Acoustic indicators		LED elements			
IP 40		IP 20			
Compact without buzzer		Screw terminal		Cage Clamp <sup>3)</sup>	
		12-30 V AC/DC	85-264 V AC	12-30 V AC/DC	85-264 V AC
M22-AMC	○	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
Buzzer 24 V AC/DC +10% / -15%	○	M22-LEDC-W	M22-LEDC230-W	M22-CLEDC-W	M22-CLEDC230-W
Continuous tone M22-XAM	●	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
Pulsed tone M22-XAMP	○	M22-LEDC-W	M22-LEDC230-W	M22-CLEDC-W	M22-CLEDC230-W

Housing	
NEMA 4X, 13 IP 67	
ATEX Ex	
Locations	Surface mounting enclosures
1 ●	M22-IY1
1 ○	M22-IY1-ATEX <sup>1)</sup>
2 ○	M22-I1
2 ○	M22-I1-ATEX <sup>1)</sup>
3 ○	M22-I2
3 ○	M22-I2-ATEX <sup>1)</sup>
4 ○	M22-I3
4 ○	M22-I3-ATEX <sup>1)</sup>
6 ○	M22-I4
6 ○	M22-I4-ATEX <sup>1)</sup>
12 ○	M22-I6
12 ○	M22-I6-ATEX <sup>1)</sup>
Connecting screw for M22-I...	M22-I12
	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*



Foot and palm switches			Emergency-Stop button		
NEMA 4X, 13 IP 67, 69K			NEMA 4X, 13 IP 67, 69K tamper proof		
<b>ATEX</b>			<b>ATEX</b>		
Mush-room head	Function	Spring-return	Mush-room head	Function	Spring-return
		FAK-S/KC11/I			FAK-R/V/KC01/IY
		FAK-R/KC11/I			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



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		AS-Interface	
Function	Part no.	For use with	Part no.
LED resistor element for connection of 12-30 V LED's to 42-60 V AC/DC	M22-XLED60	M22-I3, -I4, -I6	RMQ-M1C-ASI
LED resistor element for connection of 12-30 V LED's to 220 V DC	M22-XLED220	RMQ Titan contact and bulb socket elements RMQ16:I8, E8	RMQ-M2C-ASI
LED test element for decoupled function test (lamp test) on 12-30 V AC/DC	M22-XLED-T	RMQ Titan front fixing	M22-ASI M22-ASI-S
LED test element for decoupled function test (lamp test) on 85-264 V AC	M22-XLED230-T	RMQ Titan base fixing	M22-ASI-C M22-ASI-CD

Potentiometer, IP 66	
<b>ATEX</b>	Part no.
Resistance KΩ	Front ring black: M22S...
1	M22-R1K
4.7	M22-R4K7
10	M22-R10K
47	M22-R47K
100	M22-R100K
470	M22-R470K

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## The ID Card in Your Fingertip The Fingerprint System M22-ESA

**xCommand**



Lost your keys, misplaced your ID card or forgotten your PIN code? In addition to the annoyance caused by these everyday problems, the "conventional" access systems cost companies a vast amount in administration costs. The fingerprint system M22-ESA which acts as an electronic master lock system for machines, systems and buildings, fully eliminates these administrative costs. Fingerprints are unique, cannot be lost and can be precisely assigned to a particular person. The M22-ESA fulfils all the demands for a simple, reliable and flexible access control system.



### Easy to fit:

1. The M22-ESA requires just as the RMQ-Titan series devices, a standard 22.3mm diameter fitting aperture.
2. Fit the operating panel using the patented Moeller tool.
3. Simple fitting of the fingerprint system M22-ESA on the operating panel.
4. The fingerprint system is fitted.



## Simply more secure

The security benefits of the M22-ESA series are based on the uniqueness of biometric features. A person's fingerprint does not change in the course of his lifetime just as the characteristics of his fingerprint cannot be transferred to third parties. Different persons simply don't have the same fingerprint; even the fingerprints of twins are unique. Administrative costs which result from loss or forgetfulness with conventional access control systems are completely eliminated. The thermal line sensor of the M22-ESA recognises authorized persons via the minutiae of the fingerprint. By the limitation of the evaluation area (possibility of savings just a certain section of the fingerprint) the imitation is made even more difficult. The system saves up to 100 different fingerprints.

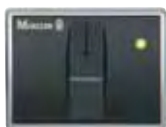
## Sensor complete

(including CPU/PS), 24 V DC



**M22-ESA**

## Sensor



**M22-ESA1**

## CPU/PS, 24 V DC



**M22-ESA-R**

## Multi-function display



**MFD-80-B**

## Communication module, 24 V DC



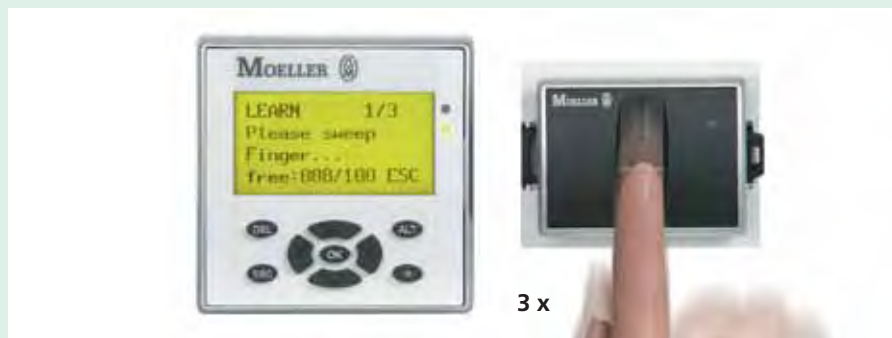
**MFD-CP4**

115/230 V AC  
**MFD-AC-CP4-800**

## Fast commissioning:



1. The user selects the Learn menu option on the MFD-Titan



2. The MFD-Titan recognizes the fingerprint M22-ESA and requests pulling the finger across the sensor in order to learn the fingerprint.



3. The **Successful** message on the display of the MFD-Titan indicates that the device has saved the fingerprint and has registered the authorized person.

4. A green LED on the fingerprint reader indicates access authorization. When all access authorized fingerprints are saved, the installer removes the MFD-Titan. Only a single MFD-Titan is required for commissioning of multiple fingerprint systems, which saves costs and time due to easy data storage.



Download free of charge at:



[www.moeller.net/fingerprint](http://www.moeller.net/fingerprint)

Commissioning with the simulation software MFD-CP4-Simulation is an alternative.

**Power supply unit, Easy-POW** see section Operating and control relays

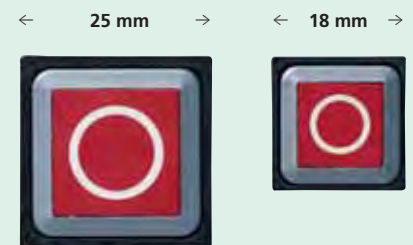
# High Information Density Thanks to Compact Mounting: RMQ 16

**xCommand**



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.

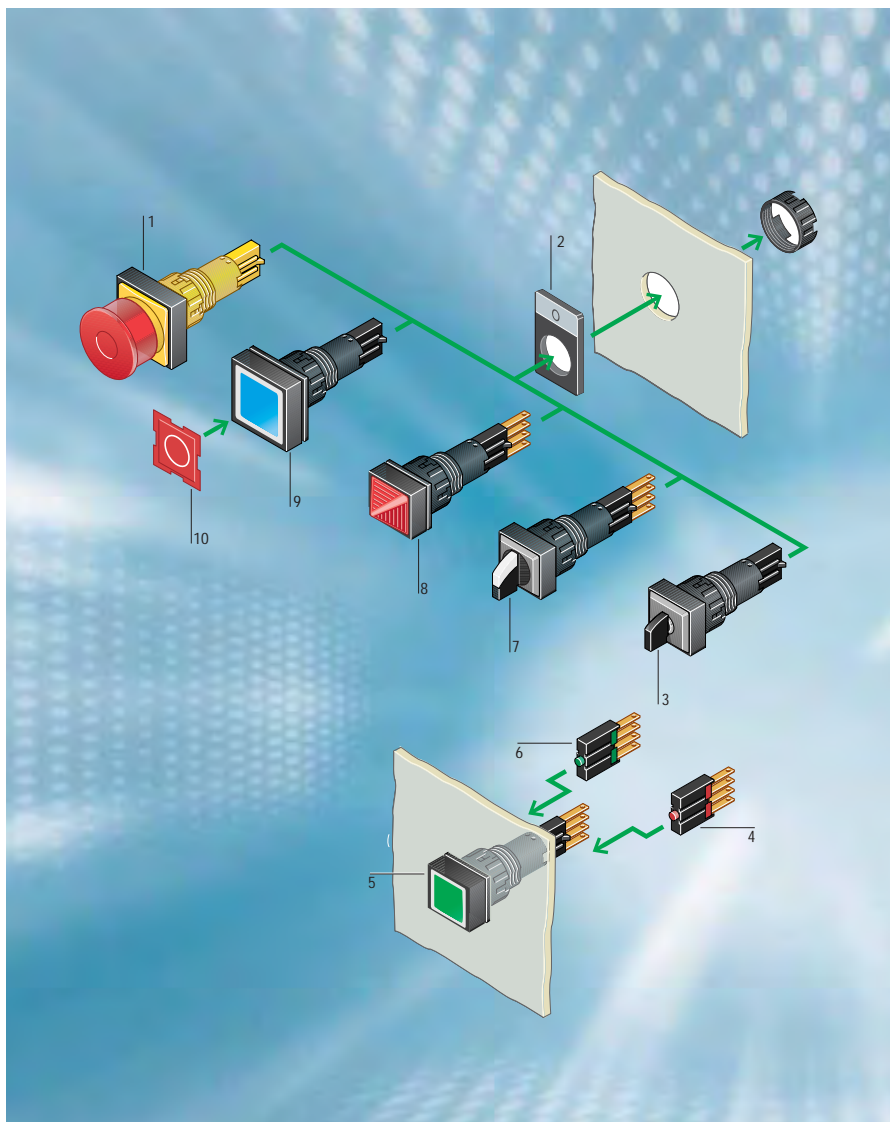
The various front elements can be mounted flush on all four sides, without any gaps. Compared with conventional 22 mm ranges, using RMQ16 devices with their 18 x 18 mm front dimension, achieves three times the information density.



**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

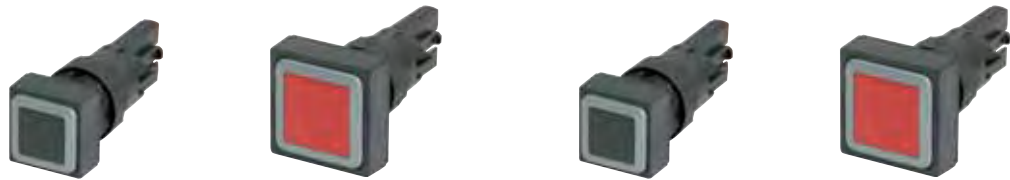
Label mounts with insert plates offer additional labelling options. Secured via the front elements, both elements are simply bolted on from the rear of the flush mounting plate using a lock nut.

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 212 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.”

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### 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



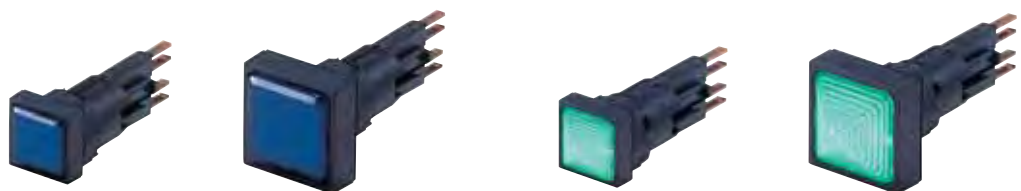
Key-operated actuators			
IP 65, NEMA 13			
18 x 18 mm 2 positions	25 x 25 mm 2 positions	18 x 18 mm 3 positions	25 x 25 mm 3 positions
↘ <sup>0</sup> Q18S1 ↘ <sup>0,I</sup> Q18S1R ↘ <sup>0</sup> Q18S1R-A1	↘ <sup>0</sup> Q25S1 ↘ <sup>0,I</sup> Q25S1R ↘ <sup>0</sup> Q25S1R-A1	↙↘ <sup>0</sup> Q18S3 ↙↘ <sup>I,0,II</sup> Q18S3R ↘ <sup>0</sup> Q18S3R-A1 ↘ <sup>I,0</sup> Q18S3R-A2 ↘ <sup>0,II</sup> Q18S3R-A3 ↘ <sup>I,0</sup> Q18S3R-A4 ↘ <sup>0</sup> Q18S3R-A5 ↙↘ <sup>0,II</sup> Q18S3R-A6 ↙↘ <sup>0</sup> Q18S3R-A7	↙↘ <sup>0</sup> Q25S3 ↙↘ <sup>I,0,II</sup> Q25S3R ↘ <sup>0</sup> Q25S3R-A1 ↘ <sup>I,0</sup> Q25S3R-A2 ↘ <sup>0,II</sup> Q25S3R-A3 ↘ <sup>I,0</sup> Q25S3R-A4 ↘ <sup>0</sup> Q25S3R-A5 ↙↘ <sup>0,II</sup> Q25S3R-A6 ↙↘ <sup>0</sup> Q25S3R-A7

Selector switch actuators	
IP 65, NEMA 13	
18 x 18 mm 2 positions	25 x 25 mm 2 positions
↘ Q18WK1 ↘ Q18WK1R	↘ Q25WK1 ↘ Q25WK1R
3 positions	3 positions
↙↘ Q18WK3 ↘ Q18WK3R ↘ Q18WK3R1 ↙↘ Q18WK3R2	↙↘ Q25WK3 ↘ Q25WK3R ↘ Q25WK3R1 ↙↘ Q25WK3R2

↘ = Stay-put 45°    ↘ = Spring-return 45°    For further individual locking arrangements please enquire

↘ = Stay-put 45°    ↘ = Spring-return 45°

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



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 SQT1	in four languages SRT1
Blank SQ-GE	Blank SR-GE

### Housing

IP 65

Locations	Surface mounting enclosures	Flush mounting panels
8	1 8	E 8
8		E 8-SW



### Contact elements

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

N/O	N/C
E10	E01

### Screw adapter

1 x 1.5 mm<sup>2</sup>  
2 x 0.75 mm<sup>2</sup>

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



Interface PCB's		
Bus system	For Titan surface mounting enclosures	
AS-Interface 4 I + 4 Q	RMQ-M1C-ASI	

Additional labelling		
	Insert plates	Label mounts, complete
	10 x 22 mm	25 x 38 mm
	01SQ25	Q25TS-01
	02SQ25	Q25TS-02
	05SQ25	Q25TGE-05
	111SQ25	Q25TS-111
	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 unmistakably.

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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	<b>24 V AC/DC</b> <b>110-130 VAC</b> <b>230 VAC</b>	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	<b>24 V AC/DC</b> <b>110-130 VAC</b> <b>230 VAC</b>	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	<b>24 V AC/DC</b> <b>110-130 VAC</b> <b>230 VAC</b>	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	<b>24 V AC/DC</b> <b>110-130 VAC</b> <b>230 VAC</b>	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	<b>24 V AC/DC</b> <b>110-130 VAC</b> <b>230 VAC</b>	SL-LED-B SL-LED230-B SL-LED230-B	SL-L24 SL-L130 SL-L230	

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# RMQ Titan with ATEX Approval



**ATEX = Atmospheres Explosibles =**  
explosive atmospheres

Moeller now offers the following in conformity with the manufacturers guidelines: ATEX guideline 94/9 EC (mandatory from 06/2003) devices from the RMQ Titan 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

II3D IP5X T85°C. According to the guideline for operators: 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.

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

Push button, flat	P.10	Double actuators	P.12
Push button, raised	P.10	Illuminated selector	
Mushroom actuators	P.11	Switch actuators	P.12
Selector switches	P.11/13	Joysticks	P.13
Key operated actuators	P.11	4-way push buttons	P.13
Illuminated push buttons	P.11	Emergency-Stop buttons	P.14
Indicator light lens assemblies	P.11	Foot and palm switches	P.15
		Potentiometers	P.15



The order is placed exclusively via M22-COMBINATION-\* with the specification M22-ATEX or FAK-COMBINATION-\* with the specification FAK-ATEX

Accessories for use with ATEX on request



**Important general mounting and application note:**

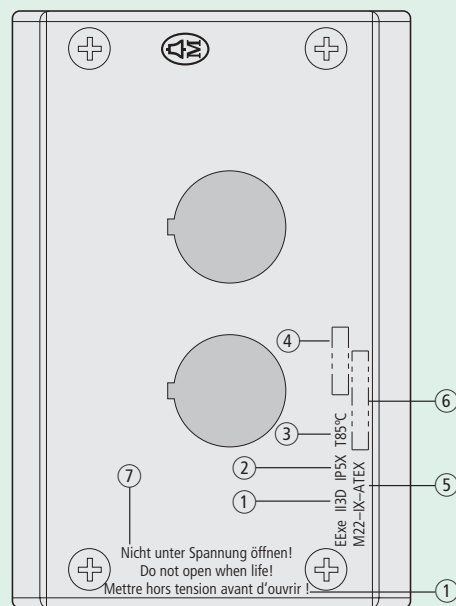
- only category 3D suitable cable glands can be used!
- only heat-resistant cables can be used (>90 °C)!
- the surface temperature is a maximum of 90 °C!
- only permissible with an ambient temperature from -20 °C to +40 °C!
- the technical data of the devices used must be observed!
- never open the device 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

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.



Approval certificate for use of the 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](http://www.moeller.net/atex)

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

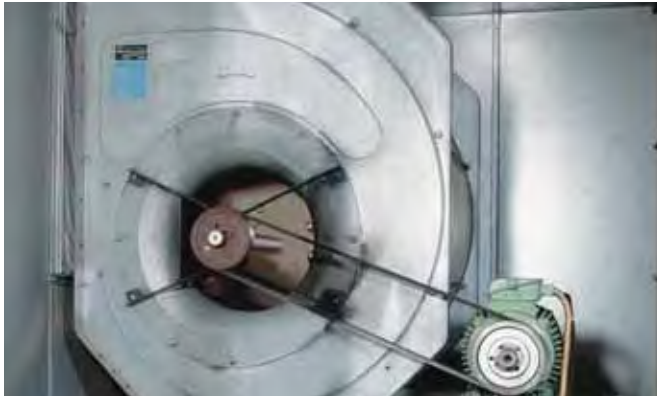
**xCommand**



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 new world innovation – the electronic safety/position switch LS-E – 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

They are used wherever positions must be reliably detected. They are available either in robust metal or light plastic enclosure designs. Exchangeable operating heads enable flexible use for all applications. The highlight of the series, the LSE-Titan electronic safety/position switches, connects mechanical safety/position switches to the world of automation. Positions can be continually detected and monitored with these switches.



### Safety/position switches LS...-ZBZ

Safety/position switches for detection of safety-relevant facilities and equipment, e.g. doors, grilles or flaps. In addition to the standard safety switches, the range includes position switches with anti-tamper features for enhanced protection of personnel and processes, and only enable after a delay time. This ensures for example, that saws must come to a standstill or process stages must be completed before the machine, system or plant can be approached.



### Proximity switches LSI, LSC, LSO

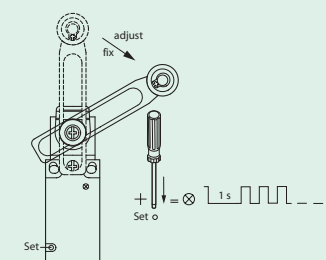
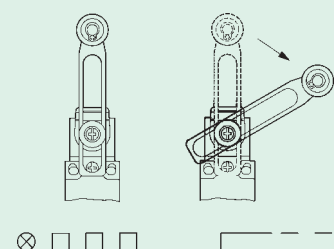
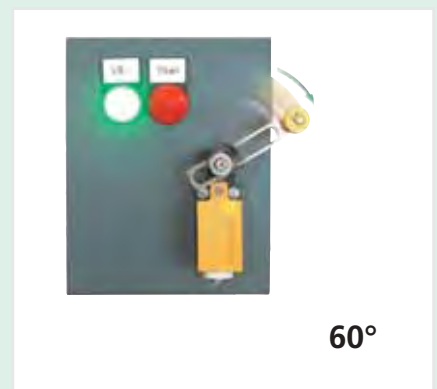
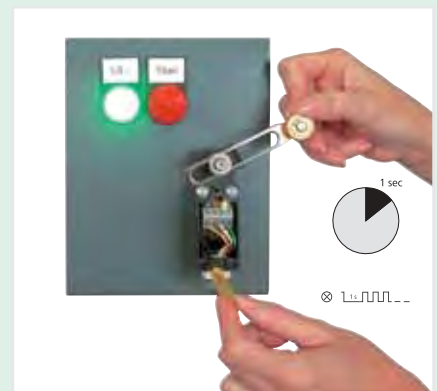
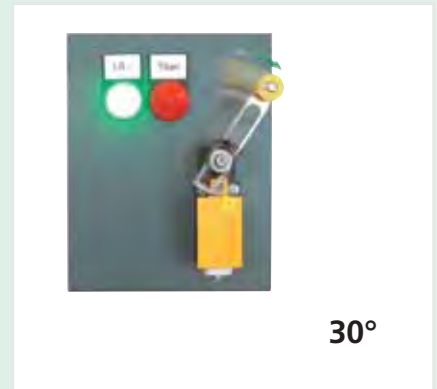
Modern automation engineering is practically unimaginable without the use of non-contact and non-invasive sensors. The speeds with which the processes are detected make the wear-free and robust sensors indispensable. Even under harsh conditions such as use in heavily contaminated environments. Inductive,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

# Electronic safety/position switch LSE-Titan® Setting a variable operating point


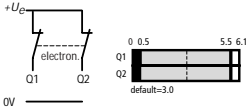
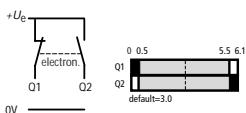

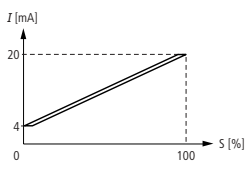
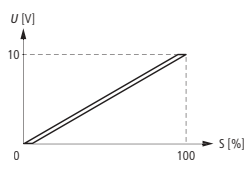


The electronic safety/position switch LSE has an operating point that can be set variably. Two fast and bounce-free PNP switch outputs enable high switching frequencies. They are protected against short-circuit and overload and are equipped with an abrupt switching behaviour. This guarantees a defined 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.
<b>Plastic version</b> 		<b>LSE-02</b>
		<b>LSE-11</b>
<b>Plastic version</b> 		<b>LSE-AI 4 – 20 mA</b>
		<b>LSE-AU 0 – 10 V</b>



#### 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 ( $4 \times 90^\circ$ ) 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.

# 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 Part no.	Plunger DIN EN 50 047 Part no.	Roller Plunger DIN EN 50 047 Part no.	Contact sequence diagram for front fixing	Front fixing DIN EN 50 047 Part no.	Contact sequence diagram for spring rod	Spring- Rod Part no.
Version	Contacts								
plastic version	- 2N/C ⊕		LS-02 LS-S02	LS-02-SW LS-S02-SW			LS-02/F LS-S02/F		
	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-11D LS-S11D	LS-11D-SW LS-S11D-SW			LS-11D/F LS-S11D/F		
	1N/O 1N/C ⊕		LS-11S <sup>2</sup> LS-S11S <sup>2</sup>	LS-11S-SW <sup>2</sup> LS-S11S-SW <sup>2</sup>	LS-11S/P <sup>2</sup> LS-S11S/P <sup>2</sup>		LS-11S/F <sup>2</sup> LS-S11S/F <sup>2</sup>		LS-11S/S <sup>2</sup> LS-S11S/S <sup>2</sup>
	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		
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 <sup>2</sup>		LSM-11S/P <sup>2</sup>		LSM-11S/F <sup>2</sup>		LSM-11S/S <sup>2</sup>
	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

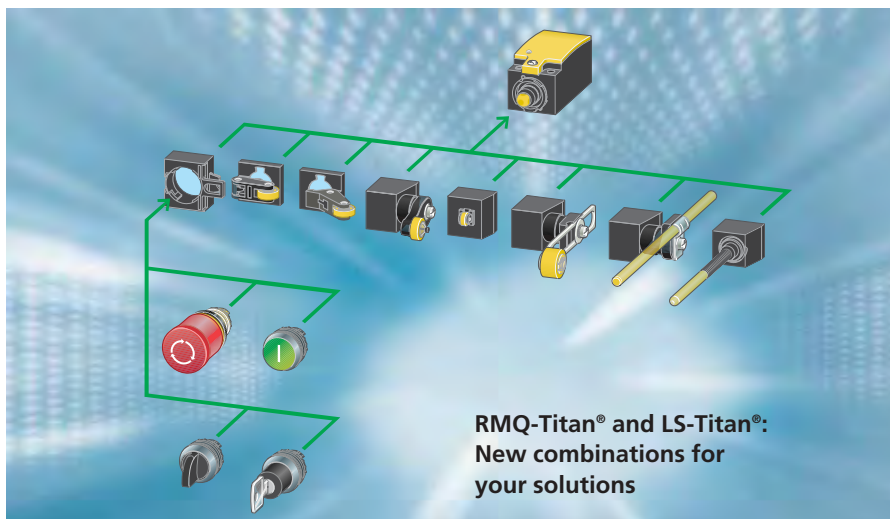
<sup>2</sup> LS/LSM-..S = Snap-Action contact


















Contact sequence diagram for roller lever short	Roller lever short	Contact sequence diagram for roller lever long	Roller lever long DIN EN 50 047	Contact sequence diagram for roller lever large	Roller lever large	Contact sequence diagram for rotary lever, adjustable roller lever and actuating rod	Rotary lever DIN EN 50 047	Adjustable roller lever	Actuating rod
	Part no.		Part no.		Part no.		Part no.		
			<b>LS-02/L</b> <b>LS-S02/L</b>						
	<b>LS-11/LS</b> <b>LS-S11/LS</b>		<b>LS-11/L</b> <b>LS-S11/L</b>		<b>LS-11/LB</b> <b>LS-S11/LB</b>		<b>LS-11/RL</b> <b>LS-S11/RL</b>	<b>LS-11/RLA</b>	
	<b>LS-11D/LS</b> <b>LS-S11D/LS</b>		<b>LS-11D/L</b> <b>LS-S11D/L</b>						
			<b>LS-11S/L<sup>2</sup></b> <b>LS-S11S/L<sup>2</sup></b>				<b>LS-11S/RL<sup>2</sup></b> <b>LS-S11S/RL<sup>2</sup></b>	<b>LS-11S/RLA<sup>2</sup></b> <b>LS-S11S/RLA<sup>2</sup></b>	<b>LS-11S/RR<sup>2</sup></b> <b>LS-S11S/RR<sup>2</sup></b>
			<b>LSM-02/L</b>						
			<b>LSM-11/L</b>				<b>LSM-11/RL</b>	<b>LSM-11/RLA</b>	
			<b>LSM-11D/L</b>						
			<b>LSM-11S/L<sup>2</sup></b>				<b>LSM-11S/RL<sup>2</sup></b>	<b>LSM-11S/RLA<sup>2</sup></b>	<b>LSM-11S/RR<sup>2</sup></b>

# 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	
Version	Part no.	Part no.	Part no.	Part no.	Part no.	Part no.	Part no.	
Plastic version	LS-XLS 	LS-XL 	LS-XLB 	LS-XLA 	LS-XP 	LS-XRL 	LS-XRLA 	
Metal version		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
	1N/O 1N/C ⊕		LS-11 LS-S11	LS-11-SW LS-S11-SW	LSM-11
	1N/O 1N/C ⊕		LS-11D LS-S11D	LS-11D-SW LS-S11D-SW	LSM-11D
	1N/O 1N/C ⊕		LS-11S <sup>2</sup> LS-S11S <sup>2</sup>	LS-11S-SW <sup>2</sup> LS-S11S-SW <sup>2</sup>	LSM-11S <sup>2</sup>
	2N/O -		LS-20 LS-S20	LS-20-SW LS-S20-SW	LSM-20
	1N/O 1N/C ⊕		LS-11DA LS-S11DS		LSM-11DA
	2N/O -		LS-20A LS-S20A		LSM-20A

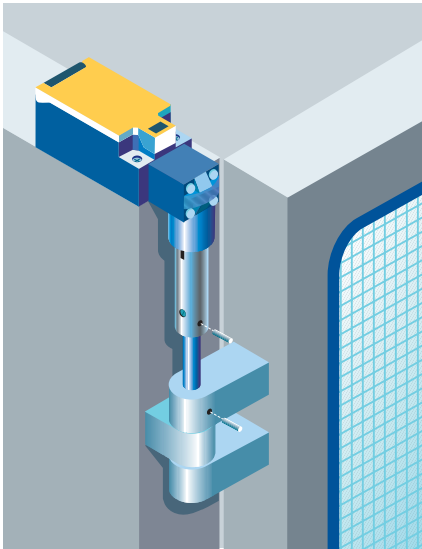
⊕ = positive opening safety function to IEC/EN 60947-5-1

<sup>2</sup> LS/LSM-..S = Snap-Action contact

Adjustable roller lever d=30mm	Adjustable roller lever d=40mm	Adjustable roller lever d=40mm (Rubber)	Plastic actuating rod	Metal actuating rod	Spring rod actuator	Actuating rod	RMQ-Titan fixing adapter	Cage-Clamp connector
Part no.	Part no.	Part no.	Part no.	Part no.	Part no.	Part no.	Part no.	Part no.
LS-XRLA30	LS-XRLA40	LS-XRLA40R	LS-XRR	LS-XRRM	LS-XS	LS-XOR	M22-LS	LS-XTW
			LSM-XRR	LSM-XRRM	LSM-XS			

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

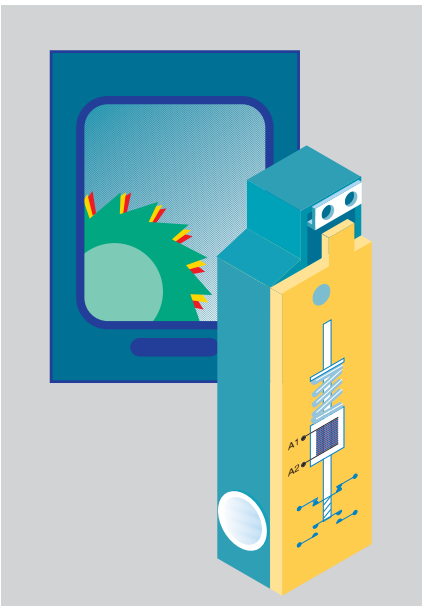
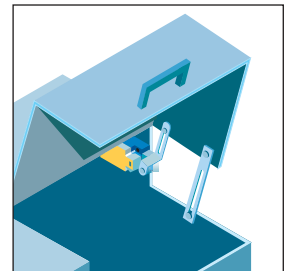


## Safety for persons and processes door safety switch LSR-... /T(K,S)

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 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.

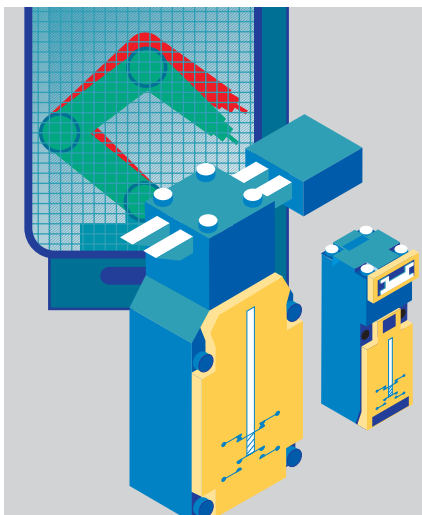


## Protect and lock: safety/position switch LS...-ZBZ

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 LS-ZB are used on centrifuges, motor and gear-box covers, presses, etc.. If the protective guard is opened, they disconnect the power and in so doing, remove the danger. LS 0-ZB and LS 4-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 driven switching elements and 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 ATR-.../TK narrow	Complete units Contacts ■ closed □ open Zw = Positive opening sequence	Door hinge safety switch ATR-.../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 <sub>s</sub> 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 DC 50/60 Hz	LS-S11-120 AFT-ZBZ/X	LS-S11-120 AMT-ZBZ/X
120 V DC 50/60 Hz	LS-S02-120 AFT-ZBZ/X	LS-S02-120 AMT-ZBZ/X
230 V DC 50/60 Hz	LS-S11-230 AFT-ZBZ/X	LS-S11-230 AMT-ZBZ/X
230 V DC 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. wide/narrow
	LS-11-1-ZB LS-S11-1-ZB LS-11S-ZB LS-S11S-ZB
	LS-02-1-ZB LS-S02-1-ZB
	LS4/S11-1-I/ZB LS4/S01-1/I/ZB
	LS4/S11-1/IA/ZB* LS4/S01-1/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 for swing doors	1500 N	LS-XW-ZBZ
Flexible, angled for doors that do not close precisely	750 N	LS-XF-ZBZ
Flexible, straight for doors that do not close precisely	1350 N	LS-XFG-ZBZ
Straight, with increased tolerance in closing direction for doors that does not close precisely	1350 N	LS-XNG-ZBZ
Angled, with increased tolerance in closing direction for doors that does not close precisely	500 N	LS-XNW-ZBZ

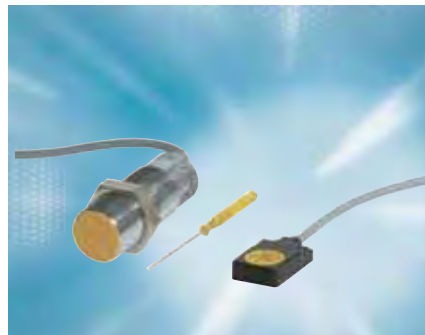
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# Proximity switches – safe switching without contact



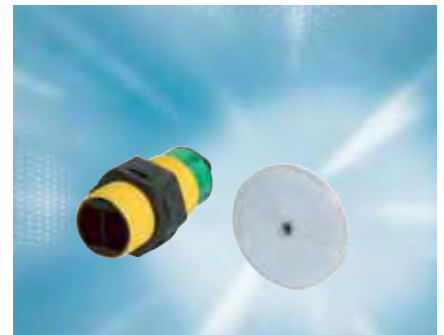
## Inductive proximity switches

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
<b>Reflected-light beam without background suppression M 18 x 1</b>			
	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
<b>Reflected-light beam with fixed background suppression M 30 x 1.5</b>			
	Plastic	LSO-R30P-S400-LD Sd 400 mm, P	LSO-R30P-S400-PD Sd 400 mm, P
<b>Reflected-light barrier without polarisation filter M 18 x 1</b>			
	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
<b>Reflected-light barrier with polarisation filter M 30 x 1.5</b>			
	Plastic	LSO-R30P-B6000-LD Sd 6000 mm, P	LSO-R30P-B6000-PD Sd 6000 mm, P
<b>Light-barrier reflectors for reflected-light barrier</b>			
		40 mm	LSO-XR40
		75 mm	LSO-XR75



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-R85-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-R85-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-R85-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*, Fitting in metal: Non-flush					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, C/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)

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

**xCommand**



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 of 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.



### 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	DILET11-M-W	DILE70-A	DILE70-W	ETR4-11-A	ETR4-11-W	ETR4-69-A	ETR4-69-W
<b>Time range</b>										
1.5-30 s	•	•								
0.05 s - 60 h			•	•	•	•				
0.05 s - 100 h						•	•	•	•	•
<b>Functions</b>										
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					•	•			•	•
<b>Features</b>										
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					•	•				
<b>Operation</b>										
Time range preselect		•	•	•	•	•	•	•	•	•
7 time ranges										
10 time ranges	•	•	•	•	•	•	•	•	•	•
Time fine setting	•	•	•	•	•	•	•	•	•	•
Function selector					•	•			•	•
<b>Control voltage</b>										
24-48 V DC										
24-240 V DC	•		•		•		•		•	
24-240 V AC 50/60Hz	•		•		•		•		•	
400 V AC 50/60Hz		•		•		•		•		•
<b>Contacts</b>										
1 changeover contact	•	•	•	•	•	•	•	•	•	•
2 changeover contacts										
Convertible 1 time, 1 non-delayed contact or 2 timed contacts										
<b>Accessories</b>										
Remote potentiometer					•	•				



	ETR4-70-A	ETR4-51-A	ETR4-51-W	ETR2-11	ETR2-12	ETR2-21	ETR2-42	ETR2-44	ETR2-69
	•	•	•	•	•	•	•	•	•
	•			•					•
	•				•				•
	•					•			•
	•						•		•
	•							•	•
		•	•						
	•								•
	•								•
	•								•
	•								•
	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•
				•	•	•	•	•	•
			•						
	•	•	•	•	•	•	•	•	•
	•								
	•								
	•								

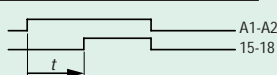
### Seven time ranges ETR2

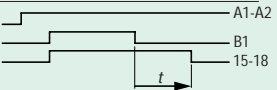
- 0.05 – 1.00 s          5 – 100 min
- 0.50 – 10.0 s         0.5 – 10 h
- 5.00 – 100 s          5 – 100 h
- 0.50 – 10 min

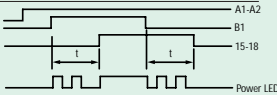
### Ten time ranges ETR4, DIL ET


- 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          15.0 – 100 h
- 0.50 – 10 min

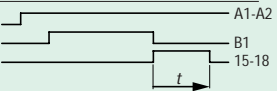
### 12 functions

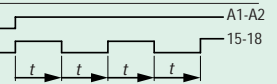
11 On-delayed 

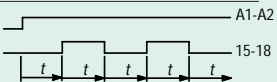
12 Off-delayed 

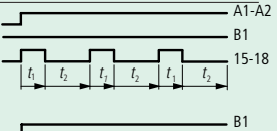
16 On- and Off-delayed 

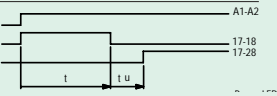
21 Fleeting contact on energization 

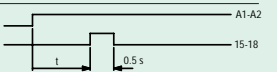
22 Fleeting contact on de-energization 


42 Flashing 

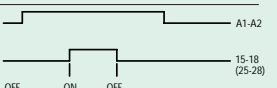
43 Flashing, pause initiating 

44 Flashing, 2 speeds 

51 Star-delta 

81 Pulse generating 

82 Pulse shaping 

On-Off function 

## Safety guaranteed – safety relays ESR

**xCommand**



Those who build machines need safety, for export also. Moeller offers competent consultation when you need to engineer a safe machine. Performing risk analysis with the Moeller safety manual is no problem. As soon as the machine control assumes safety tasks, the resistance of the control to malfunctions is defined conform to EN 954-1 "Safety-related parts of control systems". Different categories assist you in extending the control system and provide suitable resistance to malfunctions. Evaluation criteria include the seriousness of a possible injury, the length of time and frequency of which endangered persons are in the endangered area, as well as the possibility to avoid danger.



### Stop in an emergency

Stopping the machine is absolutely essential in an emergency. The EN 60204 "Electrical equipment of machines", therefore demands devices to stop the machine at the respective positions. The Emergency-Stop buttons from Moeller are positively opening and tamper-proof. The different versions cover all applications, ranging from the control desk to the Emergency-Stop button which may be actuated when wearing gloves.



### 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. Moeller offers the ideal position switch for his purpose. They are also tamper-proof and positively opening. Safety position switches with mechanical securing action can be used for coasting and dangerous movements. They prevent the door being opened until the movement ends.



### Safely monitored Emergency-Stop circuits

The electronic safety relays ESR from 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 short-circuits in the Emergency-Stop actuator circuit. These lead either 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. Tampering is prevented in this way! The safety relays comply with categories 2 to 4 of the EN 954-1 depending on their type and configuration.



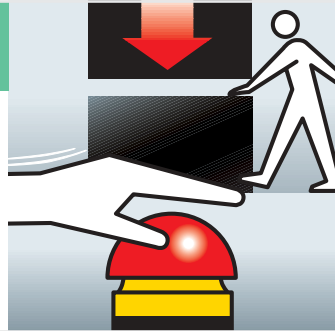
### Monitoring mobile protective mechanisms

The monitoring of protective screens on machines and processing centres is another important function of the electronic safety relay ESR from 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.

# Safety for your applications

## Stopping in an emergency

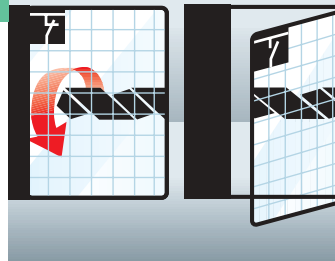
It is absolutely mandatory for a machine to be stopped in an emergency. EN60204, the standard governing "Electrical equipment of machines", therefore stipulates devices to effect this stop function at the appropriate points in the circuit. Control systems to the highest safety category, 4, can be constructed using Emergency-Stop buttons and electronic safety relays ESR4-NO from Moeller.



**Emergency-Stop mushroom buttons quickly stop the dangerous movement in an emergency.**

## 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, Moeller also offers electronic safety relays that monitor the safety function.



**Safety position switches stop potentially dangerous processes as soon as the protective door is being opened.**

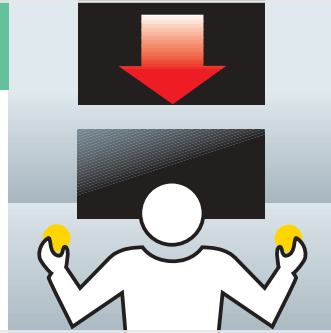
## ESR4...



Part no.	Application
ESR4-NO-21 (24VAC-DC)	Emergency-Stop, safety door, optical barrier
ESR4-NO-30-24VAC-DC	Emergency-Stop, safety door, optical barrier
ESR4-NO-30-115VAC	Emergency-Stop, safety door, optical barrier
ESR4-NO-30-230VAC	Emergency-Stop, safety door, optical barrier
ESR4-NO-31-24AC-DC	Emergency-Stop, safety door
ESR4-NO-31-115AC	Emergency-Stop, safety door
ESR4-NO-31-230AC	Emergency-Stop, safety door
ESR4-NV3-30 (24VDC)	Emergency-Stop, safety door, off-delayed 0.15-3 s
ESR4-NV30-30 (24VDC)	Emergency-Stop, safety door, off-delayed 1.5-30 s
ESR4-NZ-21 (24VAC-DC)	Two-hand
ESR4-NE-42 (24VAC-DC)	Contact expansion
ESR4-VE3-42 (24VDC)	Contact expansion, off-delayed 3 s

### Safe handling with protective controls

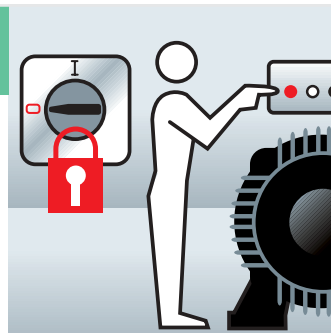
As the name suggests, two-hand controls must be actuated by two hands within 500 ms of one another, in order to start up or maintain the operating status of a machine. This protects the operating personnel during the danger period.



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

### Safety during repair and maintenance

Maintenance, repair and safety switches fulfil the important function of mains isolating devices. They isolate electrical installations safely from the supply system to enable maintenance or repair work to take place, thus preventing people, machines or production materials from being endangered.



A main switch secured by a padlock in the Off position provides safe working conditions.

	Emergency-Stop	Safety door	Two-hand control	1-channel	2-channel	Cross circuit recognition	Semiconductor input	Off-delayed	Reset button monitoring	Simultaneity monitoring	Feedback circuit	Enable current paths	Signal current paths	Feedback current paths	Enclosure width (mm)
	•	•		•	•	•	•		•	•	•	2	1		22.5
	•	•		•	•	•	•		•	•	•	3			22.5
	•	•		•	•	•	•		•	•	•	3			22.5
	•	•		•	•	•	•		•	•	•	3			22.5
	•	•		•					•		•	3	1		22.5
	•	•		•					•		•	3	1		22.5
	•	•		•	•	•	•	•	•	•	•	3			22.5
	•	•		•	•	•	•	•	•	•	•	3			22.5
			•		•	•				•	•	2	1		22.5
				•	•							4	2	1	22.5
				•	•			•				4		1	22.5

## Optimum protection for smooth operation – measuring and monitoring relays EMR4

**xCommand**



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.

For Immediate Delivery call [KMParts.com](http://KMParts.com) at (866) 595-9616



**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
<b>Phase sequence</b>	•	•	•	•	•									•	•	•	•	•	•	•	•	•	•
<b>Phase failure</b>	•	•	•	•	•									•	•	•	•	•	•	•	•	•	•
U<0.6xUe	•	•	•	•										•	•	•	•	•	•	•	•	•	•
U<0.95xUe					•																		
<b>Unbalance</b>															•	•	•	•					
2-15%															•	•	•	•				•	•
5-15%					•																		
<b>Monitoring voltage (measured voltage)</b>																							
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)																					•		
<b>Undervoltage</b>																							
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																						•	
<b>Overvoltage</b>																							
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																						•	
<b>Current measurement range</b>																							
0.003-1 A					•																		
0.3-15 A						•	•																
<b>Monitoring</b>																							
Adjustable upper and lower threshold					•	•																	
Adjustable upper threshold						•																	
<b>Sensitivity (level)</b>																							
5-100 kOhm																							
250 Ohm - 500 kOhm																							
<b>Insulation resistance</b>																							
in DC networks																							
10-110 kOhm																							
in AC networks																							
1-110 kOhm																							
<b>Supply voltage</b>																							
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																						•	
<b>Features</b>																							
<b>Width</b>																							
22.5 mm	•				•								•	•	•	•	•	•	•	•	•	•	•
45 mm		•	•	•		•	•				•												
<b>On-delay</b>																							
0.5 s					•																		
0.1-30 s						•	•																
On or off delay (selective;)																							
0.1-10 s		•	•	•																			
0.5-10 s										•	•												
Status display via LED	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<b>Contacts</b>																							
1 changeover contact					•					•			•	•									
2 changeover contacts	•	•	•	•		•	•			•	•		•	•	•	•	•	•	•	•	•	•	•
<b>Accessories</b>																							
Sealable shroud	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<b>Note</b>																							
*With neutral conductor monitoring																•	•						
Measurement/setting between phase and neutral pole																							

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

ATEX 

**xCommand**



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











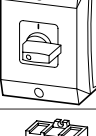

The rotary switch T represents a very flexible, compact and robust modular system. The T0, T3, T5B, T5, T6, T8 rating sizes are available in four different construction types. The rating of the T switch ranges from 6.5 kW to 132 kW with AC23A at 400/415 V, 50-60 Hz. The rated uninterrupted current  $I_U$  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.

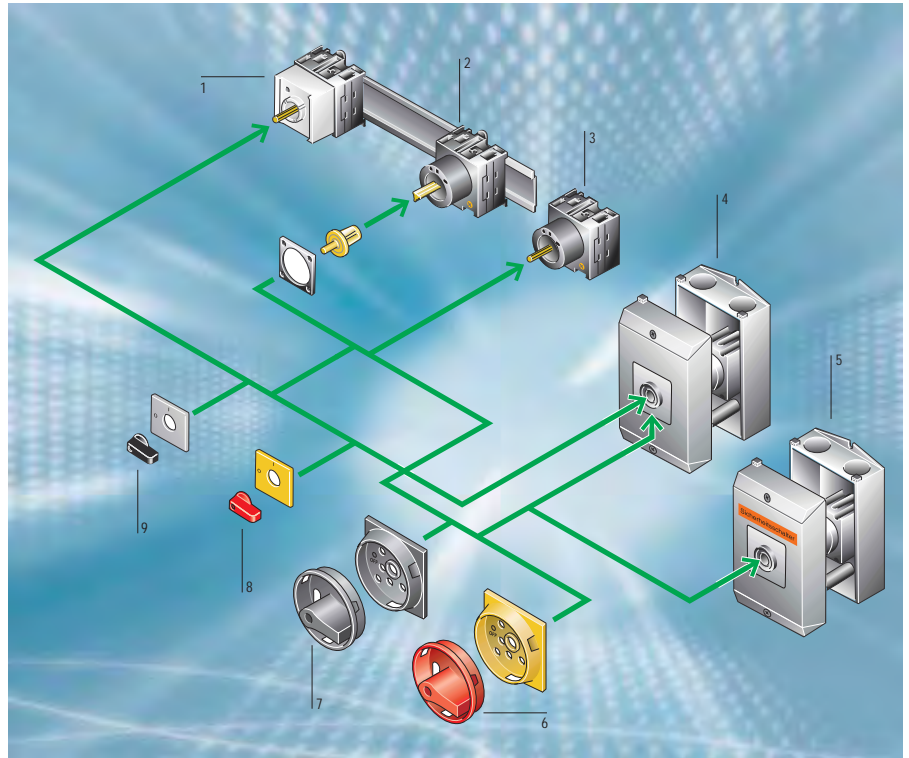
# Switching and control in practice

Construction type				Construction type group																			
Appearance	Construction type	Construction type description	Degree of protection	A1	A2	A4	A5	C	D	F	G	H1	H2	I2	K4	K5	L4	L5	N	O			
	E/SVB	Flush mount control circuit isolater <sup>1)</sup>	IP65 front																				
	EA/SVB	Flush mounting main switch, for use as an Emergency-Stop device <sup>2)</sup>	IP65 front	•	•	•	•	•	•														
	EA-SVB-SW	Flush mounting main switch, without Emergency-Stop function <sup>3)</sup>	IP65 front	•	•	•	•	•	•														
	I1/SVB	Surface mounting main switch, for use as an Emergency-Stop device <sup>2)</sup>	IP65	•																			
	I2/SVB				•																		
	I4/SVB					•																	
	I5/SVB							•															
	I45/SVB											•											
	I48/SVB													•									
	I1/SVB-SW	Surface mounting main switch, without Emergency-Stop function <sup>3)</sup>	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 <sup>2)</sup>	IP65 front	•	•	•	•	•	•	•	•												
	V/SVB-SW	Rear mounting main switch, without Emergency-Stop function <sup>3)</sup>	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 <sup>4)</sup>	IP65 front																				
	I1-RT	Surface mounting on-off switch, for use as an Emergency-Stop device <sup>4)</sup>	IP65																				
	I2-RT																						
	I4-RT																						
	I5-RT																						
	IVS-RT	Service distribution board mounting on-off switch, for use as an Emergency-Stop device <sup>4)</sup>	IP30 front																				

Notes: <sup>1)</sup> can be locked in the 0 position with padlocking feature  
<sup>2)</sup> according to IEC/EN 60204-1, VDE0113, part 1 with red rotary handle and yellow locking collar, can be locked in 0 position  
<sup>3)</sup> with black rotary handle and locking collar, can be locked in 0 position  
<sup>4)</sup> according to IEC/EN 60204-1, VDE0113 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**

# Overview of the rotary switch up to 100 A and switch-disconnector up to 315 A

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	Construction type group	13 KW	Construction type group	22 KW	Construction type group	30 KW	Construction type group	13 KW	Construction type group
Max. rated uninterrupted current $I_u$	20 A		32 A		63 A		100 A <sup>1)</sup>		25 A	
<b>Main switch without auxiliary contacts</b>										
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	–	
<b>Main switch without auxiliary contacts</b>										
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	–	
<b>On-off switch without auxiliary contacts</b>										
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	–	
<b>On-off switch with auxiliary contacts</b>										
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	–		–		–	
<b>On-off switch with Emergency-Stop function</b>										
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: <sup>1)</sup> 95A max at T5-4-8344/I5...



<b>P1-32</b>	Construction type group	<b>P3-63</b>	Construction type group	<b>P3-100</b>	Construction type group	<b>P5-125</b>	Construction type group	<b>P5-160</b>	Construction type group	<b>P5-250</b>	Construction type group	<b>P5-315</b>	Construction type group
15 KW		37 KW		50 KW		45 KW		55 KW		90 KW		110 KW	
32 A		63 A		100 A		125 A		160 A		250 A		315 A	
-		-		-		-		-		-		-	
-		-		-		-		-		-		-	
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	-		-		-		-	
-		-		-		-		-		-		-	
-		-		-		-		-		-		-	
-		-		-		-		-		-		-	
-		-		-		-		-		-		-	
P1-32/..	S2	P3-63/..	S4	P3-100/..	S5	-		-		-		-	
-		-		-		-		-		-		-	

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

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	
<b>Safety switch in surface mounting enclosure, with red handle and yellow locking collar, IP65</b>							
3 pole	-	-		-		-	
6 pole	-	-		-		T5B-3-8342/I4-SI	- <sup>1)</sup>
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	- <sup>1)</sup>
6 pole with auxiliary contact 2N/O / 0N/C	-	-		-		T5B-4-8903/I4-SI	- <sup>1)</sup>
<b>Safety switch in surface mounting enclosure, with black handle and locking collar, IP65</b>							
3 pole	-	-		-		-	
6 pole	-	-		-		T5B-3-8342/I4-SI-SW	- <sup>1)</sup>
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	- <sup>1)</sup>
6 pole with auxiliary contact 2N/O / 0N/C	-	-		-		T5B-4-8903/I4-SI-SW	- <sup>1)</sup>
<b>Changeover contact with 0 position</b>							
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
<b>Changeover contact without 0 position</b>							
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
<b>Reversing switch</b>							
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
<b>Star-delta switch</b>							
3 pole 0-Y-	-	T0-4-8410/..	H1	T3-4-8410/..	I2	T5B-4-8410/..	K4
<b>Reversing-star-delta switch</b>							
3 pole -Y-0-Y-	-	T0-5-15876/..	O	T3-5-15876/..	I2	T5B-5-15876/..	N
<b>multispeed switch, 3 poles, 2 speeds,</b>							
2 separate 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
<b>Reversing-pole changing, 3 poles, 2 speeds, 2 directions,</b>							
Pole changing 2-1-0-1-2	-	T0-6-15866/..	O	T3-6-15866/..	P	T5B-6-15866/..	N
<b>Surface mounting switch according to ATEX directive 94/9 EC</b>							
For use in ex-zone 22	-	• <sup>2)</sup>		• <sup>2)</sup>		• <sup>2)</sup>	
<b>Customized special switch</b>	•	•		•		•	

Notes:

<sup>1)</sup> The listed switch designations without construction type designation (A-Z) are completed types

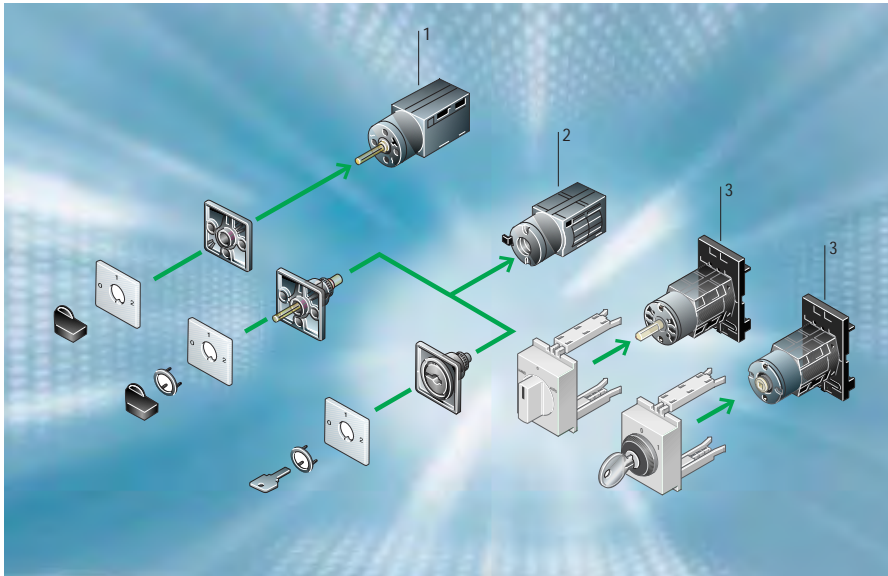
<sup>2)</sup> The basic types are available for ATEX application in dependence on the number of units or the switch type

<sup>3)</sup> 95 A max at T5-4-8344/15...

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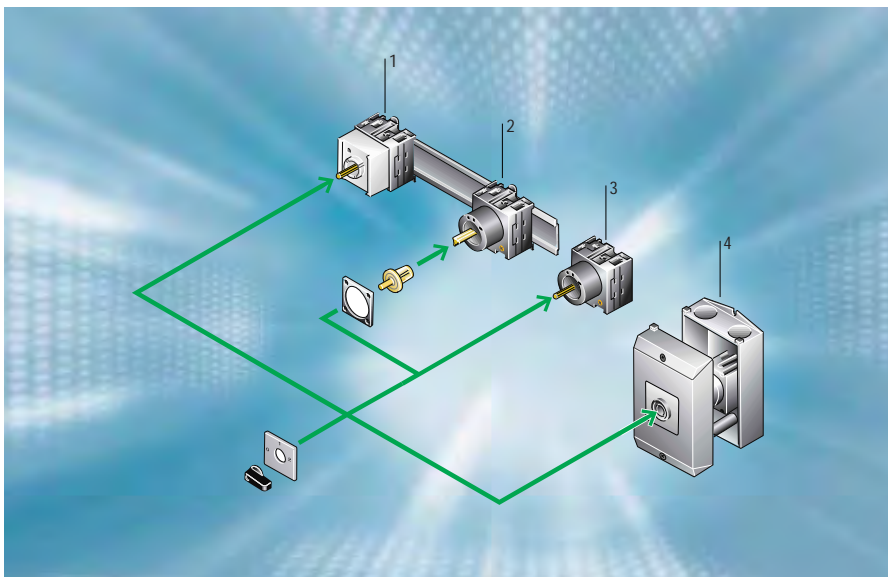
<b>T5</b>	Construction type group	<b>P1-25</b>	Construction type group	<b>P1-32</b>	Construction type group	<b>P3-63</b>	Construction type group	<b>P3-100</b>	Construction type group
30 KW	Construction type group	13 KW	Construction type group	15 KW	Construction type group	37 KW	Construction type group	50 KW	Construction type group
100 A <sup>3)</sup>		25 A		32 A		63 A		100 A	
–		P1-25/I2-SI	– <sup>1)</sup>	P1-32/I2-SI	– <sup>1)</sup>	P3-63/I4-SI	– <sup>1)</sup>	P3-100/I5-SI	– <sup>1)</sup>
T5-3-8342/I5-SI	– <sup>1)</sup>								
–		P1-25/I2-SI/N	– <sup>1)</sup>	P1-32/I2-SI/N	– <sup>1)</sup>	P3-63/I4-SI/N-	– <sup>1)</sup>	P3-100/I5-SI/N	– <sup>1)</sup>
–		P1-25/I2-SI/HI11	– <sup>1)</sup>	P1-32/I2-SI/HI11	– <sup>1)</sup>	P3-63/I4-SI/HI11	– <sup>1)</sup>	P3-100/I5-SI/HI11	– <sup>1)</sup>
T5-4-15682/I5-SI	– <sup>1)</sup>	–		–		–		–	
T5-4-8903/I5-SI	– <sup>1)</sup>	–		–		–		–	
–		P1-25/I2-SI-SW	– <sup>1)</sup>	P1-32/I2-SI-SW	– <sup>1)</sup>	P3-63/I4-SI-SW	– <sup>1)</sup>	P3-100/I5-SI-SW	– <sup>1)</sup>
T5-3-8342/I5-SI-SW	– <sup>1)</sup>								
–		P1-25/I2-SI/N-SW	– <sup>1)</sup>	P1-32/I2-SI/N-SW	– <sup>1)</sup>	P3-63/I4-SI/N--SW	– <sup>1)</sup>	P3-100/I5-SI/N-SW	– <sup>1)</sup>
–		P1-25/I2-SI/HI11-SW	– <sup>1)</sup>	P1-32/I2-SI/HI11-SW	– <sup>1)</sup>	P3-63/I4-SI/HI11-SW	– <sup>1)</sup>	P3-100/I5-SI/HI11-SW	– <sup>1)</sup>
T5-4-15682/I5-SI-SW	– <sup>1)</sup>	–		–		–		–	
T5-4-8903/I5-SI-SW	– <sup>1)</sup>	–		–		–		–	
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	–		–		–		–	
–		–		–		–		–	
● <sup>2)</sup>		● <sup>2)</sup>		● <sup>2)</sup>		● <sup>2)</sup>		● <sup>2)</sup>	
•		–		–		–		–	

# Switching and control in practice



**Control switch TM**

1. flush mounting
2. centre mounting
3. service distribution board mounting



**Control switch T0**

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

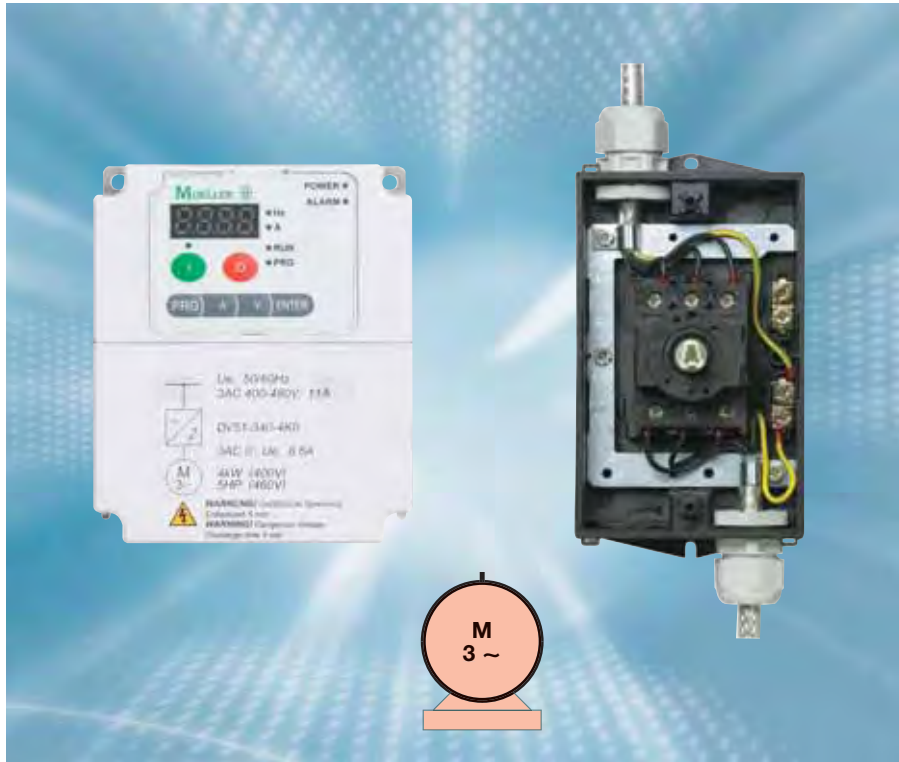
current control switch. Particularly suitable are rotary switches T0 and mini rotary switches TM; they also feature space-saving installation. Rotary switches are suitable for switching electronic circuits conform to IEC/EN 61131-2, VDE 0411 part 500. The T0 can master a whole range of switching applications 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**

Overview of rotary switches up to 20 A											
Basic switch type	TM	T0	Construction type group	Basic switch type	TM	T0	Construction type group	Basic switch type	TM	T0	Construction type group
Max. rated uninterrupted current $I_u$	10 A	20 A		Max. rated uninterrupted current $I_u$	10 A	20 A		Max. rated uninterrupted current $I_u$	10 A	20 A	
<b>Step switch with 0 position</b>				<b>On-off switch</b>				<b>Measurement selector switch voltage</b>			
1 pole 2 step; 0-1-2	TM-1-8240/..		W	1 pole; 0-1	TM-1-8290/..		X	3x phase-phase with 0 position		T0-2-15920/..	H1
1 pole 3 step; 0-1-2-3	TM-2-8241/..		W	2 pole; 0-1	TM-1-8291/..		X	3x phase-phase without 0 position		T0-2-15922/..	H1
1 pole 4 step; 0-1-2-3-4	TM-2-8242/..		W	3 pole; 0-1	TM-2-8292/..		X	3x phase-N with 0 position		T0-2-15921/..	H1
1 pole 5 step; 0-1-2-3-4-5	TM-3-8243/..		W	3 pole + N; 0-1	TM-2-8293/..		X	3x phase-phase and 3x phase-N with 0 position		T0-3-8007/..	H1
1 pole 6 step; 0-1-2-3-4-5-6	TM-3-8244/..		W	6 pole; 0-1	TM-3-8326/..		W	3x phase-phase and 3x phase-N without 0 position, complete rotation advance/retract		T0-3-15924/..	H1
1 pole 6 step; 0-1- bis-9	TM-3-8247/..		W	1 pole; 0-1	T0-1-15401/..		H1	<b>Current selector switch</b>			
2 pole 2 step; 0-1-2	TM-2-8260/..		W	2 pole; 0-1	T0-1-15402/..		H1	0-L1-L2-L3, complete rotation advance/retract		T0-3-8048/..	H1
2 pole 3 step; 0-1-2-3	TM-3-8261/..		W	3 pole; 0-1	T0-2-15403/..		H1	<b>Measurement selector switch voltage and current</b>			
2 pole 4 step; 0-1-2-4	TM-4-8262/..		W	3 pole + N; 0-1	T0-2-15404/..		H1	1-0-2-0, complete rotation advance/retract, measurement via transducer		T0-3-8030/..	H1
				<b>Selector switch with 0 position</b>				<b>Control circuit isolater 90°</b>			
3 pole 2 step; 0-1-2	TM-3-8280/..		W	1 pole; 1-0-2	TM-1-8210/..		X	1 pole, 0-1, red handle yellow locking collar		TM-1-8290/ E/SVB	— <sup>1)</sup>
3 pole 3 step; 0-1-2-3	TM-5-8281/..		W	2 pole; 1-0-2	TM-2-8211/..		X	1 pole, 0-1, black rotary handle/locking collar		TM-1-8290/ E/SVB-SW	— <sup>1)</sup>
3 pole 4 step; 0-1-2-3-4	TM-6-8282/..		W	3 pole; 2-0-1	TM-3-8212/..		W	2 pole, 0-1, red handle yellow locking collar		TM-1-8291/ E/SVB	— <sup>1)</sup>
1 pole 2 step; 0-1-2	T0-1-8240/..		H1	4 pole; 2-0-1	TM-4-8213/..		W	2 pole, 0-1, black rotary handle/locking collar		TM-1-8291/ E/SVB-SW	— <sup>1)</sup>
1 pole 3 step; 0-1-2-3	T0-2-8241/..		H1	1 pole; 2-0-1	T0-1-15421/..		H1	3 pole, 0-1, red rotary handle yellow locking collar		TM-2-8292/ E/SVB	— <sup>1)</sup>
1 pole 4 step; 0-1-2-3-4	T0-2-8242/..		H1	2 pole; 2-0-1	T0-2-15422/..		H1	3 pole, 0-1, black rotary handle/locking collar		TM-2-8292/ E/SVB-SW	— <sup>1)</sup>
1 pole 5 step; 0-1-2-3-4-5	T0-3-8243/..		H1	3 pole; 2-0-1	T0-3-15423/..		H1	3 pole + N, 0-1, red rotary handle yellow locking collar		TM-2-8293/ E/SVB	— <sup>1)</sup>
1 pole 6 step; 0-1-2-3-4-5-6	T0-3-8244/..		H1	<b>Selector switch via 0 position</b>				3 pole + N, 0-1, black rotary handle/locking collar		TM-2-8293/ E/SVB-SW	— <sup>1)</sup>
3 pole 2 step; 0-1-2	T0-3-8280/..		H1	1 pole; 1-2	TM-1-8220/..		X	6 pole, 0-1, red rotary handle yellow locking collar		TM-3-8326/ E/SVB	— <sup>1)</sup>
3 pole 3 step; 0-1-2-3	T0-5-8281/..		O	2 pole; 1-2	TM-2-8221/..		X	6 pole, 0-1, black rotary handle/locking collar		TM-3-8326/ E/SVB-SW	— <sup>1)</sup>
3 pole 4 step; 0-1-2-3-4	T0-6-8282/..		O	3 pole; 1-2	TM-3-8222/..		W	<b>Manual/automatic switch with 0 position</b>			
<b>Step switch without 0 position</b>				4 pole; 1-2	TM-4-8223/..		W	1 pole; manual-0-auto		TM-1-15431/..	X
1 pole 3 step; 1-2-3	TM-2-8230/..		X	5 pole; 1-2	TM-5-8369/..		W	2 pole; manual-0-auto		TM-2-15432/..	X
1 pole 4 step; 1-2-3-4	TM-2-8231/..		X	6 pole; 1-2	TM-6-8370/..		W	3 pole; manual-0-auto		TM-3-15433/..	W
1 pole 5 step; 1-2-3-4-5	TM-3-8232/..		W	<b>without 0 position</b>				1 pole; manual-0-auto		T0-1-15431/..	H1
1 pole 6 step; 1-2-3-4-5-6	TM-3-8233/..		W	1 pole; manual-auto	T0-1-15451/..		H1	2 pole; manual-0-auto		T0-2-15432/..	H1
1 pole 10 step; 1-2-bis -10	TM-5-8237/..		W	2 pole; manual-auto	T0-2-15452/..		H1	3 pole; manual-0-auto		T0-3-15433/..	H1
2 pole 5 step; 1-2-3-4-5	TM-5-8252/..		W	<b>with button function for manual</b>				1 pole; manual->0-auto		T0-1-15434/..	H1
2 pole 6 step; 1-2-3-4-5-6	TM-5-8253/..		W	1 pole; manual->0-auto	T0-1-15434/..		H1	2 pole; manual->0-auto		T0-2-15435/..	H1
3 pole 3 step; 1-2-3	TM-5-8270/..		W	2 pole; manual->0-auto	T0-2-15435/..		H1	1 pole; auto-0-manual<-start		T0-2-15907/..	H1
3 pole 4 step; 1-2-3-4	TM-6-8271/..		W	3 pole; manual-auto	T0-3-15453/..		H1	<b>Notes:</b> <sup>1)</sup> The listed switch designations without constructions type designation (A-Z) are completed types			
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								

# Practical Installation



## Screening connection to the switch enclosure!

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

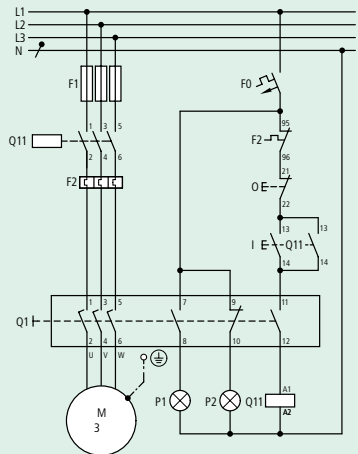
## CI-K the clever enclosure

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

# 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.

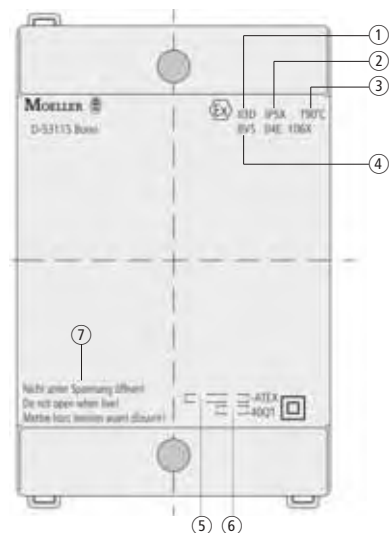
The listed circuits are complemented by special circuits.

## 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.

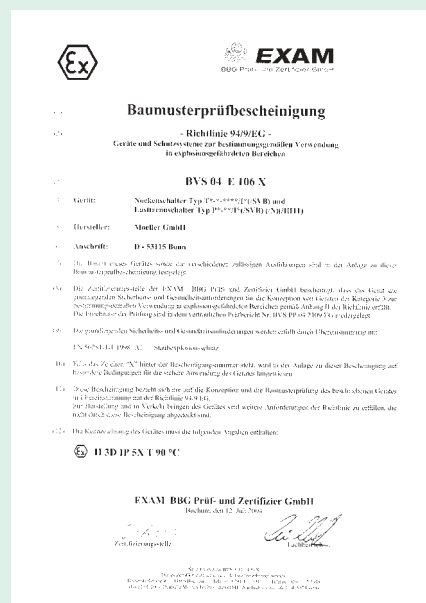


[www.moeller.net/atex](http://www.moeller.net/atex)

**ATEX = Atmospheres Explosibles = explosive atmospheres**

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.



Approval certificate for use of the 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

**xCommand**



**IP65**



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, .....



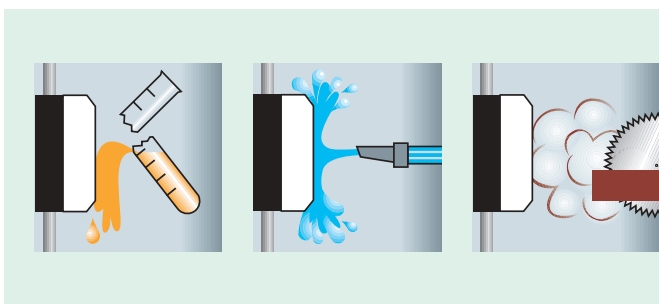
**Wiring without cable glands**

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.

# Overview of Small Enclosure Range CI-K



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

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

A = 1/4 x 1/2 inch knockout apertures  
 K = smooth all-round with lathe centre UL File No E54120  
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# Refreshingly Easy – The Clever easy Relays

**xSystem**

EASY-SOFT-BASIC / EASY-SOFT-PRO

easy Soft CoDeSys

easy Relay



easy MFD



easy Control



I/O expansions



Communication expansions



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.



### easy500 control relay

For controlling small applications with up to 12 I/O signals

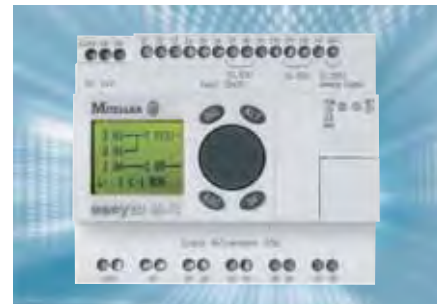
- Up to 12 I/O
- 128 rungs of 3 contacts and 1 coil each
- 16 operating and message texts
- 2 analog inputs (10-bit) optional (not 230 V AC)
- 2 high-speed inputs 1 kHz (only DC devices)
- 1 Ethernet gateway



### easy700 control relay

For controlling medium-sized applications with up to 40 I/O signals

- Up to 40 I/O
- 128 rungs of 3 contacts and 1 coil each
- 16 operating and message texts
- 4 analog inputs (10-bit) optional (not 230 V AC)
- 2 high-speed counter inputs 1 kHz (only DC devices)
- 1 Ethernet gateway
- 1 easy expansion device or 1 fieldbus module



### easy800 control relay

For controlling large applications with over 300 I/O signals

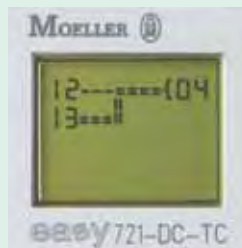
- Over 300 I/O
- 256 rungs of 4 contacts and 1 coil each
- 32 operating and message texts
- 4 analog inputs (10-bit) optional (not 230 V AC)
- 4 high-speed counter inputs 5 kHz (only DC devices)
- 1 Ethernet gateway
- 1 digital expansion or network gateway
- Networkable via easy-NET with up to 8 stations
- 1 analog output (10-bit)

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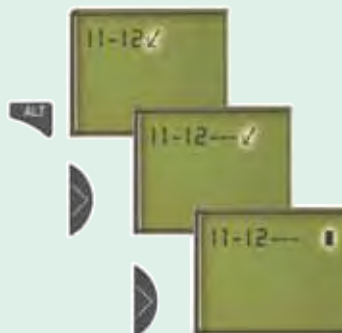
# easy500/easy700 and easy800 Control Relays

## 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	Stand-alone operation							Expandable (EASY2... , EASY6... )				
Part no.	EASY512-AB-RC <sup>1)</sup>	EASY512-AC-R	EASY512-AC-RC <sup>1)</sup>	EASY512-DA-RC <sup>1)</sup>	EASY512-DC-R	EASY512-DC-RC <sup>1)</sup>	EASY512-DC-TC <sup>1)</sup>	EASY719-AB-RC <sup>1)</sup>	EASY719-AC-RC <sup>1)</sup>	EASY719-DA-RC <sup>1)</sup>	EASY719-DC-RC <sup>1)</sup>	EASY721-DC-TC <sup>1)</sup>
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 the following can be used as: Inputs, analog 0 - 10 V	2	-	-	2	2	2	2	4	-	4	4	4
of which the following can be used as: 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 mm <sup>2</sup> (AWG 22-12), rigid 0.2 - 2.5 mm <sup>2</sup> (AWG 22-12), flexible							0.2 - 4.0 mm <sup>2</sup> (AWG 22-12), rigid 0.2 - 2.5 mm <sup>2</sup> (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				

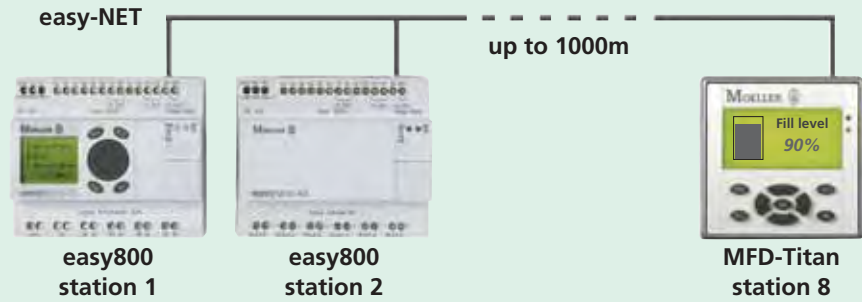
[1] Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A / 24 V DC, max 4 outputs switchable in parallel

[2] With backlight in continuous operation

\*) Add X for types without integrated display or keypad

**Over 300 I/O points with easy800 and MFD-Titan**

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**

Basic units	800 series basic units				
Application	Expandable (EASY2... , EASY6... ), networkable (easy-NET)				
Part no.	EASY819-AC-RC <sup>(1)</sup>	EASY819-DC-RC <sup>(1)</sup>	EASY820-DC-RC <sup>(1)</sup>	EASY821-DC-TC <sup>(1)</sup>	EASY822-DC-TC <sup>(1)</sup>
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 the following can be used as: Inputs, analog 0 - 10 V	-	4	4	4	4
of which the following can be used as: 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 mm <sup>2</sup> (AWG 22-12), rigid 0.2 - 2.5 mm <sup>2</sup> (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				

“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”.



[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 to 30 °C

\*) Add X for types without integrated display or keypad

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# Visualization, Control, Regulation and Communication – made 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. During operation, the function buttons of the MFD-Titan can also be used for displaying and changing setpoints.

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 aggressive environments. Like easy800, MFD-Titan can be expanded and networked to standard bus systems and can also be networked via "easy-Net". 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.

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### 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

For controlling large-scale applications with powerful visualization features

-  • Over 300 I/O
-  • 256 rungs of 4 contacts and 1 coil each
-  • 32 operating and message texts
-  • 4 analog inputs (10-bit optional (not 230 V AC))

-  • 4 high-speed counter inputs 5 kHz (only DC devices)
-  • 1 digital expansion or network gateway
-  • Networkable via easy-NET with up to 8 stations
-  • 1 analog output (10-bit)
-  • 1 Ethernet gateway

-  • LCD display, 132 x 64 pixels, 4x16 or 2x9 lines x characters
-  • Bitmaps
-  • Value display/entry
-  • Bargraph
-  • Clock

# MFD-Titan

## Multi-Function Display



### MFD-Titan, the HMI control

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 easy 800 with powerful visualization functions. The two modules are simply plugged together. Plug & Work.



MFD-80-B



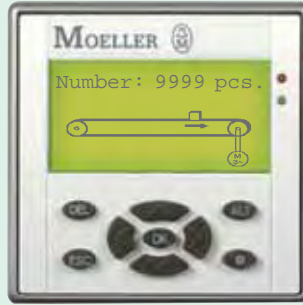
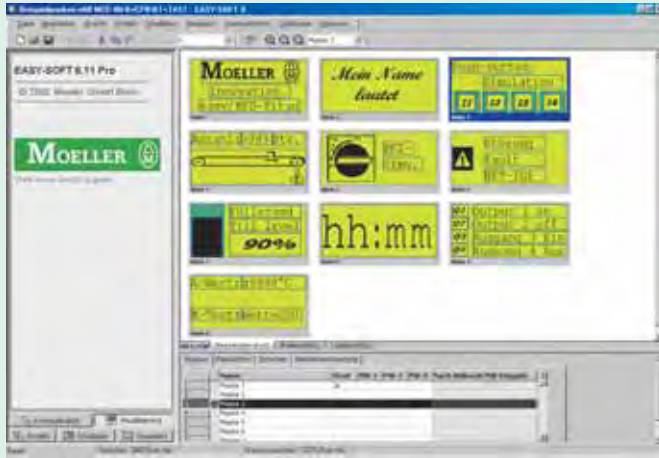
MFD-CP8-NT

Basic units	MFD-Titan					
Application	Display		Power supply/CPU			
Part no.	MFD-80	MFD-80-B	MFD-CP8-ME	MFD-CP8-NT	MFD-AC-CP8-ME	MFD-AC-CP8-NT
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 mm <sup>2</sup> (AWG 24-12), rigid 0.2 - 2.5 mm <sup>2</sup> (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

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### Screen editor

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



MFD-R16



MFD-TA17



MFD-TP12-PT-B

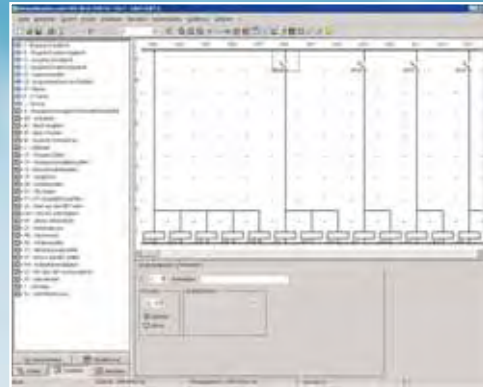
### Inputs / outputs

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	12	12	12	12	12	12
-	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 mm <sup>2</sup> (AWG 24-12), rigid 0.2 - 2.5 mm <sup>2</sup> (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

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# easy Soft User-Friendly Circuit Diagram Entry Parameterization and Visualization



Easy Soft 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!

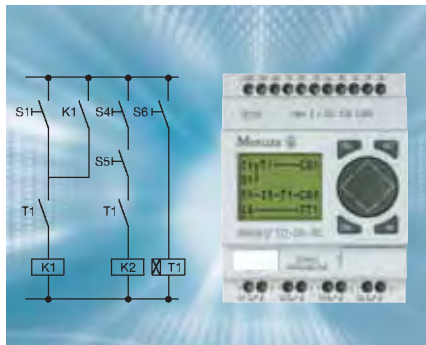
The screen editor provides a host of different screen elements for creating visualizations with the MFD-Titan multi-function display.

easy Soft:

- 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

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



The menus and dialogs of easy-soft 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

Easy Soft 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

Easy Soft 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 easy-soft 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



Easy Soft also enables you to manage easy800 control relays or MFD-Titan MFD...CP8... units connected via easy-NET. The program for the possible maximum of 8 stations on the easy-NET is created in easy Soft.

Easy Soft also enables simple and time-saving commissioning of the easy800 control relays or MFD-Titan MFD...CP8... units connected to easy-NET.

Easy Soft'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.

### easy control relay and MFD-Titan multi-function display are maintenance-free

The created program is stored retentively in the devices. An additional auxiliary supply or battery is not required. The easy control relay and MFD-Titan multi-function display are thus completely maintenance-free. However, not only the program and parameters are protected in the event of a power failure. Actual switching states and values are also retained in easy and MFD...CP8. For example, the actual values of operating hours meters, counters and timing relays can be processed further once power is restored. Function block and data retention is possible for all easy types and for the multi-function display.

# easy Control – Full Functionality in the Compact Class, Ethernet and High Performance



Easy Control is the logical continuation of the easy success story. The easy Control EC4P can provide user-friendly solutions for small to medium-sized automation tasks. It can be used both with the standard easy system as well as in combination with virtually all automation devices via the integrated CANopen interface. The Ethernet onboard interface enables the inclusion of additional features such as an OPC server and network programming. The IEC 61131-3 based easy Soft CoDeSys, a 256K program memory and a powerful CPU make the easy Control the perfect solution provider for tasks that were previously impossible for the easy world.



**Versatile use:**

The versatility of the new easy Control compact PLC enables it to be used in a wide range of areas. It has the ideal design for both machine and system building. More and more technologies today are combined in automation solutions.




**Easy to network:**

In addition to the basic control functions, this includes fieldbus gateways, HMI functions and also the connection to planning and quality management systems. The Ethernet connection plays an ever increasing importance here, and is not a problem for the powerful easy Control device.




**easy Control**


Controller for small and medium-sized automation tasks

-  • 12 digital inputs


---

-  • 6 digital relay outputs or alternatively


---


-  • 8 transistor outputs

---


-  • 4 analog inputs (10-bit) optional (not 230 V AC)

---


-  • 4 high-speed inputs 50 kHz (only DC devices)

-  • 1 digital expansion or network gateway


---

-  • Networkable via easy-NET with up to 8 stations, CANopen

---

-  • 1 analog output (10-bit)


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-  • 1 Ethernet gateway

---

- 256k** • 256K program memory

---

-  • IL / FBD / LD / ST / CFC / SFC

# easy Control Compact Controller



### 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 integrated Ethernet interface enables the easy Control to be programmed conveniently and also installed in existing infrastructures such as OPC.

### 4 User-friendly operation

As the only compact PLC with an integrated or detached display, the easy Control is also suitable for basic HMI functions like the standard easy models.



EC4P-221-MTX1



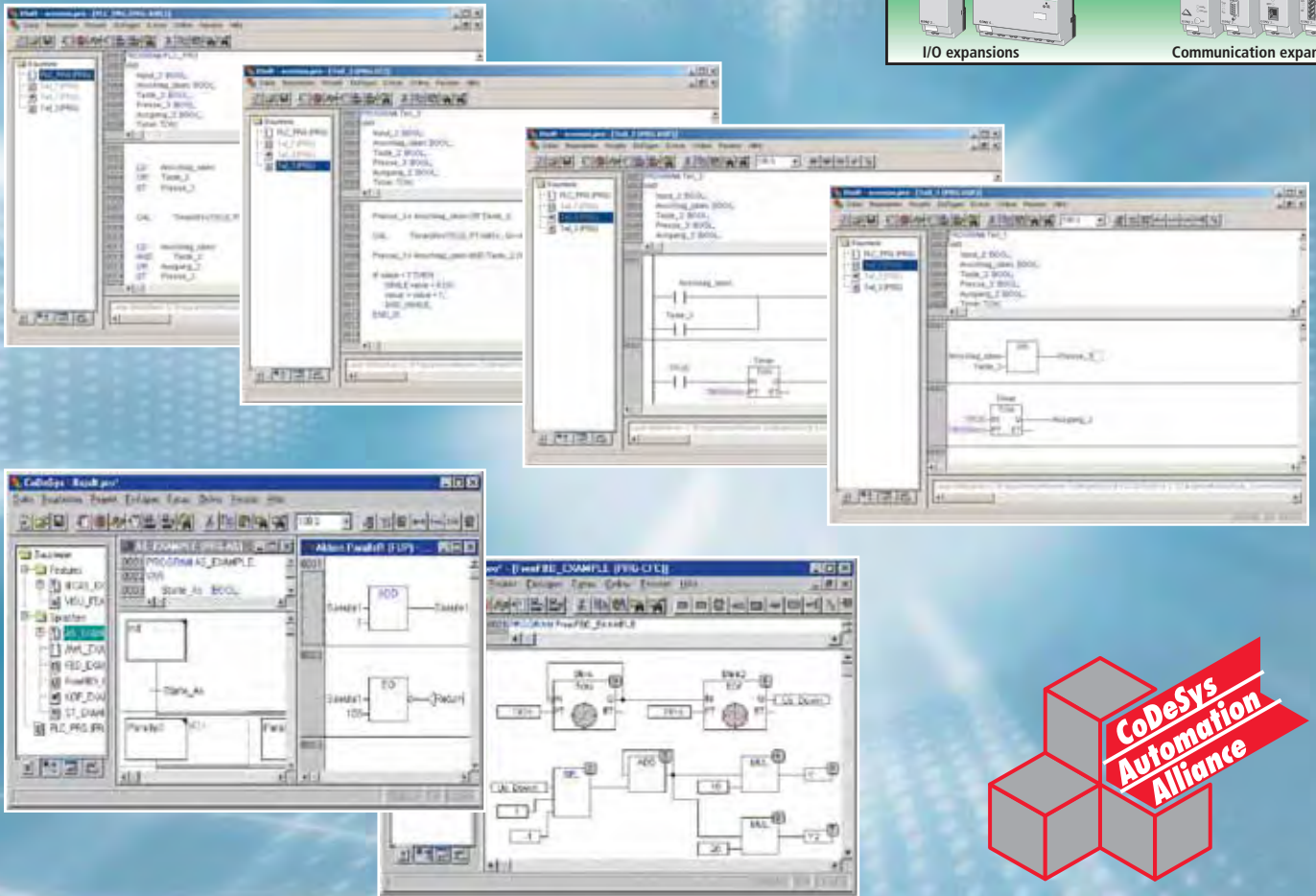
EC4P-222-MTX1

Basic units	easy Control							
Application	Compact PLC for different applications							
Part no.	EC4P-221-MTX <sup>1)</sup>	EC4P-221-MRX <sup>1)</sup>	EC4P-221-MTA <sup>1)</sup>	EC4P-221-MRA <sup>1)</sup>	EC4P-222-MTX <sup>1)</sup>	EC4P-222-MRX <sup>1)</sup>	EC4P-222-MTA <sup>1)</sup>	EC4P-222-MRA <sup>1)</sup>
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

[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  
\*) X without display, D with display

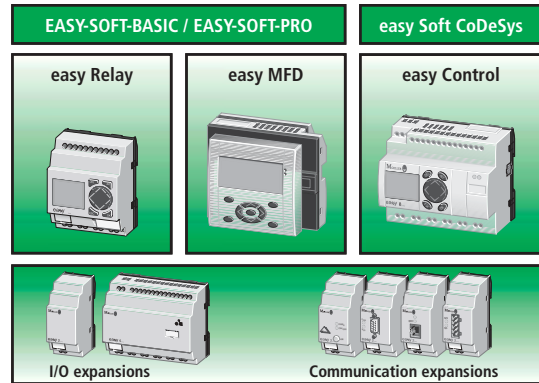


# easy Soft CoDeSys – IEC 61131-3 Compliant Programming



Easy Soft CoDeSys is an IEC 61131-3 compliant programming system based on CoDeSys 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. Regardless of whether you require a graphical programming language such as function block diagram, ladder diagram, sequential function chart; or textual programming such as instruction list or structured text – easy Soft Codesys is the right programming tool. You can also test your application program without having to connect a PLC. XSoft's integrated online simulation function makes this possible. Neither do you have to use a different operator interface, since handling is exactly the same as online operation with the PLC connected.

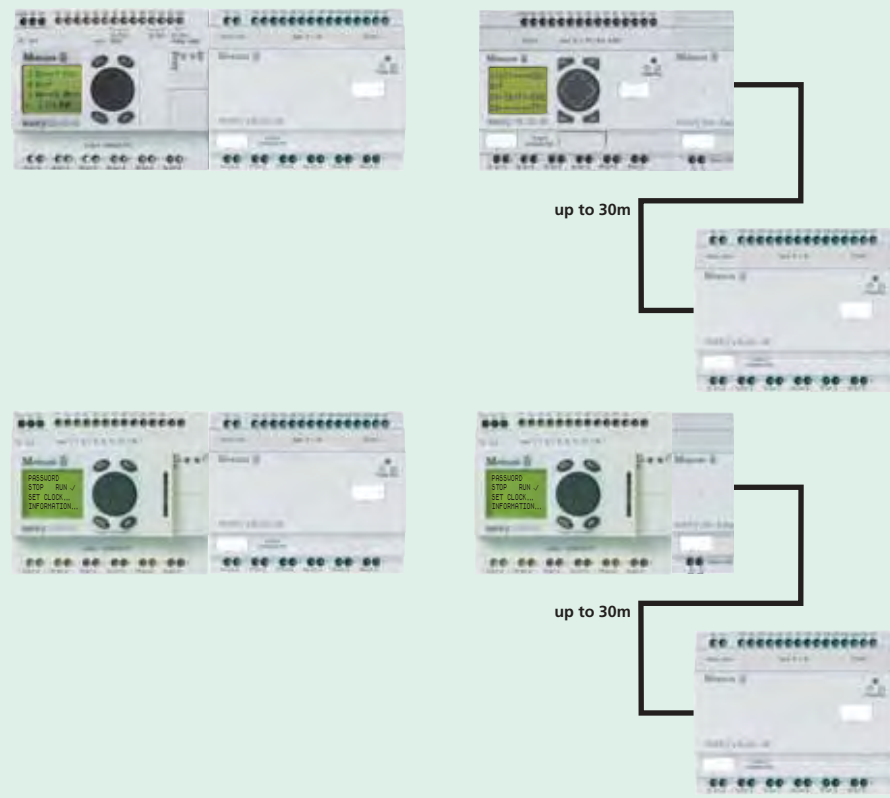
# easy Expansions and Communication Modules



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

The communication modules of the easy Relays, easy MFD and easy Control 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
- Profibus DP

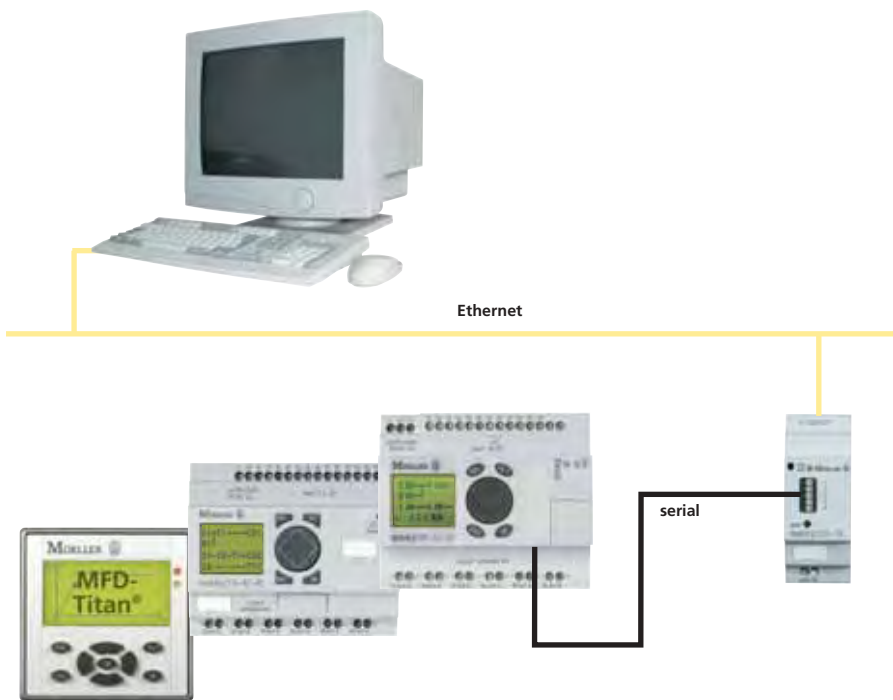


The expandable basic units of the easy Relay series, easy MFD and easy Control enable the implementation of both local and remote I/O expansions.

In conjunction with the EASY618-AC-RE, EASY618-DC-RE or EASY620-DC-TE expansion modules, a unit can be provided with up to 24 inputs and 16 outputs.

These three expansion modules are fitted directly on the basic unit and are connected via the easy-Link 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.



### Ethernet gateway

The Easy-209-SE network module now provides a convenient Ethernet connection for the easy Relays and MFD-Titan, thus enabling corporate network connections, remote programming and the implementation of an OPC server. (programming via Ethernet from EASY-Soft V6.20)

The network module is an RS232 Ethernet gateway that can be connected to the programming interface of all devices of the easy system.



Accessories	Expansion modules				Expansion modules					
Application	Digital inputs / outputs				Communication					
Part no.	EASY202-RE	EASY618-AC-RE	EASY618-DC-RE	EASY620-DC-TE	EASY200-EASY	EASY204-DP	EASY205-ASI	EASY221-CO	EASY222-DN	EASY209-SE
Supply voltage	-	100 - 240 V AC	24 V DC		-	24 V DC	-	24 V DC	24 V DC	24 V DC
Heat dissipation	1 W	10 VA	4 W		1 W	2 W	1 W	1 W	1 W	1 W
Inputs, digital	-	12	12	12	-	-	-	-	-	-
Outputs (R=Relay, T=Trans.)	2R	6R	6R	8T	-	-	-	-	-	-
Continuous current outputs [1]	8 A	8 A	8 A	0.5 A	-	-	-	-	-	-
Connection cables	0.2 - 4.0 mm <sup>2</sup> (AWG 22-12), rigid 0.2 - 2.5 mm <sup>2</sup> (AWG 22-12), flexible				0.2 - 4.0 mm <sup>2</sup> (AWG 22-12), rigid 0.2 - 2.5 mm <sup>2</sup> (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	35.5 x 90 x 58 mm	107.5 x 90 x 58 mm			35.5 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

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# "Detached" Display: easy Text Display With Optimum Protection



MFD-80-B



MFD-CP4

## Plug & Work

With Moeller's MFD-CP4-500 / MFD-CP4-800 supply and communication module, all easy Relay and easy Control applications can include a detached 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 easy control 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 & Play 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.

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-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 mm <sup>2</sup> (AWG 24-12), rigid 0.2 - 2.5 mm <sup>2</sup> (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

# Download Center Information and Documentation



Further information on the easy control relay and MFD-Titan multi-function display described is available from our home page at:

<http://mfd.moeller.net>

<http://easy.moeller.net>

<http://www.moeller.net/support>  
(Search term: easy or MFD)

## Online Training Center

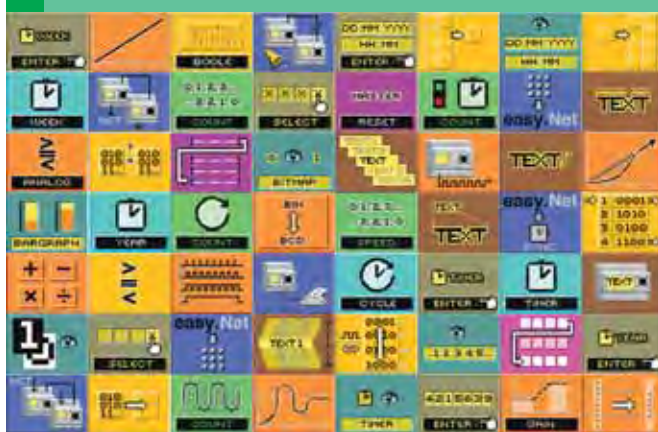
Moeller has also developed a brand new web-based information and training platform for the easy control relay and for the MFD-Titan multi-function display. The Online Training Center is divided into the four areas "Products", "Functions", "Applications" and "Software": The website primarily provides fully programmed and documented applications for different branches. It also

provides a wide range of information on all aspect of easy and MFD-Titan, with additional links to more detailed information. The FAQ area of the website presents useful tips and tricks for these devices. A full text search facility provides support for finding information on particular topics.



<http://www.trainingscenter.moeller.net>

## ▶ Functions



This provides an overview of the functionality of easy devices, as well as direct links to more detailed presentations of the selected functions.

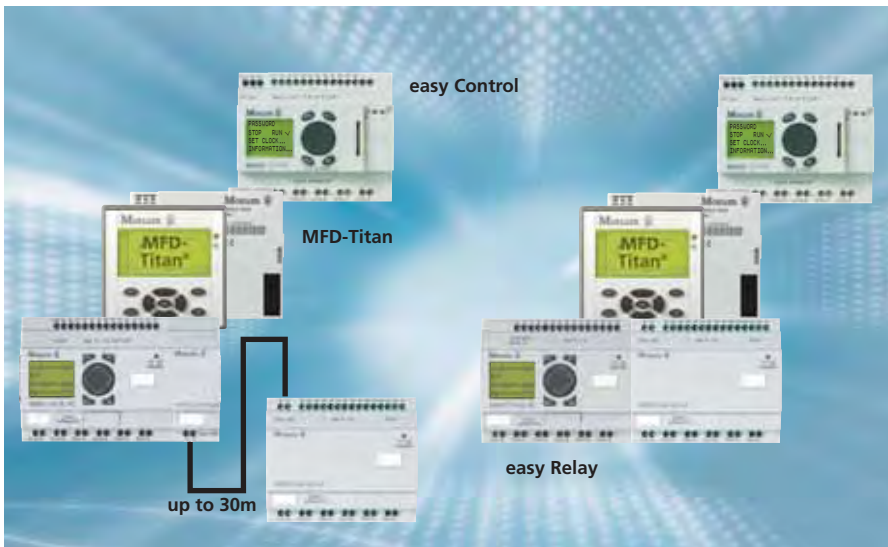
## ▶ Applications



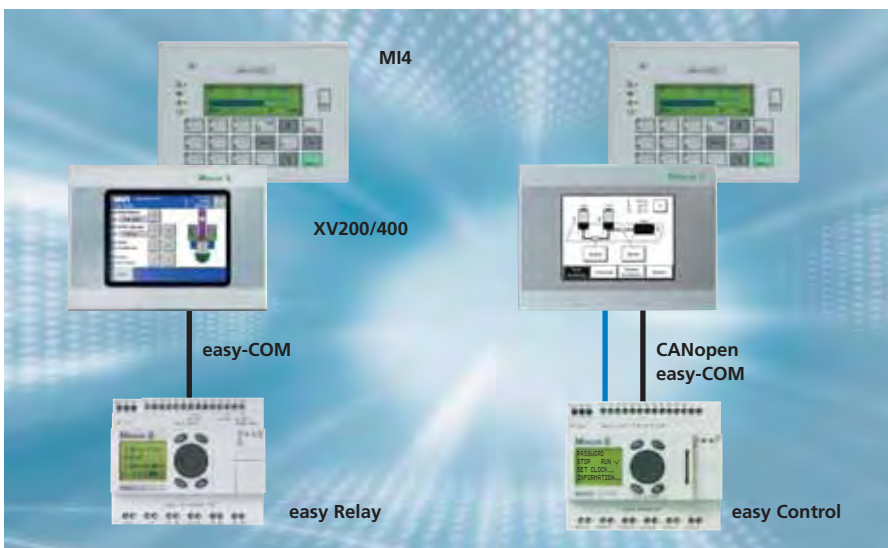
This presents applications for different branches. Load the ready-to-use program in your easy and put it immediately into practice.

For Immediate Delivery call [KMParts.com](http://KMParts.com) at (866) 595-9616

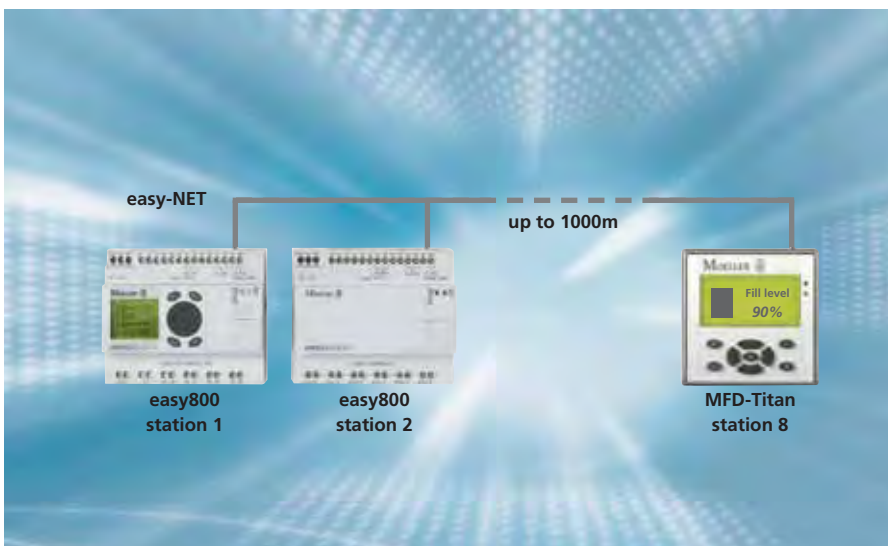
# Applications



The expandable basic units of the easy700, easy800 series and MFD-Titan® and easy Control enable local or remote I/O expansions to be implemented.

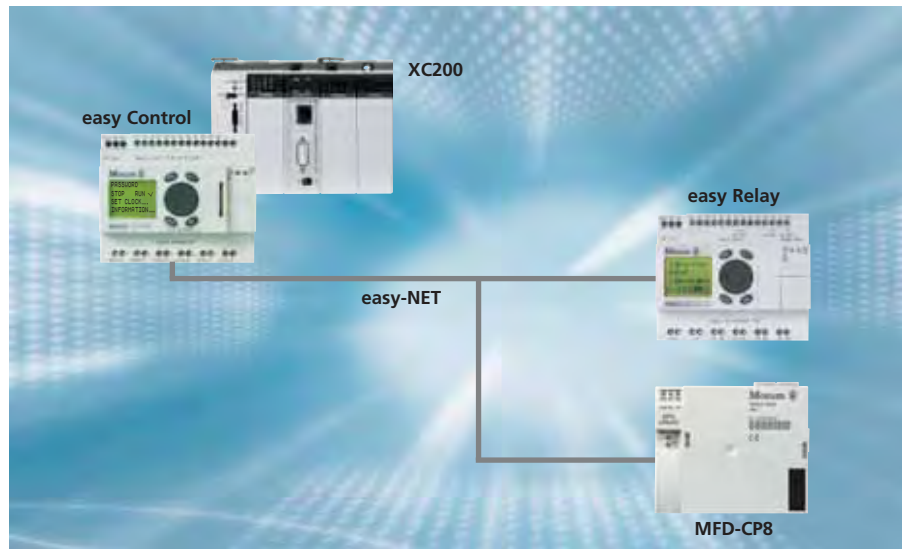


Text and touch displays for more powerful visualization tasks can communicate with the easy800/MFD-Titan and easy Control without any additional requirements.

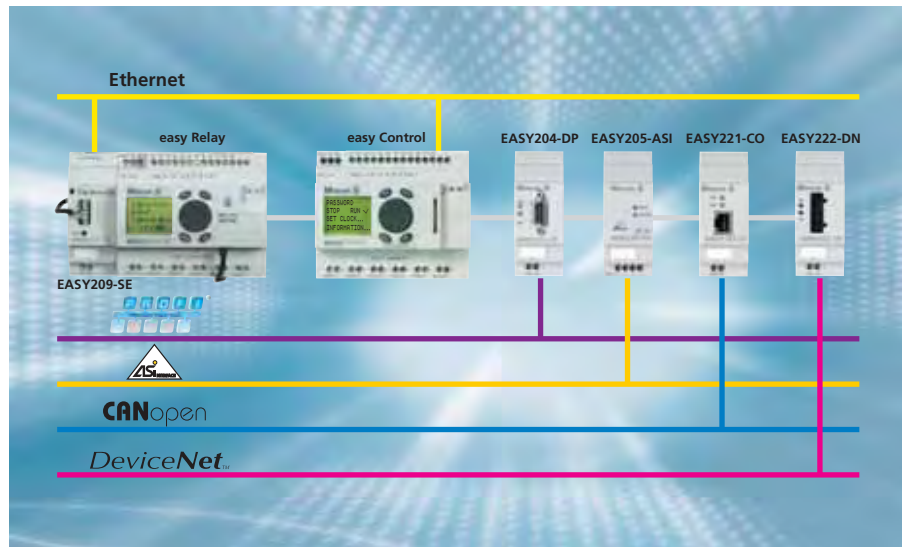


easy-NET enables up to 8 easy800, MFD-Titan and easy Control devices to be networked together. In this way, up to 300 I/O points can be scanned.

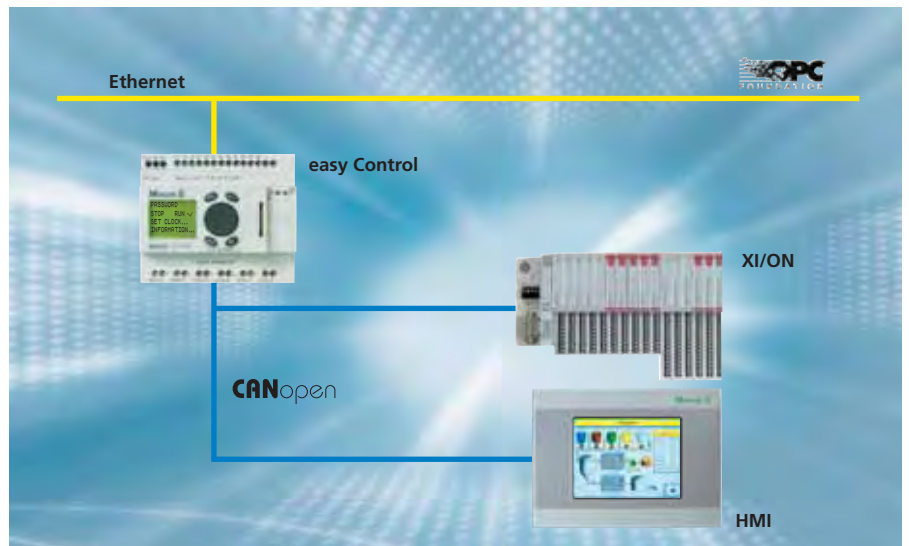
The easy-Net connects the standard easy world with the easy Control and XC200 PLCs. This ensures convenient data transmission to higher-level control systems.



The connection to other PLC systems is provided via the different communication modules. Modules are available for AS-I, Profibus-DP, CANopen and DeviceNet.



A wide range of different peripheral devices can also be connected to the CANopen interface of the easy Control. Remote I/O systems (such as XI/ON), HMIs and many more. Thanks to the integrated Ethernet interface, a connection to higher-level systems can be implemented easily.



For Immediate Delivery call [KMParts.com](http://KMParts.com) at (866) 595-9616

## Ethernet

Software

XSoft Professional

XSoft-GALILEO

Sucosoft S40



Embedded HMI-PLC



XVC-101



XV200



XV400

Modular PLC



XC100



XC200

Compact PLC



easy Control



PS4-201



PS4-341



Communication

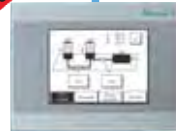
CANopen



HMI



MI4



XV200



XVH300/XV400

Remote I/O



XI/ON



XI/ON ECO



WINbloc

Operating and Control Relays



easy500



easy700



easy800



MFD-Titan

xStart

Drives



DF51/DV51



DF6/DV6



I/O Assistant      easy Soft



TCP/IP

Modbus

Ethernet

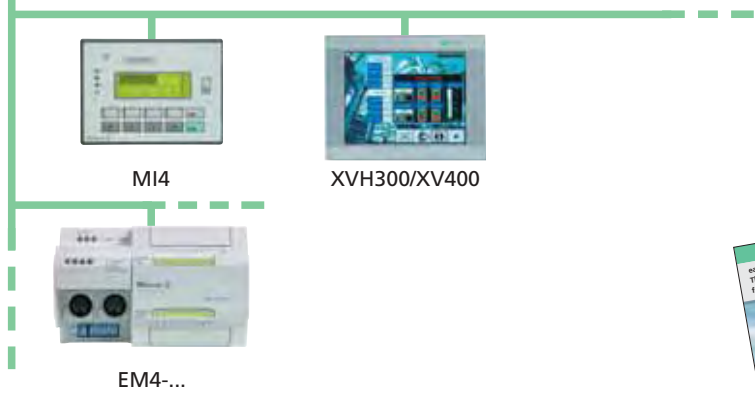


CANopen

RS232  
↔  
RS485



Suconet K



Up-to-date information concerning the xSystem automation products can be requested with the Fax coupon on page 221.

## 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.

For Immediate Delivery call [KMParts.com](http://KMParts.com) at (866) 595-9616



Type	SN3-050-BU8	SN3-100-BV8	SN3-200-BV8	SN3-050-EU8	SN3-100-EU8	SN3-200-EU8
<b>Rated input voltage</b>						
110...120 V AC		•	•			
110...240 V AC	•					
220...240 V AC		•	•			
110...240 V AC/DC				•	•	•
<b>Input voltage range</b>						
85...264 V AC	•			•	•	•
85...132 V AC		•	•			
110...240 V AC						
184...264 V AC		•	•			
100...350 V DC	•			•	•	•
220...350 V DC		•	•			
<b>Rated frequency</b>						
47...64 Hz	•	•	•	•	•	•
<b>Rated output voltage</b>						
24 V DC	•	•	•	•	•	•
<b>Setting range</b>						
22-28 V DC				•	•	•
<b>Tolerance of the rated output voltage in %</b>	-1...+5	-1...+5	-1...+5	-1...+5	-1...+5	-1...+5
<b>Rated output current <math>T_u &lt; 60^\circ\text{C}</math></b>						
5 A	•			•		
10 A		•			•	
20 A			•			•
<b>Rated output current <math>T_u &lt; 40^\circ\text{C}</math></b>						
7 A	•			•		
15 A		•			•	
22 A			•			•
<b>Current limitation in A</b>						
At short-circuit	11	19	25	11	19	25
Short-circuit and overload protect	Permanent short-circuit proof, thermal protection					
<b>Power failure bridging</b>						
At rated load	>100 ms	> 50 ms	> 50 ms	> 100 ms	> 40 ms	> 40 ms
<b>Degree of protection</b>						
Housing	IP20	IP20	IP20	IP20	IP20	IP20
Terminals	IP20	IP20	IP20	IP20	IP20	IP20
<b>Dimensions size/weight</b>						
Height in mm	57	130	126	57	130	126
Width in mm	130	130	130	130	130	130
Depth in mm	126	126	126	126	126	126
kg	1	1.1	2.9	1	1.4	3.2
<b>Mounting</b>						
DIN rail EN50022	•	•	•	•	•	•
<b>Function module can be retrofitted<sup>1)</sup></b>						
Annunciation module SN3-000-MMEU8				•	•	•
<b>Internal input fuse</b>	4 AT	6.3 AT	12 AF	4 AT	6.3 AT	12 AF
<b>Heat dissipation in W</b>	< 15	< 29	< 56	< 15	< 29	< 56
<b>Efficiency in %</b>	> 88	> 88	> 88	> 88	> 88	> 88
<b>Parallel connection ability</b>	up to 5 devices	up to 5 devices	up to 5 devices	up to 5 devices	up to 5 devices	up to 5 devices
<b>Product standard</b>	EN61204					
<b>Approvals</b>	UL (file no. E190715)					

## Frequency inverters DF51, DV51, DF6, DV6

**xStart**



The need for variable speed drives is increasing consistently, for example, in optimization of manufacturing and production processes or for saving energy. The frequency inverters of the DF51, DF6, DV51 and DV6 series are ideally suited for this purpose. They match the required speed of a standard three-phase asynchronous motor to the drive requirements; be it as compact devices or modular system devices. They reliably assure the required sequence of movements of the drive motor and thus guarantee operational reliability and cost savings. A high level of functionality need not be complex to operate: with their user-friendly design they feature – depending on the demands of the application – differing functional characteristics in a power range from 0.18 kW to 132 kW. Approvals from global standards allow them to be used worldwide.



### DF51, DF6 – the versatile ones

DF51 and DF6 provide the economical solution for many machine and processing sequences for which it is sufficient to vary the rotational speed using a V/f control. Among these are pump and fan applications where the DF51 or DF6 inverters can contribute significantly to saving power and reducing cost. Functions, such as PID control loops or a thermistor input for motor protection, that normally require external components, are already built in. The devices can be used immediately, as they are supplied, without the need for programming, and the built-in keypad with setpoint potentiometer enables easy configuration and local operation.

### DV51, DV6 – the powerful ones

DV51 and DV6 expand the scope of the DF series by numerous additional functions. Wherever more dynamics and higher torque levels are involved, the vector control provides the required motor torque at just the right moment. This brings safety and reliability of drives and optimum efficiency for the processing sequence. The various analog and digital configurable inputs and outputs offer a great deal of flexibility because they can be matched precisely to the requirements of individual machines and systems.



### DEX-KEY-6/-61, DEX-KEY-10 Keypads

DEX-KEY-6/-61:  
For device "on-site operation" and parametric programming.  
DEX-KEY-10:  
in addition to comfortable parameter transfer (copying) within the DF/DV51 or DF/DV6 series.  
Both are suitable for front panel mounting, e.g. in a control panel door, etc.

Features of the DEX-KEY-10:

- Plain text display
- Back-lit LCD display
- Multi-language

### DV51 & DV6 powerful dynamics; Sensorless vector control

The special sensorless vector control of the DV51 & DV6 series provides high drive quality where just standard asynchronous motors – even without feedback (open-loop circuit) – are used. The DV51 requires no further setting to develop its drive power.

Special features:

- Greater than 200% motor starting torque
- Rapid correction of speed fluctuation at changes in load
- Great constancy of speed and high level of smooth running

### DEV51-NET-TC, DE51-NET-DP, DE51-NET-CAN Communication circuits

Optional modules which are available enable integration of the DF51 and DV51 in differing standardized communication systems. Regardless of it being MODBUS-RTU, PROFIBUS-DP or CAN-Open, the plug-in module transforms DV51 and DF51 to a unit with communication features.

Features:

- Plug on to the DV51
- Bus address and baud rate setting via DIP switch
- Status LED for diagnostics

# Frequency Inverters DF51, DF6 V/f



## DF51

### Application examples

- Speed control of three-phase motors up to 7.5 kW
- General pump and fan applications in buildings or industrial premises
- Standard drives on machine tools, as well as on processing and packaging machines in the foodstuffs and beverages industries

### Mains connection

1x 230 V, 50/60 Hz  
3x 230 V, 50/60 Hz  
3x 400 V, 50/60 Hz

### Rating range

0.18 kW to 2.2 kW (at 230 V)  
DF51-322-..., (DF51-320-...)  
0.37 kW to 7.5 kW (at 400 V)  
DF51-340-...

### Features

- Compact device
- V/f characteristic control
- Built-in keypad with potentiometer
- Thermistor input
- PID controller
- RS-422/ RS485 Modbus RTU, interface
- Fieldbus connection to PROFIBUS-DP, CAN Open (external options)
- Automatic voltage monitoring
- Overload: 1.5 times starting torque for 60 s, every 600 s
- 5 configurable digital inputs
- 2 configurable outputs
- 1 relay output (changeover contacts)
- 2 analog inputs
- 1 analog output
- Global approval to standards (CE, UL, c-UL, cTick)



## DF6

### Application examples

- Speed control of three-phase motors up to 132 kW
- General pump and fan applications (square-law load characteristic)
- Through-put regulation in process engineering

### Mains connection:

3 x 400 V, 50/60 Hz

### Rating range

11 kW up to 132 kW (at 400 V),  
DF6-340-...

### Features

- V/f characteristic control
- 1.2 times starting torque for 60 s, every 600 s
- Integral braking transistor (at 15 kW)
- Can be parameterized
  - 5 digital inputs
  - 2 relay outputs (make, NO)
  - 1 relay output (changeover contacts)
  - 3 analog inputs
  - 2 analog outputs
  - 1 PWM output
- Thermistor input (PTC)
- Removable keypad with potentiometer
- PID control loop
- Automatic energy-saving mode
- RS485 and RS422 interfaces
- Fieldbus connection to PROFIBUS-DP (internally pluggable option)
- User-macro parameter memory
- Automatic voltage monitoring
- Function expansion by means of plug-in modules
- Global approval to Standards (CE, UL, c-UL, cTick)

## The DF/DV, 51/6 drive package, an excellent choice

With everything ranging from the mains fuse to the sinusoidal filter, a comprehensive range of accessories is available to introduce the DF/DV, 51/6 to various fields, applications and systems. Networking modules such as the DE51-NET-DP, DE51-NET-CAN, DE6-NET-DP or the "closed loop" – operating mode extension DE6-IOM-ENC for the DV6 additionally enhance the fields of application.

## "MOELLER DRIVES" How to choose...

A complete selection guide with all types and accessories of the "MOELLERDRIVES" can be found in our main catalogue, in the selection slider (VKF 8230-460 D/GB) or on the Internet.



[www.moeller.net/select](http://www.moeller.net/select)

Moeller offers everything from switchgear and controlgear to complete solutions to do with motors.



Motor-protective circuit breaker



Contactor



Mains choke



Frequency inverter with filter module

# Vector Frequency Inverters DV51, DV6



## DV51

### Application examples

- Speed and sensorless torque control of three-phase motors up to 7.5 kW
- Versatile application options for the textile, paper and printing industries
- Manufacturing and processing machines in the metal industry
- Drives in mechanical handling, as well as crane and hoist systems
- Applications with enhanced demands in terms of starting torque and the speed/torque characteristic

### Mains connection:

1x 230 V, 50/60 Hz  
3x 230 V, 50/60 Hz  
3x 400 V, 50/60 Hz

### Rating range

0.18 kW to 2.2 kW (at 230 V):  
DV51-322-..., (DV51-320-...)  
0.37 kW to 7.5 kW (at 400 V):  
DV51-340-...

### Features

- Modular system device
- Sensorless vector control
- Built-in keypad with potentiometer
- Thermistor input
- PID controller
- Highly dynamic current limit control
- RS-422/ RS485 Modbus RTU, interface
- Fieldbus connection to PROFIBUS-DP, CAN Open (plug-in options)
- Automatic voltage monitoring
- Full torque from 0.5 Hz to 400 Hz
- Overload: 1.5 times starting torque for 60 s, every 600 s
- Starting torque > 200% at approx. 1 Hz
- Integrated brake chopper
- 6 configurable digital inputs
- 2 configurable outputs
- 1 relay output (changeover contacts)
- 2 analog inputs
- 1 analog output
- Global standards (CE, UL, c-UL, cTick)



## DV6

### Application examples

- Speed and torque control of three-phase motors up to 132 kW
- Versatile application options for the textile, paper and printing industries
- Machine tools
- Manufacturing and processing machines in the metal industry
- Drives in mechanical handling, as well as crane and hoist systems

### Mains connection:

3 x 400 V, 50/60 Hz

### Rating range

0.75 kW up to 132 kW (at 400 V)  
DV6-340-...

### Features

- Sensorless vector control (open loop/ closed loop optional with DE6-IOM-ENC)
- 1.5 times starting torque for 60 s, every 600 s
- Integral braking transistor (up to 11 kW)
- Auto-tuning (automatic acquisition of motor parameters)
- 32 Bit processor
- Full torque at near to 0 Hz (open loop)
- Starting torque up to more than 200%
- Multi-motor operation possible with SLV
- Can be parameterized
  - 8 configurable digital inputs
  - 5 configurable outputs
  - 1 relay output (changeover contacts)
  - 3 analog inputs
  - 2 analog outputs
  - 1 PWM output
- Thermistor input (PTC)
- Removable keypad with potentiometer
- PID control loop
- RS485 and RS422 interfaces
- Fieldbus connection to PROFIBUS-DP (internally pluggable option)
- User-macro parameter memory
- Variable speed and synchronisation control (DE6-IOM-ENC internally pluggable option)
- Global approval to Standards (CE, UL, c-UL, cTick)

## The drive under control with "DrivesSoft2"

"DrivesSoft2" parameter software is an efficient tool for handling the entire range of DF/DV functions. Application-specific parameters can be individually compiled in a clear overview in their own window which enables fast and immediate access to the relevant parameters. Online device control enables direct control of the frequency inverter. The comparator function highlights altered parameter settings whether for documentation or management purposes.

The "monitor function" graphically displays the development of the most important drive data and thus helps to optimise the drive.



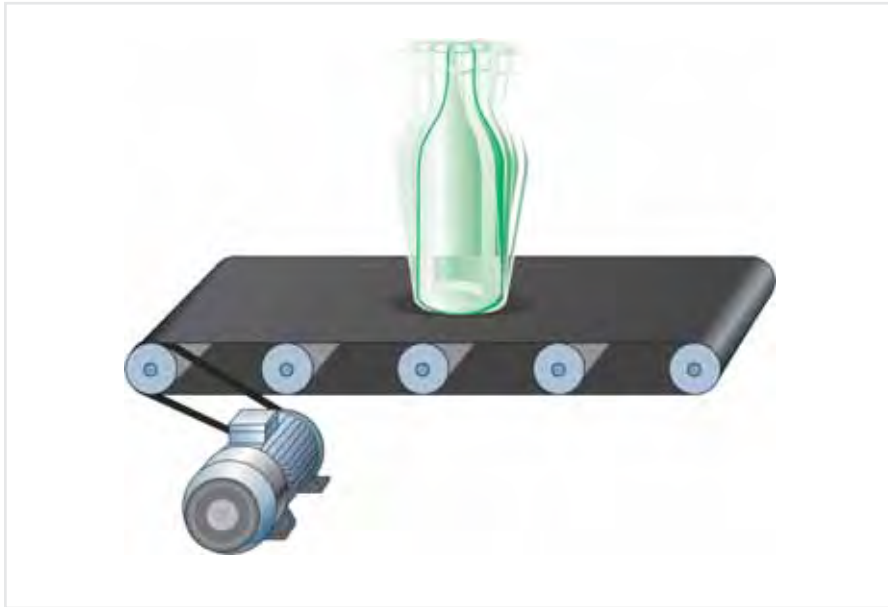
## Compact soft starters: System features of DS4, DS6



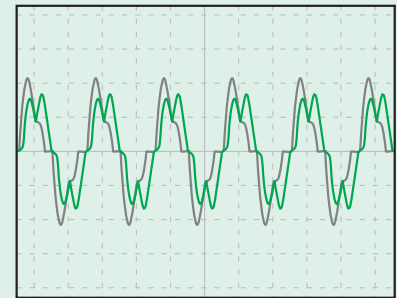
The three-phase motor is currently the optimum drive for simple and economic implementation of machine and system concepts. Nevertheless, a DOL start or a star-delta start is not always the best solution in many cases. If you want to avoid pressure hammers in pump systems, reduce starting currents with 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 2.2 kW to 110 kW. 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 Moeller:

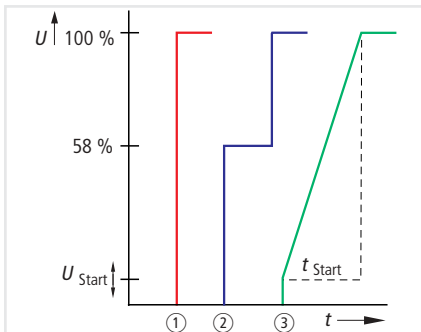
■ Asymmetric control without DC components

### 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

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

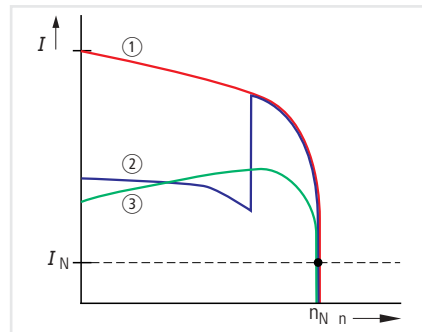
and which unnecessarily extends acceleration times. With the devices of the DS4 and DS6 series the start with asymmetrical trigger control is active in the start phase, with DS4-340-...-M(R) in uninterrupted operation also.



### Motor voltage – softer start

- ① DOL start
- ② Star-delta start
- ③ Soft start

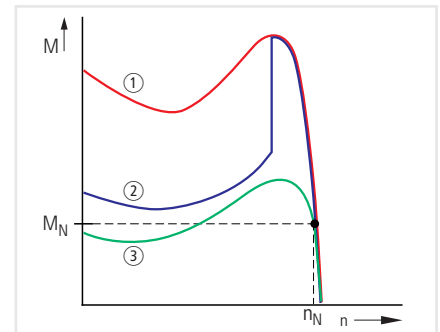
With a soft starter the motor voltage is reduced by phase angle variation and increased to the value of the mains voltage from an adjustable start voltage ( $U_{START}$ ) within a preselected ramp time  $t_{START}$ . The soft run up and run down protects the coupled mechanical parts from abrupt loading,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



### Motor current – dampened peaks

- ① DOL start
- ② Star-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 checkout area
- Smooth start that reduces wear on V-belts in fan drives

### Power supply

110 – 500 V  $\pm 10\%$ , 50/60 Hz

### Control voltage

15 – 30 VDC / 110 – 240 VAC

### Power range

6 – 23 A (AC53, inductive load)

2.2 – 11 kW (motors)

7.5 – 15 kW (with internal bypass)

18.5 – 22 kW (with external bypass)

### Performance characteristic

#### DS4-340-...-M(R)

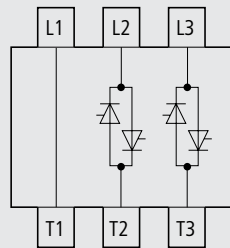
- AC53b, 600 starts per hour with 6-times starting current for 0.5 seconds
- AC53b, 20 starts per hour with 6-times starting current for 5 seconds

#### 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 15 kW.

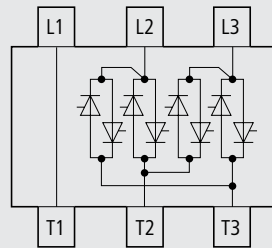
#### DS4-340-...-M



#### DOL starter 2.2 to 11 kW



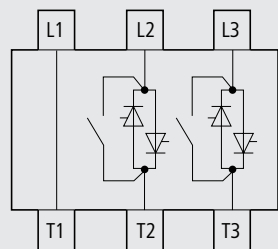
#### DS4-340-...-MR



#### Reversing starter 2.2 to 11 kW



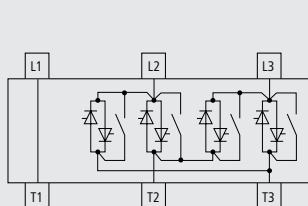
#### DS4-340-...-MX



#### Motor starter with internal bypass contacts 7.5 to 15 kW



#### DS4-340-...-MXR



#### Reversing starter with internal bypass contacts 7.5 to 15 kW



## DS4 – controlled switching and starting

### Common features

- Simple handling
- Terminals similar to 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 voltage
- Status indication via LED
- CE conformity
- UL approval (File No. E236856)

### Motor starters in combination



Softer escalator start

# Soft starter DS6 – the compact “in-line”-starter up to 110 kW



## Soft starter DS6-340-...-MX

With its compact design, the DS6 provides a two phase controlled motor start for assigned ratings from 18.5 to 110 kW, 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 Moeller standard from the circuit-breakers NZM1 (up to 55 kW) and NZM2 (up to 110 kW).

## 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 – 460 V  $\pm$ 10 %, 50/60 Hz

## Control voltage

24 VDC

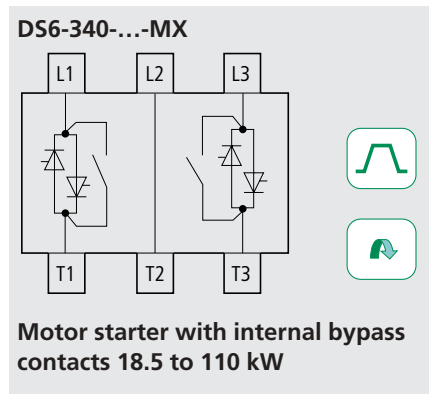
## Performance range





18.5 – 110 kW (with internal bypass)

## Performance characteristic

### DS6-340-...-MX

- AC53a, 10 starts per hour with 3-times starting current for 5 seconds



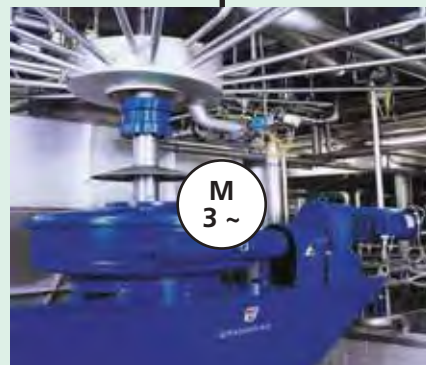
-  **DOL-start, without delay ( $t_{START}$ )**
-  **Operation with acceleration and delay time ( $t_{START}$ ,  $t_{STOP}$ )**
-  **Operation with direction or rotation**
-  **Reversing starter, two directions of rotation**

## 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

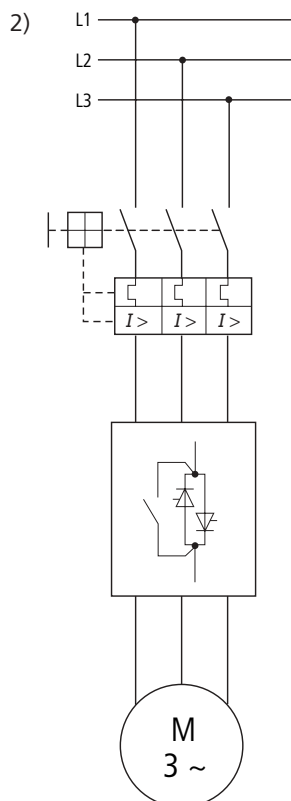


# DS6 – Technical data

## Soft starters for three-phase power supply, low operating frequency (5 s, 3x $I_e$ , 10 starts)

Part no.	Assigned motor rating at 400 V kW	Rated operational current <sup>1)</sup>		Soft starter function		
		Device A	Motor A	Contactor and motor protection <sup>2)</sup>	Mains contactor (optional) <sup>3)</sup>	Overload relay <sup>4)</sup> (optional)
DS6-340-22K-MX	18,5	41	36	NZMN1-M40 / PKZM4-40 NZMN1-M50 / PKZM4-50 NZMN1-M63 / PKZM4-58 NZMN1-M80 NZMN1-M100 NZMN1-M100	DILM40 DILM50 DILM65 DIL3M80 DIL3M85 DIL4M115	ZB65-40+ZB65-XEZ ZB65-40+ZB65-XEZ ZB65-57+ZB65-XEZ Z5-70/KK3 Z5-100/KK3 Z5-100/KK4
DS6-340-22K-MX	22	41	41			
DS6-340-30K-MX	30	55	55			
DS6-340-37K-MX	37	68	68			
DS6-340-45K-MX	45	81	81			
DS6-340-55K-MX	55	99	99			
DS6-340-75K-MX	75	135	134	NZMN2-M160 NZMN2-M200 NZMN2-M200	DIL4AM115 DILM185 DILM225	Z5-150/KK4 Z5-160/FF250 Z5-220/FF250
DS6-340-90K-MX	90	160	160			
DS6-340-110K-MX	110	200	196			

- Notes:**
- <sup>1)</sup> Rated operational current related to the stated load cycle.
  - <sup>2)</sup> 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.
  - <sup>3)</sup> A mains contactor is not necessary. Isolating characteristics to VDE can only be assured via the stated circuit-breaker.
  - <sup>4)</sup> 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 110 kW<sup>2)</sup>.

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.

## Design versions

Generally a distinction is made between two design versions:

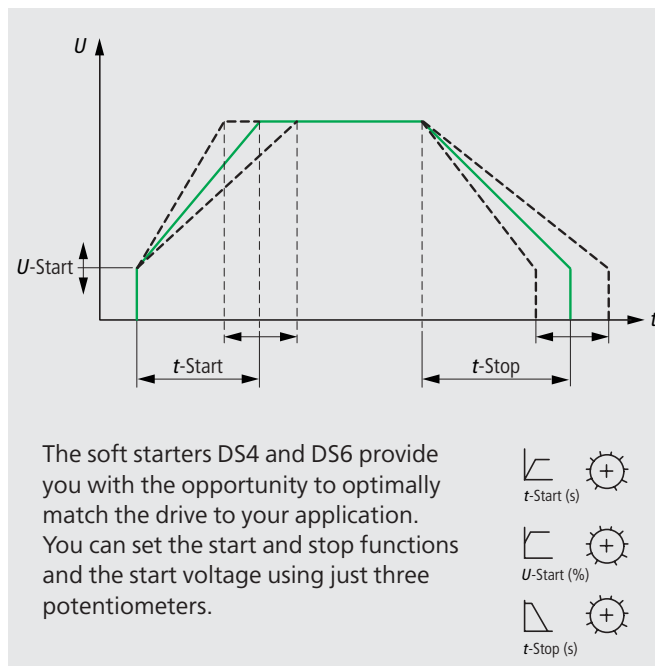
- For simple tasks:
  - Use with small ratings.
  - These devices prove their value with simple applications where smooth, judder free operation is desired in the start phase.
  - Simple handling.
  - Compact construction type
  - Simple power components, mainly two-phase controlled.
- For complex tasks:
  - 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 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.

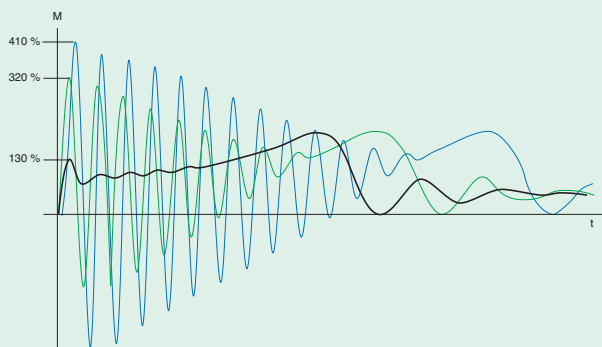
## DOL method avoids premature fatigue of the mechanical components

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.



## 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 Moeller:

- : DS4-340-M(R)

<sup>\*)</sup> DOL= direct-on-Line

The DOL-method (Direct-On-Line) developed by 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 pre-settings 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



## 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 fieldbus interfacing in chemical plants

### Power supply

230 – 460 V  $\pm 10\%$ , 50/60 Hz

### Control voltage

14 – 230 VAC / DC

### Performance range

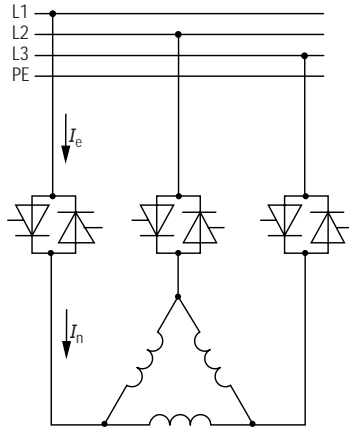
16 – 900 A

7.5 – 500 kW (in-line configuration)

11 – 900 kW (in-delta configuration)

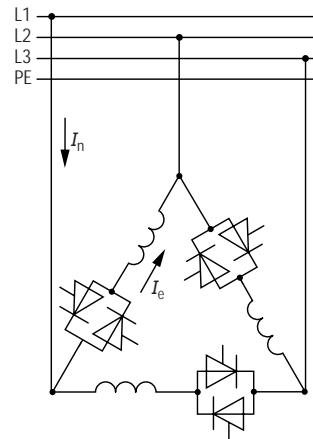
### Product feature

- 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)



## Contactors DIL: Efficient Solutions for the Motor Feeder

**xStart**



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 150 A, engineering is made even simpler.

A key benefit with contactors up to 32 A is that the auxiliary contact is already built in, and the DC contactors include a suppressor circuit up to 150 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.





### 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.



### DIL M

The newly developed motor contactors DIL M can switch motors up to 150 A. Their significantly improved performance criteria such as pick-up and sealing consumption, space saving foot-prints and ease of installation make these contactors state-of-the-art, top-class products.



### DIL A

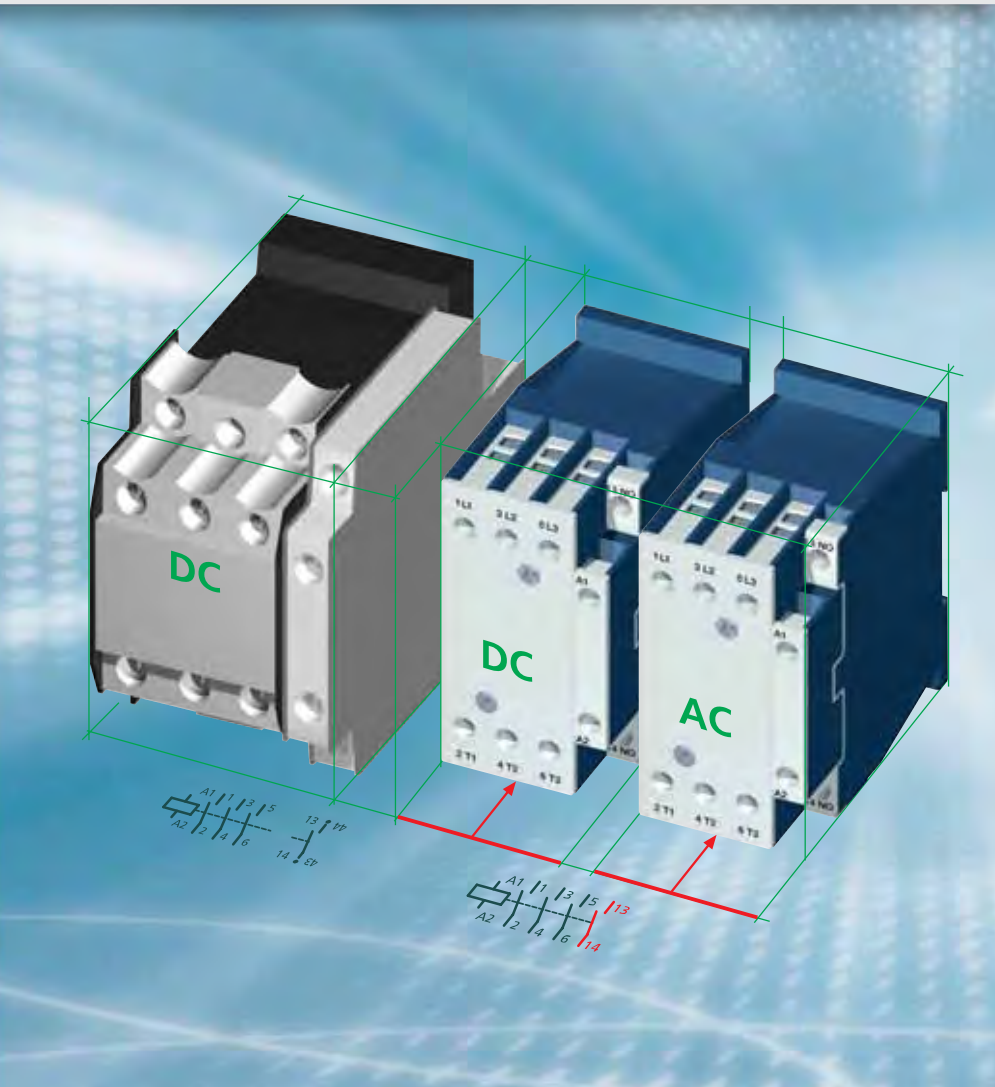
The new auxiliary contacts DIL A perfectly complement the new motor contactors DIL M. A wide range of auxiliary contacts specially designed for the contactor relays ensures optimum solutions and reliable identification.



### 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



### Speedier wiring using spring-loaded terminations

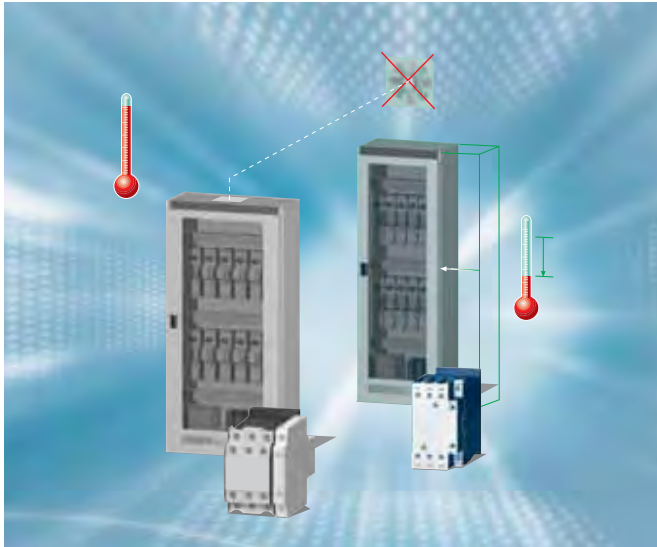
Moeller provides proven quality with tension clamp terminals. Numerous tests have proved that contactors and motor-protective circuit-breakers are just as securely wired in this way as by screw connection – even in strongly vibrating machines. But wiring work using tension clamp terminals is very much quicker to do. The main current paths on PKZM 0 and motor contactors up to 12 A all use spring-loaded terminals. The sundries for termination are always available for both screw and tension clamp connection.

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.

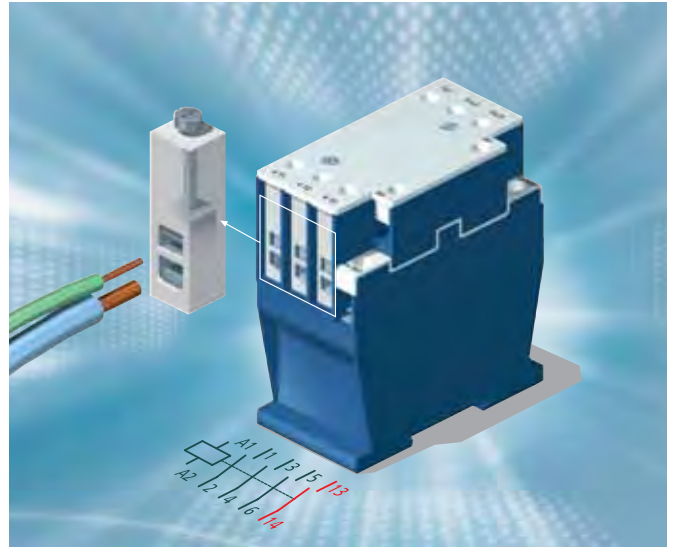


### Coil terminals on the front simplify wiring



### 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 Moeller DC contactors from 17 up to 65 A have a sealing consumption of only 0.5 Watt, even those at 150 A only use 1.5 Watt. This also results in lower power consumption for the whole installation.



### No compromise where termination reliability is concerned

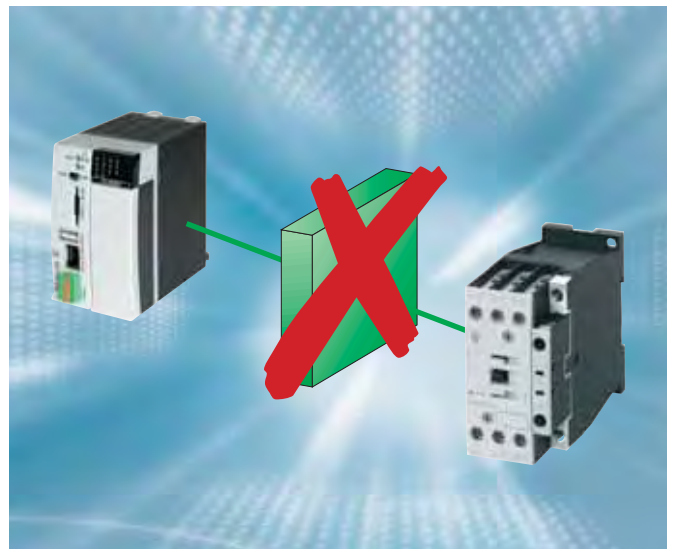
DIL contactors up to 150 A have box terminals with two clamping chambers, allowing unequal cable cross-sections to be terminated absolutely securely. This makes wiring easier and cuts down on associated errors.



### 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 32 A

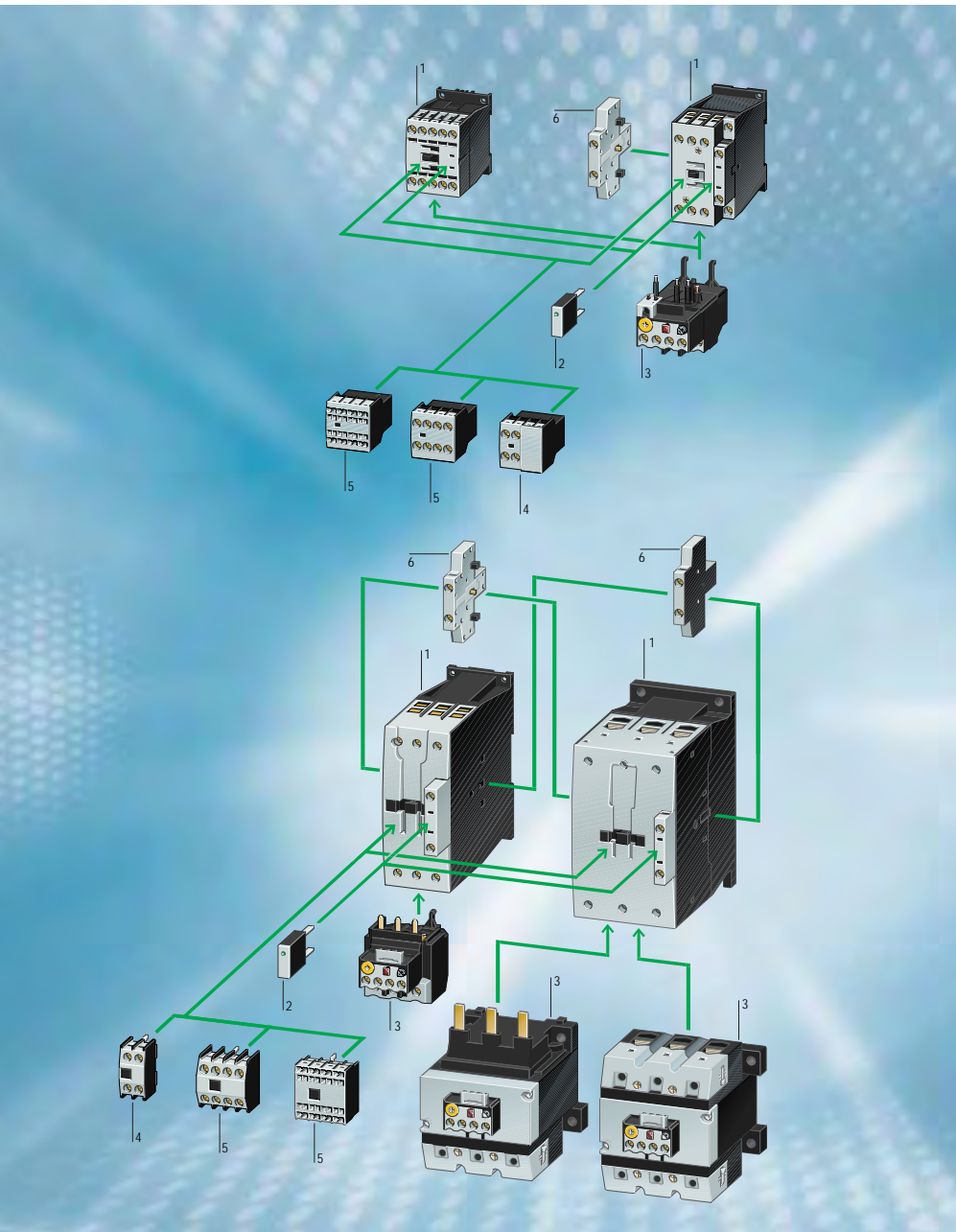


### Switching contactors directly from the PLC

This is a feature that is becoming increasingly more popular and is primarily made possible by the limitation of the DC pick-up power. Moeller's new contactors DIL M up to 32 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.

For Immediate Delivery call [KMParts.com](http://KMParts.com) at (866) 595-9616

# Simply Select: Contactors DIL M:



1. Basic units
2. Suppressor<sup>1</sup>
3. Overload relays
4. Auxiliary contact modules, 2-pole
5. Auxiliary contact modules, 4-pole
6. Side-mounted auxiliary contact modules, 2-pole

<sup>1</sup> For AC operated contactors 50-60 Hz;  
in DC operated contactors, the suppressor  
circuit is incorporated. Note drop-out delay



<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<sup>1</sup>

$I_e$ A	$P$ kW	Contacts	Part no. <small>Add voltages from above</small>
7	3	1N/C	DILM7-10 (...)
7	3	1N/O	DILM7-01(...)
9	4	1N/C	DILM9-10 (...)
9	4	1N/O	DILM9-01 (...)
12	5.5	1N/C	DILM12-10 (...)
12	5.5	1N/O	DILM12-01 (...)
15.5	7.5	1N/C	DILM15-10 (...)
15.5	7.5	1N/O	DILM15-01 (...)
–	–	Four-pole	DILMP 20 (...)
18	7.5	1N/C	DILM17-10 (...)
18	7.5	1Ö	DILM17-01 (...)
25	11	1S	DILM25-10 (...)
25	11	1Ö	DILM25-01 (...)
32	15	1S	DILM32-10 (...)
32	15	1Ö	DILM32-01 (...)
40	18.5	–	DILM40 (...)
50	22	–	DILM50 (...)
65	30	–	DILM65 (...)
80	37	–	DILM80 (...)
95	45	–	DILM95 (...)
115	55	–	DILM115 (...) <sup>2</sup>
150	75	–	DILM150 (...) <sup>2</sup>

<sup>2</sup> DILM 115, DILM 150  
suppressor circuit also not required with the AC version



Auxiliary contact		Overload relay		Suppressor <sup>1</sup>					
AC 15, 380 V 400 V 415 V		Setting range, Overload release			Varistor suppressors	Varistor suppressors with integrated LED	RC suppressor	Voltage indicator	
Contacts	Part no.	$I_r$ A	Part no.	$U_s$ V AC	Part no.	Part no.	Part no.	Part no.	
1N/C 1N/O – 2N/O	<b>DILM 32-XHI11</b> <sup>3</sup> <b>DILM 32-XHI02</b> <sup>3</sup>	0.1-0.16 0.16-0.24	<b>ZB12-0,16</b> <b>ZB12-0,24</b>	24-48 48-130	<b>DILM12-XSPV48</b> <b>DILM12-XSPV130</b>	<b>DILM12-XSPVL48</b>	<b>DILM12-XSPR48</b>	<b>DILM12-XSPI48</b> <b>DILM12-XSPI130</b>	
2N/C 2N/O 2N/C –	<b>DILM 32-XHI22</b> <sup>3</sup> <b>DILA-XHI20</b>	0.24-0.4 0.4-0.6	<b>ZB12-0,4</b> <b>ZB12-0,6</b>	130-240 240-500	<b>DILM12-XSPV240</b> <b>DILM12-XSPV500</b>	<b>DILM12-XSPVL240</b>	<b>DILM12-XSPR240</b> <b>DILM12-XSPR500</b>	<b>DILM12-XSPI250</b>	
1N/C 1N/O – 2N/O	<b>DILA-XHI11</b> <b>DILA-XHI02</b>	0.6-1 1-1.6	<b>ZB12-1,0</b> <b>ZB12-1,6</b>						
1N/C 1N/O	<b>DILA-XHIV11</b>	1.6-2.4	<b>ZB12-2,4</b>						
4N/C –	<b>DILA-XHI40</b>	2.4-4	<b>ZB12-4</b>						
3N/C 1N/O	<b>DILA-XHI31</b>	4-6	<b>ZB12-6</b>						
2N/C 2N/O	<b>DILA-XHI22</b>	6-10	<b>ZB12-10</b>						
1N/C 3N/O – 4N/O	<b>DILA-XHI13</b> <b>DILA-XHI04</b>	9-12 12-16	<b>ZB12-12</b> <b>ZB12-16</b>						
2N/C 2N/O	<b>DILA-XHIV22</b>								
2N/C –	high version <b>DILA-XHIT20</b>	0.1-0.16 0.16-0.24	<b>ZB32-0,16</b> <b>ZB32-0,24</b>	24-48 48-130	<b>DILM32-XSPV48</b> <b>DILM32-XSPV130</b>	<b>DILM32-XSPVL48</b>	<b>DILM32-XSPR48</b>	<b>DILM32-XSPI48</b> <b>DILM32-XSPI130</b>	
1N/C 1N/O	<b>DILA-XHIT11</b>	0.24-0.4	<b>ZB32-0,4</b>	130-240	<b>DILM32-XSPV240</b>	<b>DILM32-XSPVL240</b>	<b>DILM32-XSPR240</b>	<b>DILM32-XSPI250</b>	
– 2N/O	<b>DILA-XHIT02</b>	0.4-0.6	<b>ZB32-0,6</b>	240-500	<b>DILM32-XSPV500</b>		<b>DILM32-XSPR500</b>		
2S 2N/O	<b>DILA-XHIT22</b>	0.6-1	<b>ZB32-1,0</b>						
	side-mounted auxiliary contact modules only for DILM 17, 25, 32	1-1.6 1.6-2.4	<b>ZB32-1,6</b> <b>ZB32-2,4</b>						
1S 1N/O	<b>DILM32-XHI11-S</b> <sup>4</sup>	2.4-4 4-6 6-10 10-16 16-24 24-32	<b>ZB32-4</b> <b>ZB32-6</b> <b>ZB32-10</b> <b>ZB32-16</b> <b>ZB32-24</b> <b>ZB32-32</b>						
2N/C –	<b>DILM150-XHI20</b>	6-10	<b>ZB65-10</b>	24-48	<b>DILM95-XSPV48</b>	<b>DILM95-XSPVL48</b>	<b>DILM95-XSPR48</b>	<b>DILM150-XSPI48</b>	
1N/C 1N/O	<b>DILM150-XHI11</b>	10-16	<b>ZB65-16</b>	48-130	<b>DILM95-XSPV130</b>			<b>DILM150-XSPI130</b>	
– 2N/O	<b>DILM150-XHI02</b>	16-24	<b>ZB65-24</b>	130-240	<b>DILM95-XSPV240</b>	<b>DILM95-XSPVL240</b>	<b>DILM95-XSPR240</b>	<b>DILM150-XSPI250</b>	
4N/C –	<b>DILM150-XHI40</b>	24-40	<b>ZB65-40</b>	240-500	<b>DILM95-XSPV500</b>		<b>DILM95-XSPR500</b>		
3N/C 1N/O	<b>DILM150-XHI31</b>	40-57	<b>ZB65-57</b>						
2N/C 2N/O	<b>DILM150-XHI22</b>	57-65	<b>ZB65-65</b>						
1N/C 3N/O	<b>DILM150-XHI13</b>								
– 4N/O	<b>DILM150-XHI04</b>	25-35	<b>ZB150-35</b>	24-48	<b>DILM95-XSPV48</b>	<b>DILM95-XSPVL48</b>	<b>DILM95-XSPR48</b>		
2N/C 2N/O	<b>DILM150-XHIV22</b>	35-50	<b>ZB150-50</b>	48-130	<b>DILM95-XSPV130</b>				
1N/C 1N/O	<b>DILM150-XHI11-SI</b>	50-70	<b>ZB150-70</b>	130-240	<b>DILM95-XSPV240</b>	<b>DILM95-XSPVL240</b>	<b>DILM95-XSPR240</b>		
1N/C 1N/O	<b>DILM150-XHIA11</b>	70-100 95-125 120-142	<b>ZB150-100</b> <b>ZB150-125</b> <b>ZB150-150</b>	240-500	<b>DILM95-XSPV500</b>		<b>DILM95-XSPR500</b>		

<sup>3</sup> cannot be combined with DIL M .....01

<sup>4</sup> can only be installed on left, cannot be combined with top mounting auxiliary contacts or mechanical interlocks

UL/CSA see page 122

# 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 $I_e$ 4A	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 $I_e$ 3A		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.	Contacts	Part no.	
	Add voltages from above			
4N/C 3N/C 1N/O 2N/C 2N/O	<b>DILA40(...)</b> <b>DILA31(...)</b> <b>DILA22(...)</b>	- 2N/O 1N/C 1N/O 2N/C - 1N/C 1N/O - 4N/O 1N/C 3N/O 2N/C 2N/O 3N/C 1N/O 4N/C - 2N/C 2N/O 2N/C - 1N/C 1N/O - 2N/O 2N/C 2N/O	<b>DILA-XHI02</b> <b>DILA-XHI11</b> <b>DILA-XHI20</b> <b>DILA-XHIV11</b> <b>DILA-XHI04</b> <b>DILA-XHI13</b> <b>DILA-XHI22</b> <b>DILA-XHI04</b> <b>DILA-XHI40</b> <b>DILA-XHIV22</b> <b>DILA-XHIT20</b> <b>DILA-XHIT11</b> <b>DILA-XHIT02</b> <b>DILA-XHIT22</b>	

## 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, undervoltage 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 <sup>1</sup>				Mini contactor relays DIL ER <sup>1</sup>		Auxiliary contact modules <sup>1</sup>		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>I<sub>e</sub></i> 3A		AC 15, 380 V / 400 V / 415 V  <i>I<sub>e</sub></i> 2A		Setting range, overload release	
<i>I<sub>e</sub></i> A	<i>P</i> kW	Contacts	Part no. <small>Add voltages from above</small>	Contacts	Part no.	Contacts	Part no.	<i>I<sub>r</sub></i> A	Part no.
6.6	3	1N/C -	<b>DILEEM-10(...)</b>	4N/C -	<b>DILER-40(...)</b>	- 2N/O	<b>02DILEM</b>	0.1 - 0.16	<b>ZE-0,16</b>
6.6	3	- 1N/O	<b>DILEEM-01(...)</b>	3N/C 1N/O	<b>DILER-31(...)</b>	1N/C 1N/O	<b>11DILEM</b>	0.16 - 0.24	<b>ZE-0,24</b>
8.8	4	1N/C -	<b>DILEM-10(...)</b>	2N/C 2N/O	<b>DILER-22(...)</b>	2N/C 2N/O	<b>22DILEM</b>	0.24 - 0.4	<b>ZE-0,4</b>
8.8	4	- 1N/O	<b>DILEM-01(...)</b>			- 2N/O	<b>02DILE</b>	0.4 - 0.6	<b>ZE-0,6</b>
						1N/C 1N/O	<b>11DILE</b>	0.6 - 1	<b>ZE-1,0</b>
						2N/C -	<b>20DILE</b>	1.6 - 2.4	<b>ZE-2,4</b>
						1N/C 1N/O	<b>11DDILE</b>	2.4 - 4	<b>ZE-4</b>
						- 4N/O	<b>04DILE</b>	4 - 6	<b>ZE-6</b>
						1N/C 3N/O	<b>13DILE</b>	6 - 9	<b>ZE-9</b>
						2N/C 2N/O	<b>22DILE</b>		
						3N/C 1N/O	<b>31DILE</b>		
						4N/C -	<b>40DILE</b>		
						2N/C 2N/O	<b>22DDILE</b>		

<sup>1</sup> The auxiliary and main contacts listed are available with spring-loaded terminals.

UL/CSA see page 122

### 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 <b>EMT6</b> <b>EMT6 (230V)</b>
Basic functions + short-circuit recognition in the sensor circuit	230V AC <b>EMT6-K</b>
Basic functions + manual/autoreset + remote reset + test function + error memory	24-240V DC/AC 230V AC <b>EMT6-DB</b> <b>EMT6-DB (230V)</b>
Basic functions + manual/autoreset + remote reset + test function + error memory + short-circuit recognition in the sensor circuit	24-240V DC/AC <b>EMT6-KDB</b>
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 <b>EMT6-DBK</b>

# Star-Delta Combination



## 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.

### Star-delta combinations

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	Star-delta wiring set	Wiring set
$I_e$ A	P kW	Part no. Add voltages from above	Coordination type "1"	Coordination type "2"
12	5.5	SDAINLM12(...)	DILM12-XSL	PKZM0-XSM12
15	7.5	SDAINLM16(...)		
22	11	SDAINLM22(...)		
30	15	SDAINLM30(...)	DILM32-XSL	PKZM0-XSM32
45	22	SDAINLM45(...)		
55	30	SDAINLM55(...)		
70	37	SDAINLM70(...)	DILM65-XSL	–
90	45	SDAINLM90(...)		
115	55	SDAINLM115(...)		
140	75	SDAINLM140(...)	DILM95-XSL	–
165	90	SDAINLM165(...)		
200	110	SDAINLM200(...)	DILM150-XSL	–
250	132	SDAINLM260(...)		

## 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



## 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 combinations

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	Reversing starter wiring set	Wiring set
$I_e$ A	P kW	Part no. Add voltages from above	Coordination type "1"	Coordination type "2"
7	2.2	DIULM7/21 (...)	DILM12-XRL	PKZM0-XRM12
9	2.5	DIULM9/21 (...)		
12	3.5	DIULM12/21 (...)		
17	5	DIULM17/21 (...)	DILM32-XRL	PKZM0-XRM32
25	7.5	DIULM25/21 (...)		
32	10	DIULM32/21 (...)		
40	12.5	DIULM40/11 (...)	DIL65-XRL	—
50	15.5	DIULM50/11 (...)		
65	20	DIULM65/11 (...)		
80	25	DIULM80/11 (...)	DIL150-XRL	—
95	30	DIULM95/11 (...)		
115	37	DIULM115/11 (...)		
150	48	DIULM150/11 (...)		

## Reversing starter combinations come with a particularly slimline design



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
<b>Lighting load</b>				
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	$\mu\text{F}$	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.

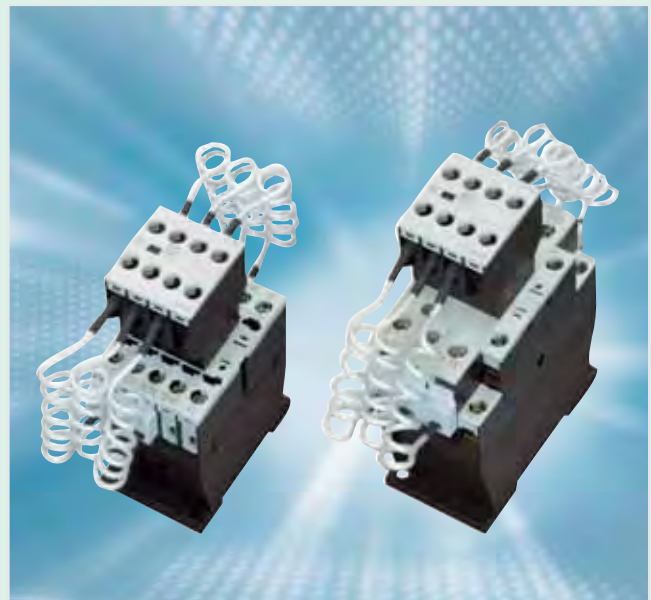


## Simple to select: DIL K – contactor for reactive current compensation systems

### 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	
				<b>Part no.</b> Complement with above voltages
7.5	12.5	16.7	20	<b>DILK12-11(...)</b>
11	20	25	33.3	<b>DILK20-11(...)</b>
15	25	33.3	40	<b>DILK25-11(...)</b>
20	33.3	40	55	<b>DILK33-10(...)</b>
25	50	65	85	<b>DILK50-10(...)</b>

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 then do the main contacts then close and conduct continuous current.



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## High Rated Contactors DIL: Switching High Currents Reliably

**xStart**



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 1000 A reliably and safely. Circuit-breakers NZM and the overload relays Z 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-1 applications. 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 2000 A are available with electronically-controlled drives. This provides outstanding benefits for your application:

- Flexible actuation
- Considerably lower switch cabinet temperatures due to sealing power reduced to 4 %
- Design of smaller control transformers due to pick-up power reduced by up to 79 %
- 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

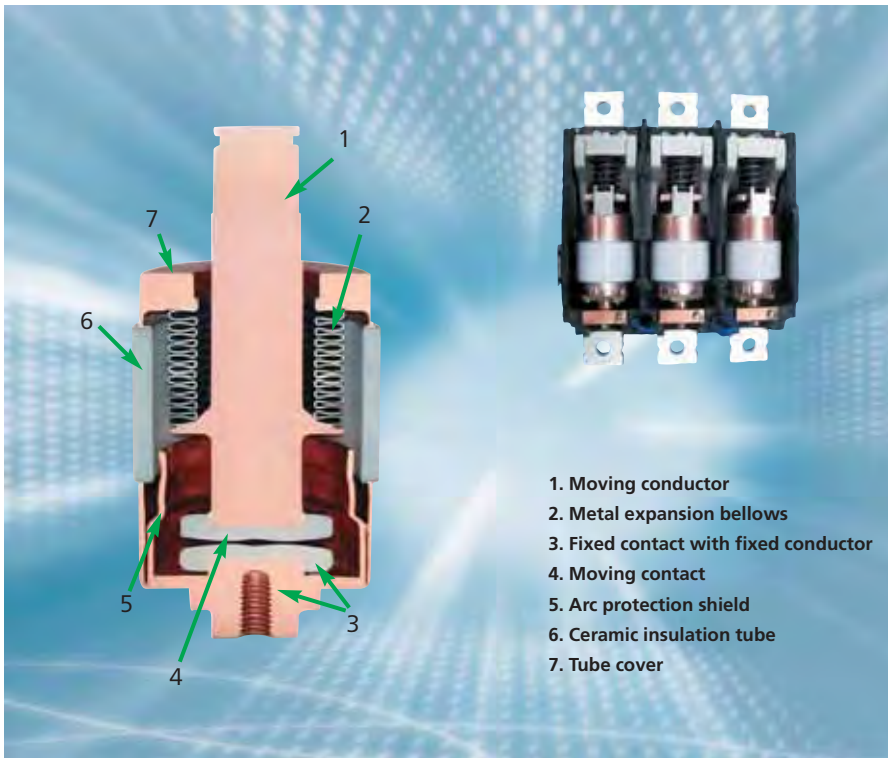
## Compact dimensions

The vacuum switching tubes with the electromechanical drive system have a very compact design. Vacuum contactors therefore also offer outstandingly small dimensions.

## 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.


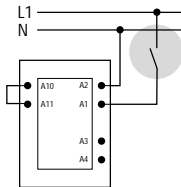

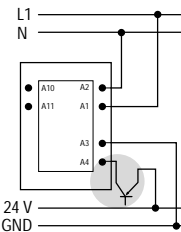

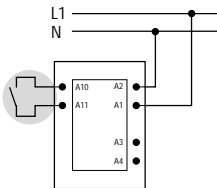
The ceramic insulation tube isolates the incoming and outgoing sides of the switching tube. The vacuum switching tube technology used has been tried and tested since the 1980s.

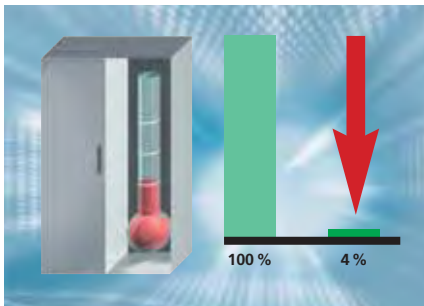


1. Moving conductor
2. Metal expansion bellows
3. Fixed contact with fixed conductor
4. Moving contact
5. Arc protection shield
6. Ceramic insulation tube
7. Tube cover

## It's your choice: standard or premium version

All contactors from 185 to 500 A are available as standard or premium versions. All contactors over 500 A are premium version devices in all cases.

Contactor actuation		Standard	Premium
 <p><b>Conventional:</b> A1/A2 are energized in the usual manner.</p>		+	+
 <p><b>Directly from the PLC:</b> A 24 V PLC output can be connected at terminals A3/A4 without the need of a coupling relay.</p>		-	+
 <p><b>From low power command devices:</b> Low-power command devices such as board relays, control circuit devices or position switches can be connected directly to A10/A11.</p>		-	+



### 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.

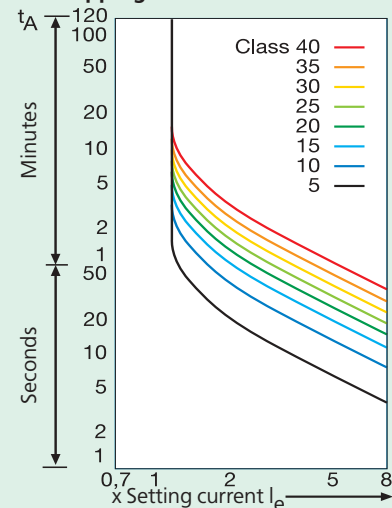


### User benefits of the innovative motor protective relay ZEV

User-friendliness has top priority with the motor protective relay ZEV.

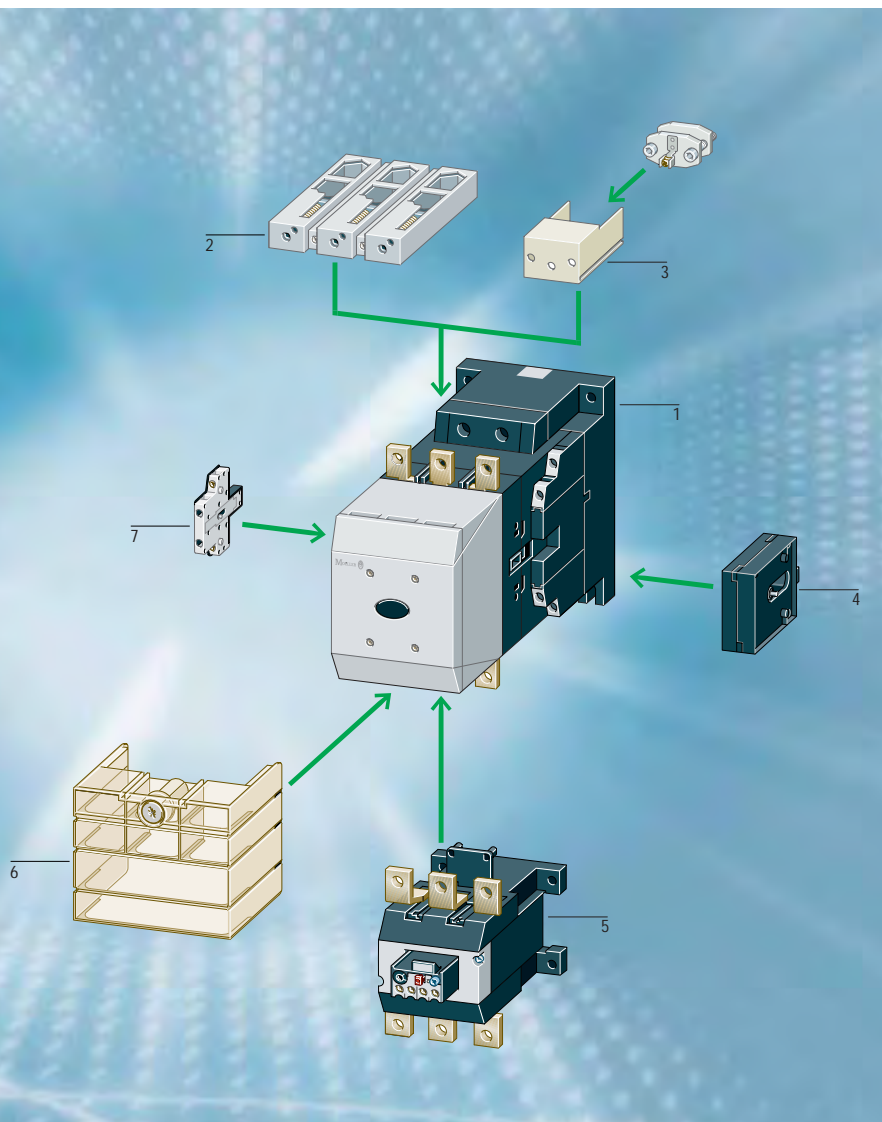
- Simple engineering with multi-voltage coils (24-240 V, 50/60 Hz or DC)
- All settings are menu guided, enabling currents, tripping classes and other functions to be set easily.
- Small and light current sensors with exceptionally broad current ranges simplify selection. The cables are simply passed 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 2000 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	<b>DILM185-S/22(...)</b>
315	225	110	<b>DILM225-S/22(...)</b>
350	250	132	<b>DILM250-S/22(...)</b>
400	300	160	<b>DILM300-S/22(...)</b>
500	400	200	<b>DILM400-S/22(...)</b>
700	500	250	<b>DILM500-S/22(...)</b>
800	580	315	—
850	650	355	—
900	750	400	—
1000	820	450	—
1000	1000	560	—
1400	—	—	—
2000	—	—	—

## Contactor, 4-pole

AC-1	AC-1	AC-1	Standard electronics
			AC: 110 - 120 V 50/60 Hz 220 - 240 V 50/60 Hz
$I_e=I_{th}$ at 40° C	$I_e$ at 55° C	$I_e$ at 70° C	Part no.
			Add voltages from above
160	160	155	<b>DILP160/22(...)</b>
250	230	200	<b>DILP250/22(...)</b>
315	270	215	<b>DILP315/22(...)</b>
500	470	400	<b>DILP500/22(...)</b>
630	470	400	<b>DILP630/22(...)</b>
800	650	575	<b>DILP800/22(...)</b>

\*  
 RDC48 = 24-48 V DC  
 RA110 = 48-110 V, 40-60Hz/DC  
 RA250 = 110-250 V, 40-60Hz/DC  
 RAC500 = 250-500 V, 40-60Hz  
 RAW250 = 230-250 V, 40-60Hz/DC

1. Contactors 90 - 560 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

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		Auxiliary contacts		Overload/motor protection			
Standard electronics	Premium electronics	2 DILM1000-XHI11SI <b>integrated</b>	Optional Max. total number of auxiliary contacts: 8	Relays			Circuit-breakers
Control circuit terminal with spring-loaded terminals AC: 110 - 120 V 50/60 Hz 220 - 240 V 50/60 Hz	AC/DC: RDC 48*, RDC 110*, RA 250*, RAC 500*						
Part no.	Part no.	Contacts	Part no.	Part no.	Part no.	Part no.	Part no.
Add voltages from above	Add voltages from above		SI at side internally SA at side externally				
DILMC185-S/22(...)	DILM185/22(...)	2N/C 2N/O	DILM1000-XHI11-SI DILM1000-XHI11-SA DILM1000-XHI11V-SI DILM1000-XHIC11-SI DILM1000-XHIC11-SA	Z5	ZW7	ZEV	NZM...
DILMC225-S/22(...)	DILM225/22(...)	2N/C 2N/O					
DILMC250-S/22(...)	DILM250/22(...)	2N/C 2N/O					
DILMC300-S/22(...)	DILM300/22(...)	2N/C 2N/O					
DILMC400-S/22(...)	DILM400/22(...)	2N/C 2N/O					
DILMC500-S/22(...)	DILM500/22(...)	2N/C 2N/O					
–	DILM580/22(...)	2N/C 2N/O					
–	DILM650/22(...)	2N/C 2N/O					
–	DILM750/22(...)	2N/C 2N/O					
–	DILM820/22(...)	2N/C 2N/O					
–	DILM1000/22(...)	2N/C 2N/O					
–	DILH1400/22(RAW250)*	2N/C 2N/O					
–	DILH2000/22(RAW250)*	2N/C 2N/O				IZM...	

		Auxiliary contact		Short-circuit protection		
		2 DILP800-XHI-SI <b>integrated</b>	Optional Max. total number of auxiliary contacts: 8	Fuse		
		Contacts	Part no.	Part no.	Part no.	Part no.
			SI at side internally SA at side externally	Type "1" coordination gG/gL <b>A</b>	Type "2" coordination gG/gL <b>A</b>	
		2N/C 2N/O		250	200	
		2N/C 2N/O		250	200	
		2N/C 2N/O	DILP800-XHI-SI	355	315	
		2N/C 2N/O	DILP800-XHI-SA	630	630	
		2N/C 2N/O		630	630	
		2N/C 2N/O		800	630	

UL/CSA see page 122

# Non-Combination Motor-Starter DILM/Z for North America

Rating data for approved types <sup>1</sup>				Contactor	Overload relays	Maximum short circuit protection for North America		
Maximum three-phase current motor rating			Maximum motor current			Fuses acc. CEC/NEC	Circuit Breaker	
							Continuous current	Short-circuit release, non delayed
230 V	460 V	575 V	FLC	Part no.	Part no. <sup>2</sup>	A	A	A
hp	hp	hp	A					
-	0.5	0.5	1	DILEEM	ZE-1	3	15	-
-	0.75	1	1.4	DILEEM	ZE-1,6	6	15	-
0.5	1	1.5	2.3	DILEEM	ZE-2,4	6	15	-
1	2	3	3.9	DILEEM	ZE-4	15	15	-
1.5	3	-	6	DILEEM	ZE-6	20	15	-
2	-	-	6.8	DILEEM	ZE-9	35	15	-
2	5	5	7.8	DILEM	ZE-9	35	15	-
3	5	5	9.6	DILEM	ZE-12	45	-	-
-	0.5	0.5	1	DILM7	ZB12-1	3	25	200
-	0.75	1	1.4	DILM7	ZB12-1,6	6	25	200
0.5	1	1.5	2.3	DILM7	ZB12-2,4	6	25	200
1	2	3	3.9	DILM7	ZB12-4	15	25	200
1.5	3	-	6	DILM7	ZB12-6	20	25	200
-	-	7.5	9	DILM9	ZB12-10	25	25	200
3	5	7.5	9.6	DILM12	ZB12-10	25	25	200
-	7.5	10	11	DILM12	ZB12-12	40	25	200
5	10	-	15.2	DILM15	ZB12-16	40	30	320
-	0.5	0.5	1	DILM17	ZB32-1	3	25	200
-	0.75	1	1.4	DILM17	ZB32-1,6	6	25	200
0.5	1	1.5	2.3	DILM17	ZB32-2,4	6	25	200
1	2	3	3.9	DILM17	ZB32-4	15	25	200
1.5	3	-	6	DILM17	ZB32-6	20	25	200
3	5	7.5	9.6	DILM17	ZB32-10	25	25	200
-	7.5	10	11	DILM17	ZB32-12	40	30	320
5	10	-	15.2	DILM17	ZB32-16	40	30	320
7.5	15	20	22	DILM25	ZB32-24	90	100	1200
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
7.5	20	25	32.2	DILM40	ZB65-24	90	90	1200
10	20	30	34	DILM40	ZB65-40	125	125	1200
20	40	50	54	DILM50	ZB65-57	200	150	2000
20	50	50	63	DILM65	ZB65-65	200	150	2000
in approbation in this time				DILM80	ZB150-70			
				DILM95	ZB150-100			
				DILM115	ZB150-125			
				DILM150	ZB150-150			
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	-	-

<sup>1</sup> Devices for world markets IEC  $\Delta$  UL/CSA

<sup>2</sup> on request, the ZEV can be fitted

### 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 motor switching, 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.

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 Moeller contactors starting with the DIL M80 have, together with their corresponding Type Z overload relays, a short circuit rating of 10 kA.

### Combination

#### “Contactor + Overload Relay” („Non-combination Motor Starter“)

NEMA-sizes, as they relate to the HP ratings of 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 <sup>1)</sup>			
		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
	<sup>1)</sup> HP ratings for 3-Phase contactors, single speed motors, with no jogging, reversing and dynamic current braking.				

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## Motor-protective circuit-breakers PKZ: now better than ever

**xStart**



Motor-protective circuit-breakers PKZ from 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 16 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.

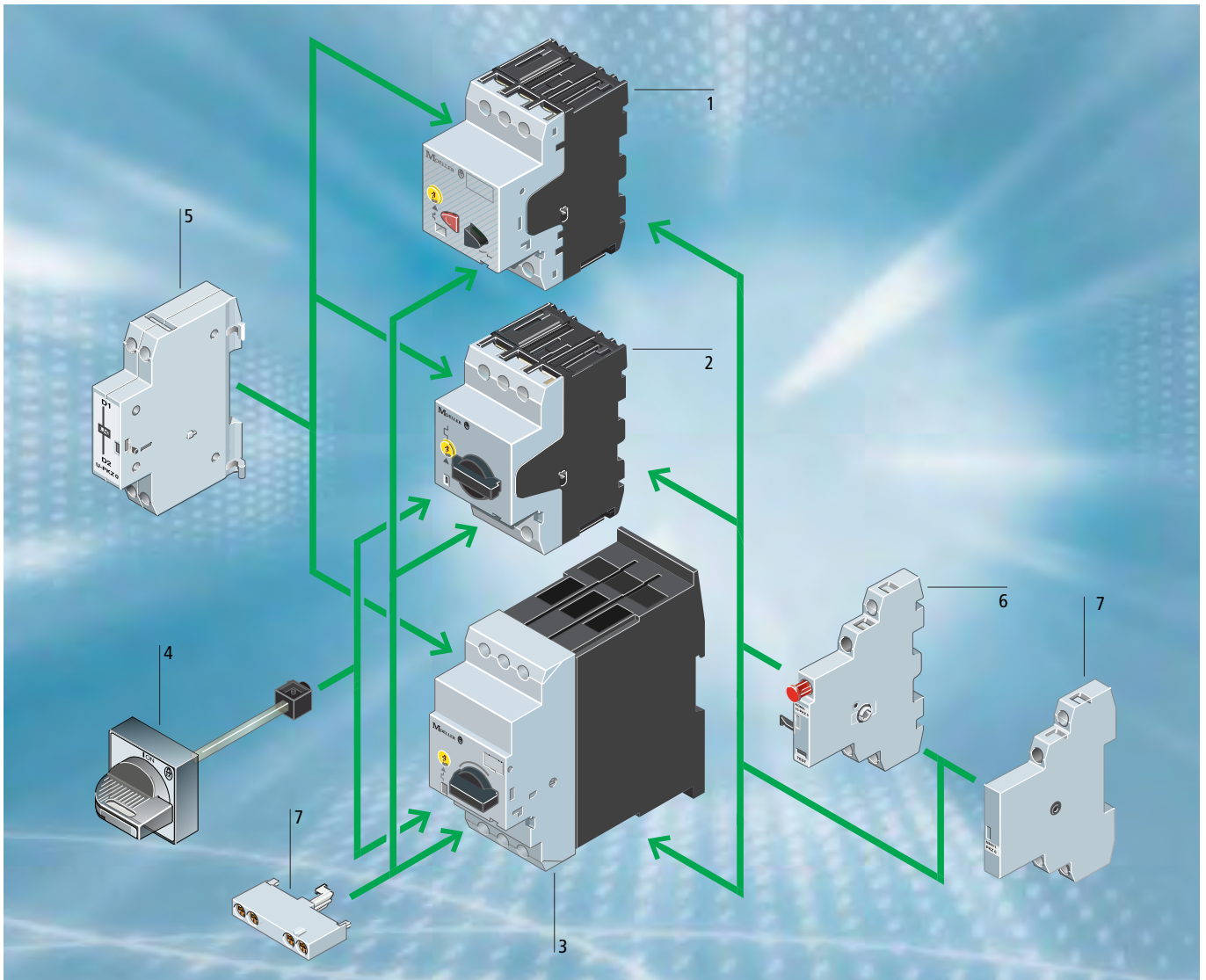


### Motor-protective circuit-breakers PKZM 01: easy to operate by pressing or hitting a button

The new motor-protective circuit-breakers PKZM 01 for motors up to 12 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. 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 <i>P</i> kW	Rated uninterrupted current $I_U$ A	Setting range		Screw terminals  <b>Part no.</b>
			Overload releases $I_r$ A 	Short-circuit release $I_{rm}$ A 	
<b>Motor-protective circuit-breakers, coordination type "1" and "2"</b>  	–	0.16	0.1 – 0.16	2.2	<b>PKZM0-0,16</b>
	0.06	0.25	0.16 – 0.25	3.5	<b>PKZM0-0,25</b>
	0.09	0.4	0.25 – 0.4	5.6	<b>PKZM0-0,4</b>
	0.12	0.63	0.4 – 0.63	8.8	<b>PKZM0-0,63</b>
	0.25	1	0.63 – 1	14	<b>PKZM0-1</b>
	0.55	1.6	1 – 1.6	22	<b>PKZM0-1,6</b>
	0.75	2.5	1.6 – 2.5	35	<b>PKZM0-2,5</b>
	1.5	4	2.5 – 4	56	<b>PKZM0-4</b>
	2.2	6.3	4 – 6.3	88	<b>PKZM0-6,3</b>
	4	10	6.3 – 10	140	<b>PKZM0-10</b>
	5.5	12	8 – 12	168	<b>PKZM0-12</b>
	7.5	16	10 – 16	224	<b>PKZM0-16</b>
	9	20	16 – 20	280	<b>PKZM0-20</b>
	12.5	25	20 – 25	350	<b>PKZM0-25</b>
	15	32	25 – 32	448	<b>PKZM0-32</b>
<b>Motor-protective circuit-breaker, coordination type "1" and "2"</b>  	7.5	16	10 – 16	224	<b>PKZM4-16</b>
	12.5	25	16 – 25	350	<b>PKZM4-25</b>
	15	32	25 – 32	448	<b>PKZM4-32</b>
	20	40	32 – 40	560	<b>PKZM4-40</b>
	25	50	40 – 50	700	<b>PKZM4-50</b>
	30	58	50 – 58	812	<b>PKZM4-58</b>
	34	65	55 – 65	882	<b>PKZM4-63</b>

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 <i>P</i> kW	Rated uninterrupted current $I_U$ A	Setting range		Screw terminals  <b>Part no.</b>
			Overload releases $I_r$ A	Short-circuit releases $I_{rm}$ A	
<b>Motor-protective circuit-breakers, coordination type "1" and "2"</b>  	–	0.16	0.1 – 0.16	2.2	<b>PKZM01-0,16</b>
	0.06	0.25	0.16 – 0.25	3.5	<b>PKZM01-0,25</b>
	0.09	0.4	0.25 – 0.4	5.6	<b>PKZM01-0,4</b>
	0.12	0.63	0.4 – 0.63	8.8	<b>PKZM01-0,63</b>
	0.25	1	0.63 – 1	14	<b>PKZM01-1</b>
	0.55	1.6	1 – 1.6	22	<b>PKZM01-1,6</b>
	0.75	2.5	1.6 – 2.5	35	<b>PKZM01-2,5</b>
	1.5	4	2.5 – 4	56	<b>PKZM01-4</b>
	2.2	6.3	4 – 6.3	88	<b>PKZM01-6,3</b>
	4	10	6.3 – 10	140	<b>PKZM01-10</b>
	5.5	12	8 – 12	168	<b>PKZM01-12</b>
7.5	16	10 – 16	224	<b>PKZM01-16</b>	







**Note** Three-phase motors (approximate values for squirrel-cage rotors)

## Insulated enclosures

	Protection	For use with	Part no.	
<b>Insulated enclosures for surface mounting</b>  	–	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	<b>CI-PKZ01</b>	
	With actuating diaphragm	IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	<b>CI-PKZ01-G</b>
	Lockable in the Off position	IP65 NEMA 4X	PKZM01+NHI-E+U or A+L (2 off)	<b>CI-PKZ01-SVB</b>
	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)	<b>CI-PKZ01-SVB-V</b>
	With stay-put Emergency-Stop mushroom button	IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	<b>CI-PKZ01-PVT</b>
	With key-release Emergency-Stop mushroom button	IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	<b>CI-PKZ01-PVS</b>
<b>Insulated enclosures for flush mounting</b>  	–	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	<b>E-PKZ01</b>	
	With actuating diaphragm	Front IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A or NHI+L (2 off)	<b>E-PKZ01-G</b>
	Lockable in the Off position	Front IP65 NEMA 4X	PKZM01+NHI-E+U or A+L (2 off)	<b>E-PKZ01-SVB</b>
	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)	<b>E-PKZ01-SVB-V</b>
	With stay-put Emergency-Stop mushroom button	Front IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	<b>E-PKZ01-PVT</b>
	With key-release Emergency-Stop mushroom button	Front IP65 NEMA 4X	PKZM01+NHI-E or VHI-PKZ01+U or A+L (2 off)	<b>E-PKZ01-PVS</b>



## Accessories

	Contacts		Type of current AC/DC	For use with	Part no.
<b>Trip-indicating auxiliary contact</b> 	2 × 1 N/O	–	–	PKZM0 PKZM4 PKZM01	<b>AGM2-10-PKZ0</b>
	–	2 × 1 N/C	–		<b>AGM2-01-PKZ0</b>
<b>Early-make auxiliary contacts</b> 	2 N/O	–	–	PKZM0	<b>VHI20-PKZ0</b>
	–	2 N/O	–		PKZM01
<b>Shunt release</b> 	–	–	AC operation	PKZM0 PKZM4 PKZM01	<b>A-PKZ0(230V50HZ)</b>
	–	–	DC operation		<b>A-PKZ0(24VDC)</b>
<b>Undervoltage release</b> 	–	–	AC operation	PKZM0 PKZM4 PKZM01	<b>U-PKZ0(230V50HZ)</b>
<b>Standard auxiliary contact</b> 	1 N/O	1 N/C	–	PKZM0 PKZM4 PKZM01	<b>NHI11-PKZ0</b>
	1 N/O	2 N/C	–		<b>NHI12-PKZ0</b>
	2 N/O	1 N/C	–		<b>NHI21-PKZ0</b>
<b>Standard auxiliary contact</b> 	1 N/O	1 N/C	–		<b>NHI-E-11-PKZ0</b>
	1 N/O	–	–		<b>NHI-E-10-PKZ0</b>

## Motorprotective circuit-breakers for North America

Rating data for approved types <sup>1)</sup> UL 508/CSA C 22.2 No. 14	Maximum motor rating				Setting ranges		Maximum protective device to UL/CSA Group protection <sup>2)</sup>					
	Three-phase current HP				Overload release	Overload release	Maximum					
	200 V	230 V	460 V	575 V			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
<b>PKZM 01 motor-protective circuit-breakers</b> "Manual Motor Starter with thermal and magnetic trip"												
PKZM01-0,16	<sup>3)</sup>				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
<b>PKZM 0 motor-protective circuit-breakers</b> "Manual Motor Starter with thermal and magnetic trip"												
PKZM0-0,16	<sup>3)</sup>				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
<b>PKZM 4 motor-protective circuit-breakers</b>												
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	
<b>Notes</b>	Service factor (SF) Setting $I_r$ of current scale in dependence of load factor $SF = 1.15 \rightarrow I_r = 1 \times I_{n\text{mot}}$ $SF = 1 \rightarrow I_r = 0.9 \times I_{n\text{mot}}$					<sup>1)</sup> Devices for world markets: IEC = UL/CSA <sup>2)</sup> Important: Changed requirements for group protection <sup>3)</sup> 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.*

Manual motor starters are used primarily as manually operated protective switches in industrial control panels as well as

## 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		PKZM0-0,4
				0.4 – 0.63	8.8	50	50	50		PKZM0-0,63
		0.5	0.5	0.63 – 1	14	50	50	50		PKZM0-1
		0.75	1	1 – 1.6	22	50	50	50		PKZM0-1,6
0.5	0.5	1	1.5	1.6 – 2.5	35	50	50	50		PKZM0-2,5
1	1	2	3	2.5 – 4	56	50	50	50		PKZM0-4
1.5	1.5	3	5	4 – 6.3	88	50	50	50		PKZM0-6,3
3	3	7.5	10	6.3 – 11	140	50	50	50		PKZM0-10
3	3	7.5	10	6.3 – 11	168	42	42	18		PKZM0-12
3	5	10	10	10 – 16	224	42	42	10		PKZM0-16
5	5	10	–	16 – 20	280	42	42	–		PKZM0-20
5	7.5	15	–	20 – 25	350	18	18	–		PKZM0-25
7.5	10	20	–	25 – 32	448	18	18	–		PKZM0-32
3	5	10	15	10 – 16	224	50	50	25		BK50/3-PKZ4-E
7.5	7.5	20	25	20 – 25	350	50	50	25	BK50/3-PKZ4-E	PKZM4-25
10	10	25	30	25 – 32	448	50	50	25	BK50/3-PKZ4-E	PKZM4-32
10	10	30	30	32 – 40	560	50	50	25	BK50/3-PKZ4-E	PKZM4-40

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

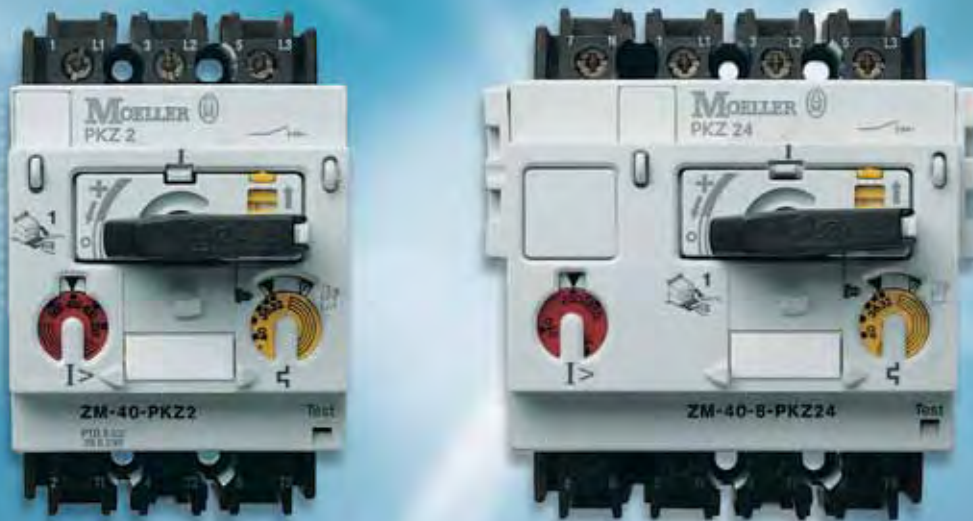
A significant step in the expansion of *UL 508* and *CSA-C22.2 No. 14* with respect to combination motor controllers came about with the introduction of “Construction Type E” in each respective standard. In order to fulfill the necessary upstream main disconnect and short circuit protective functions 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.

## Motor- and System-Protective- Circuit-Breakers PKZ 2: Versatile in Application



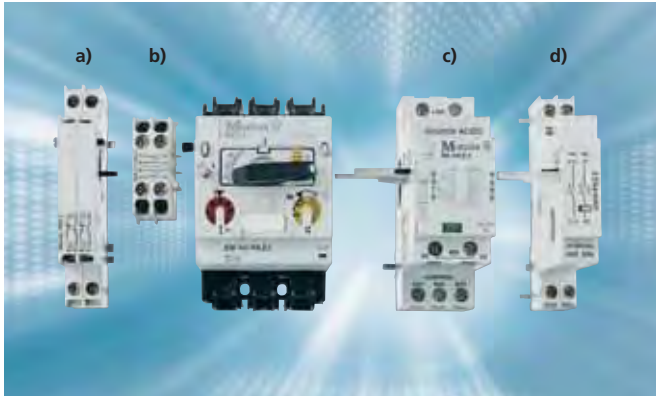
### Motor and system protection: All the options in one range

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.

*“Motor-protective circuit-breakers PKZ are, and always will be, the epitome of safety, reliability and quality in motor protection.”*



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**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 ZMRPKZ 2.

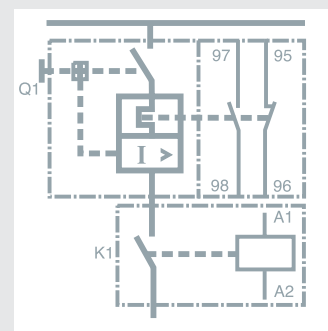
When used in combination with the PKZ 2 basic unit, the trip block with overload relay function switches Off the down-stream contactor, rather than disconnecting the circuit-breaker in the event of a motor overload. The circuit-breaker PKZ 2 thus remains switched On and does not need to be manually reset 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.



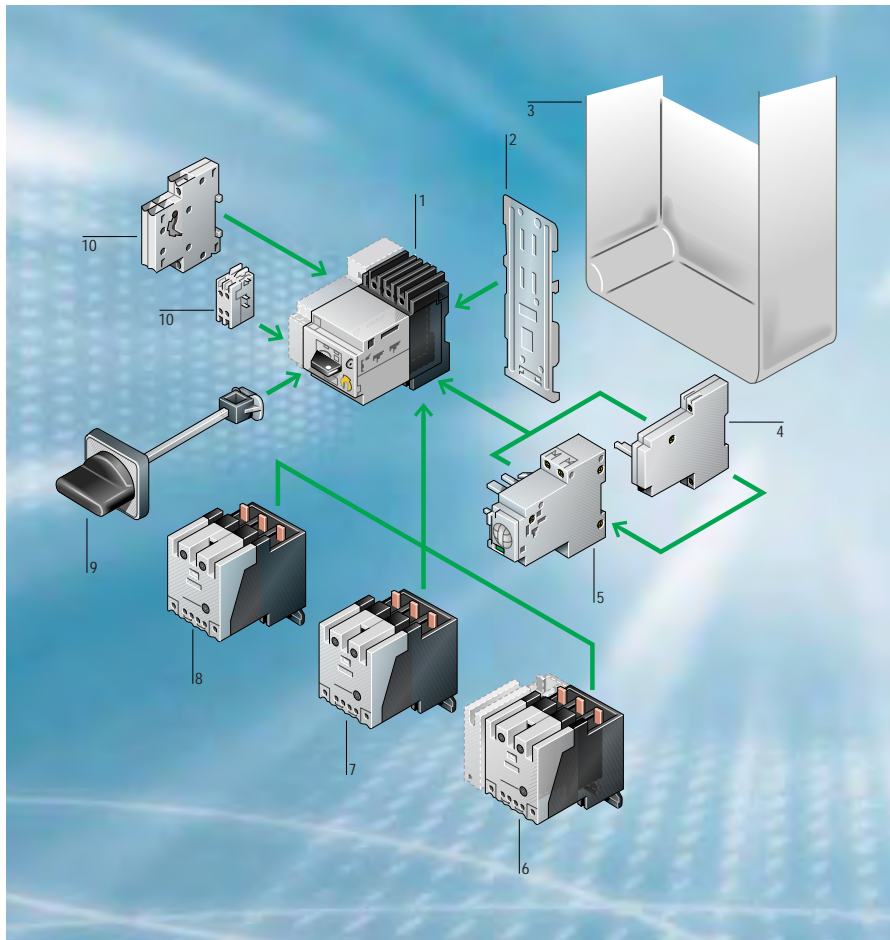
1



2



# The complete range for flexible solutions



- 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
$I_u$	<b>Part no.</b>	<b>Part no.</b>	<b>Part no.</b>
A			
40	PKZ2	PKZ2/S(230V50HZ)	PKZ2/SE1A/11(230V50HZ)

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**PKZ 2 motor-protective circuit-breakers, PKZ 2 circuit-breakers for North America**

Rating data for approved types <sup>1)</sup> UL 508/CSA C 22.2 No. 14	Maximum motor rating				Setting ranges		Maximum protective device to UL/CSA Group protection <sup>2)</sup>			
	Three-phase current HP				Overload release	Short-circuit release	To max. short-circuit rating 600 V		Maximum fuse rating	Circuit-breaker max.
	200 V	230 V	460 V	575 V			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					0.6 – 1	8 – 14	65	42	500	600
PKZ2/ZM-1,6					0.75	1	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(...)					0.6 – 1	8 – 14	65	42	2000	2000
PKZ2/ZM-1,6/S(...)					0.75	1	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				

**Reversing combination** "Reversing combination" in combination with ZM-...PKZ2 trip block for motor protection

PKZ2/SW-MV-11(...)	10		15		30	30				
Reversing busbar system	For UL/CSA-conformance, order a BK50/3-PKZ2 terminal separately.									

**Notes**

Service factor (SF)  
 Setting  $I_r$  of current scale in dependence of load factor  
 $SF = 1.15 \rightarrow I_r = 1 \times I_{n\text{ mot}}$   
 $SF = 1 \rightarrow I_r = 0.9 \times I_{n\text{ mot}}$

<sup>1)</sup> Devices for world markets: IEC = UL/CSA  
<sup>2)</sup> Important: Changed requirements for group protection  
<sup>3)</sup> 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			Part no.
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	
1) <sup>1)</sup>	1) <sup>1)</sup>	0.5	0.5	0.6 – 1	8 – 14	100	65	42	<b>PKZ2/ZM-1/S-SP(120V60HZ)</b> <b>PKZ2/ZM-1,6/S-SP(120V60HZ)</b> <b>PKZ2/ZM-2,4/S-SP(120V60HZ)</b> <b>PKZ2/ZM-4/S-SP(120V60HZ)</b> <b>PKZ2/ZM-6/S-SP(120V60HZ)</b> <b>PKZ2/ZM-10/S-SP(120V60HZ)</b> <b>PKZ2/ZM-16/S-SP(120V60HZ)</b> <b>PKZ2/ZM-25/S-SP(120V60HZ)</b> <b>PKZ2/ZM-32/S-SP(120V60HZ)</b> <b>PKZ2/ZM-40/S-SP(120V60HZ)</b>
1) <sup>1)</sup>	1) <sup>1)</sup>	0.75	1	1 – 1.6	14 – 22	100	65	42	
0.5	0.5	1	1.5	1.6 – 2.4	20 – 35	100	65	42	
1	1	2	3	2.4 – 4	35 – 55	100	65	42	
1.5	1.5	3	5	4 – 6	50 – 80	100	65	42	
2	3	5	7.5	6 – 10	80 – 140	100	65	42	
3	5	10	10	10 – 16	130 – 220	100	65	42	
7.5	7.5	20	25	16 – 27	200 – 350	100	65	42	
10	10	20	–	24 – 32	275 – 425	100	65	–	
10	15	30	–	32 – 42	350 – 500	100	65	–	

**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.

<sup>1)</sup> 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

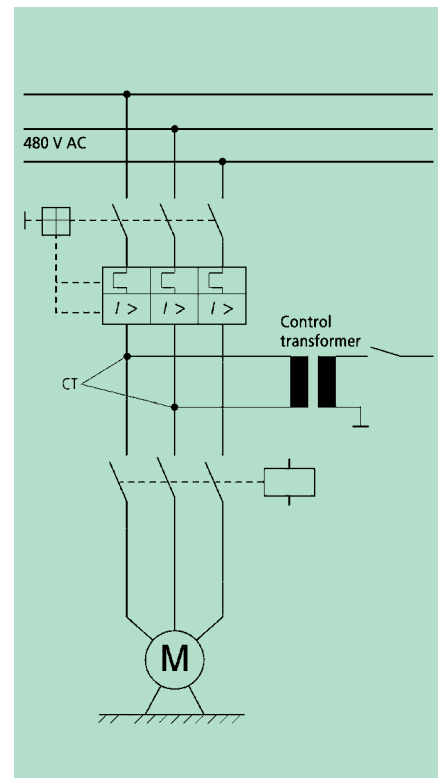
The Self-Protected Combination Starter Type *PKZ2/ZM-.../S-SP* fulfills all „Type E“-requirements. This high fault rated compact combination starter is made up of a thermal-magnetic manual motor protective switch *PKZ2/ZM-...* and a high fault capacity magnetic controller (contactor) */S*. The unit features 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!**

**xStart**



Using the new xStart motor-starter combinations it is possible to create the best solutions from standard products even more easily and efficiently. 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 Moeller technology is available on our direct-on-line and reversing starters up to 15.5 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 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 15.5 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 17 up to 32 A. This prevents fitting errors and cuts down on wiring time.



### Plug and go: reversing starters from standard components

The reversing starters offer distinct advantages to the assembler. Instead of laboriously having to tighten up 23 screws, a small number of components simply plug together. This of course speeds up fitting work, and means fewer errors and a very clearly laid out switching installation.






### 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.

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# Direct-on-line 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"
<b>Complete units PKZ and DIL M</b>	<b>P</b> kW	<b>I<sub>e</sub></b> A	<b>I<sub>q</sub></b> kA	<b>I<sub>r</sub></b> A	<b>I<sub>rm</sub></b> A	<b>Part no.</b>	<b>Part no.</b>
	0.06	0.21	150 (50) <sup>1</sup>	0.16 – 0.25	3.5	MSC-D-0,25-M7 (...)	MSC-D-0,25-M7 (...)
	0.09	0.31	150 (50) <sup>1</sup>	0.25 – 0.4	5.6	MSC-D-0,4-M7 (...)	MSC-D-0,4-M7 (...)
	0.12	0.41	150 (50) <sup>1</sup>	0.40 – 0.63	8.82	MSC-D-0,63-M7 (...)	MSC-D-0,63-M7 (...)
	0.18	0.6	150 (50) <sup>1</sup>	0.40 – 0.63	8.82	MSC-D-0,63-M7 (...)	MSC-D-0,63-M7 (...)
	0.25	0.8	150 (50) <sup>1</sup>	0.63 – 1	14	MSC-D-1-M7 (...)	MSC-D-1-M7 (...)
	0.37	1.1	150 (50) <sup>1</sup>	1.00 – 1.6	22.4	MSC-D-1,6-M7 (...)	MSC-D-1,6-M7 (...)
	0.55	1.5	150 (50) <sup>1</sup>	1.00 – 1.6	22.4	MSC-D-1,6-M7 (...)	MSC-D-1,6-M7 (...)
	0.75	1.9	150 (50) <sup>1</sup>	1.60 – 2.5	35	MSC-D-2,5-M7 (...)	MSC-D-2,5-M7 (...)
	1.1	2.6	150 (50) <sup>1</sup>	2.50 – 4	56	MSC-D-4-M7 (...)	MSC-D-4-M7 (...)
	1.5	3.6	150 (50) <sup>1</sup>	2.50 – 4	56	MSC-D-4-M7 (...)	MSC-D-4-M7 (...)
	2.2	5	150 (50) <sup>1</sup>	4.00 – 6.3	88.2	MSC-D-6,3-M7 (...)	MSC-D-6,3-M7 (...)
	3	6.6	150 (50) <sup>1</sup>	6.30 – 10	140	MSC-D-10-M7 (...)	MSC-D-10-M17 (...)
	4	8.5	150 (50) <sup>1</sup>	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) <sup>2</sup>	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 (...)	
<b>Components PKZ and DIL M</b>  	5.5	11.3	50	10 - 16	224	-	-
	7.5	16	50	10 - 16	224	-	-
	11	21.7	50	20 - 25	350	-	-
	15	29.3	50	25 - 32	448	-	-
	18.5	36	50	32 - 40	560	-	-
	22	41	50	40 - 50	700	-	-
	30	55	50	50 - 58	812	-	-
34	63	50	55 - 65	910	-	-	

<sup>1</sup> For coordination type "2"

<sup>2</sup> 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	DILM15-..	PKZM0-XD M12	DILM17-..	PKZM0-XD M32
PKZM0-25	DILM25-..	PKZM0-XD M32	DILM25-..	PKZM0-XD M32
PKZM0-32	DILM32-..	PKZM0-XD M32	DILM32-..	PKZM0-XD M32
PKZM4-16	DILM17-..	-	DILM17-..	-
PKZM4-16	DILM17-..	-	DILM17-..	-
PKZM4-25	DILM25-..	-	DILM25-..	-
PKZM4-32	DILM32-..	-	DILM32-..	-
PKZM4-40	DILM40	-	DILM40	-
PKZM4-50	DILM50	-	DILM50	-
PKZM4-58	DILM65	-	DILM65	-
PKZM4-63	DILM65	-	DILM65	-

## Notes

The direct-on-line starters (complete units) consist of a motor-protective circuit-breaker PKZM 0 and a contactor DIL M.

Up to 15.5 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.



Moeller provides a PC-based electronic selection program for motor starters in addition to the comprehensive selection page in the 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 Moeller free of charge on the Internet. Moeller has provided the practically-minded with a carton selection slider for a number of years.



[www.moeller.net/select](http://www.moeller.net/select)

# Type F Combined Motor Controller for North America



## Type F Combination Starter

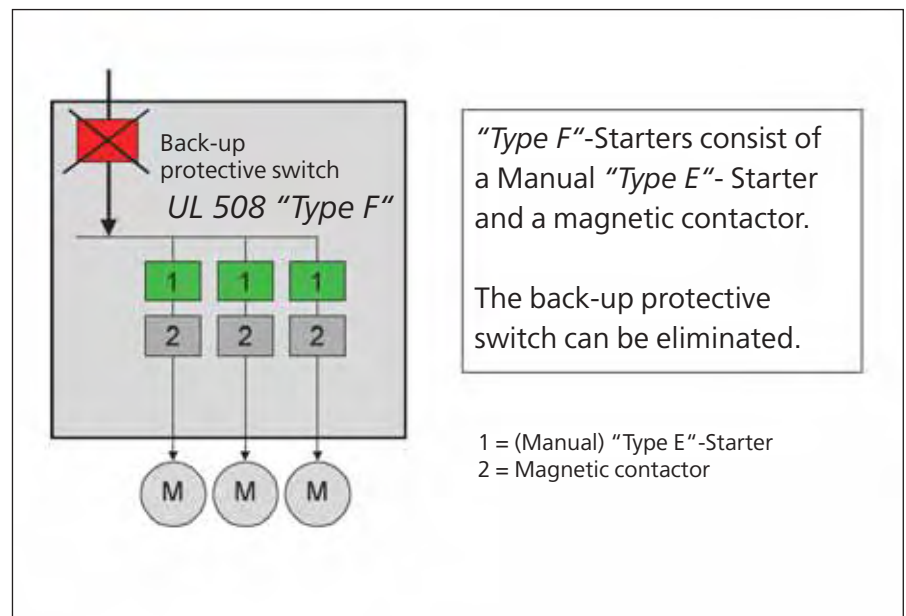
UL has now officially introduced in the *UL 508* standard the latest category of combination motor starters: a "Type F Combination Motor Controller". A Type F combination controller consists simply of a Manual self-protected "Type E" combination motor controller (e.g. a *PKZM0-...* equipped with the large clearance terminal block *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. 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 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






"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.
0.5 1 1.5 3 3 3 5 5 7.5	0.5 1 1.5 3 3 5 5 7.5 10	0.5 0.75 1 2 3 7.5 7.5 10 15 20	0.5 1 1.5 3 5 10 10 15 20 30	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
				0.63 – 1	14	50	50	50	BK25/3-PKZ0-E	PKZM0-1	DILM7
				1 – 1.6	22	50	50	50	BK25/3-PKZ0-E	PKZM0-1,6	DILM7
				1.6 – 2.5	35	50	50	50	BK25/3-PKZ0-E	PKZM0-2,5	DILM7
				2.5 – 4	56	50	50	50	BK25/3-PKZ0-E	PKZM0-4	DILM7
				4 – 6.3	88	50	50	50	BK25/3-PKZ0-E	PKZM0-6,3	DILM7
				6.3 – 11	140	50	50	50	BK25/3-PKZ0-E	PKZM0-10	DILM9
				6.3 – 11	168	50	50	50	BK25/3-PKZ0-E	PKZM0-12	DILM12
3 7.5 10 10	5 7.5 10 10	10 20 25 30	– – – –	10 – 16	224	50	50	–	BK50/3-PKZ4-E	PKZM4-16	DILM17
				20 – 25	350	50	50	–	BK50/3-PKZ4-E	PKZM4-25	DILM25
				25 – 32	448	50	50	–	BK50/3-PKZ4-E	PKZM4-32	DILM32
				32 – 40	560	50	50	–	BK50/3-PKZ4-E	PKZM4-40	DILM40

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.

# Reversing starter

Reversing starter 400/415 V								
				Setting range		Motor starter		
	AC-3 380 V 400 V 415 V	Rated opera- tional 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	<i>P</i> kW	<i>I<sub>e</sub></i> A	<i>I<sub>q</sub></i> kA	<i>I<sub>r</sub></i> A	<i>I<sub>rm</sub></i> A	Part no.	Part no.	
	0.06	0.21	150 (50) <sup>1</sup>	0.16 – 0.25	3.5	MSC-R-0,25-M7 (...)	MSC-R-0,25-M7 (...)	
	0.09	0.31	150 (50) <sup>1</sup>	0.25 – 0.4	5.6	MSC-R-0,4-M7 (...)	MSC-R-0,4-M7 (...)	
	0.12	0.41	150 (50) <sup>1</sup>	0.40 – 0.63	8.82	MSC-R-0,63-M7 (...)	MSC-R-0,63-M7 (...)	
	0.18	0.6	150 (50) <sup>1</sup>	0.40 – 0.63	8.82	MSC-R-0,63-M7 (...)	MSC-R-0,63-M7 (...)	
	0.25	0.8	150 (50) <sup>1</sup>	0.63 – 1	14	MSC-R-1-M7 (...)	MSC-R-1-M7 (...)	
	0.37	1.1	150 (50) <sup>1</sup>	1.00 – 1.6	22.4	MSC-R-1,6-M7 (...)	MSC-R-1,6-M7 (...)	
	0.55	1.5	150 (50) <sup>1</sup>	1.00 – 1.6	22.4	MSC-R-1,6-M7 (...)	MSC-R-1,6-M7 (...)	
	0.75	1.9	150 (50) <sup>1</sup>	1.60 – 2.5	35	MSC-R-2,5-M7 (...)	MSC-R-2,5-M7 (...)	
	1.1	2.6	150 (50) <sup>1</sup>	2.50 – 4	56	MSC-R-4-M7 (...)	MSC-R-4-M7 (...)	
	1.5	3.6	150 (50) <sup>1</sup>	2.50 – 4	56	MSC-R-4-M7 (...)	MSC-R-4-M7 (...)	
	2.2	5	150 (50) <sup>1</sup>	4.00 – 6.3	88.2	MSC-R-6,3-M7 (...)	MSC-R-6,3-M7 (...)	
	3	6.6	150 (50) <sup>1</sup>	6.30 – 10	140	MSC-R-10-M7 (...)	MSC-R-10-M17 (...)	
	4	8.5	150 (50) <sup>1</sup>	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 (...)		
<b>Components</b> PKZ and DIL M  	5.5	11.3	50	10 - 16	224	-	-	
	7.5	16	50	10 - 16	224	-	-	
	11	21.7	50	20 - 25	350	-	-	
	15	29.3	50	25 - 32	448	-	-	
	18.5	36	50	32 - 40	560	-	-	
	22	41	50	40 - 50	700	-	-	
	30	55	50	50 - 58	812	-	-	
	34	63	50	55 - 65	910	-	-	

<sup>1</sup> For coordination type "2"



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.	Part no.
PKZM0-0,25	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-0,4	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-0,63	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-0,63	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-1	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-1,6	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-1,6	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-2,5	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-4	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-4	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-6,3	2x DILM7-01	PKZM0-XR M12	2x DILM7-01	PKZM0-XR M12	PKZM0-XR M12
PKZM0-10	2x DILM7-01	PKZM0-XR M12	2x DILM17-01	PKZM0-XR M32	PKZM0-XR M32
PKZM0-10	2x DILM9-01	PKZM0-XR M12	2x DILM17-01	PKZM0-XR M32	PKZM0-XR M32
PKZM0-12	2x DILM12-01	PKZM0-XR M12	2x DILM17-01	PKZM0-XR M32	PKZM0-XR M32
PKZM0-16	2x DILM17-01	PKZM0-XR M32	2x DILM17-01	PKZM0-XR M32	PKZM0-XR M32
PKZM0-25	2x DILM25-01	PKZM0-XR M32	2x DILM25-01	PKZM0-XR M32	PKZM0-XR M32
PKZM0-32	2x DILM32-01	PKZM0-XR M32	2x DILM32-01	PKZM0-XR M32	PKZM0-XR M32
PKZM4-16	2x DILM17-..	-	2x DILM17-..	-	-
PKZM4-16	2x DILM17-..	-	2x DILM17-..	-	-
PKZM4-25	2x DILM25-..	-	2x DILM25-..	-	-
PKZM4-32	2x DILM32-..	-	2x DILM32-..	-	-
PKZM4-40	2x DILM40	-	2x DILM40	-	-
PKZM4-50	2x DILM50	-	2x DILM50	-	-
PKZM4-58	2x DILM65	-	2x DILM65	-	-
PKZM4-63	2x DILM65	-	2x DILM65	-	-

## Notes

The reversing starters (complete units) consist of a motor-protective circuit-breaker PKZM 0 and two contactors DIL M. Up to 12 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.

Complete units with mechanical interlock, starters up to 12 A also with electrical interlock.

# PKZM 0 accessories

PKZM 0 motor-protective circuit-breaker accessories			
	For use with	Part no.	Application note
			The set consists of
<b>Wiring set DOL starter</b>	PKZM0+DILM7 PKZM0+DILM9 PKZM0+DILM12 PKZM0+DILM15	<b>PKZM0-XDM12</b>	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	<b>PKZM0-XDM32</b>	Mounting rail adapter plate Main current wiring between PKZM 0 and contactor
	PKZM4+DILM40 PKZM4+DILM50 PKZM4+DILM65	<b>PKZM4-XDM65</b>	Mounting rail adapter plate Main current wiring between PKZM 4 and contactor
<b>Wiring set reversing starter</b>	PKZM0+DILM7-01 PKZM0+DILM9-01 PKZM0+DILM12-01	<b>PKZM0-XRM12</b>	Mechanical connection module for PKZM 0 and contactor Main current wiring between reversing starters in tool-less plug connection <u>Control cable in tool-less plug connection</u>
	PKZM0+DILM17-01 PKZM0+DILM25-01 PKZM0+DILM32-01	<b>PKZM0-XRM32</b>	Mounting rail adapter plate Reversing starter main current wiring
<b>Wiring set star-delta starter</b>	PKZM0+DILM7 PKZM0+DILM9 PKZM0+DILM12	<b>PKZM0-XSM12</b>	Mechanical connection module for PKZM 0 and contactor Star-delta starter in tool-less plug connection main current wiring Control cable in tool-less plug connection Mounting rail adapter plate
	PKZM0+DILM17-01 PKZM0+DILM25-01 PKZM0+DILM32-01	<b>PKZM0-XSM32</b>	Mounting rail adapter plate Star-delta starter main current wiring
<b>Electrical contact module for main current wiring</b>	PKZM0+DILM17 PKZM0+DILM25 PKZM0+DILM32	<b>PKZM0-XM32DE</b>	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	<b>PKZM4-XM65DE</b>	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
<b>Mounting rail adapter plate</b>	PKZM0-XDM12 PKZM0-XRM12	<b>PKZM0-XC45</b>	Consisting of: 45 mm wide adapter plate Connection nose for alignment of further plates
		<b>PKZM4-XC55</b>	Consisting of: 55 mm wide adapter plate Connection nose for alignment of further plates  <b>Reversing starter design with DIL M40..M50..M65 contactors</b> 1x PKZM 4-XDM65 + 1x PKZM 0-XC55 adapter plate + 1x DIL M65-XRL  <b>Star-delta starter design with DIL M40..M50..M65 contactors</b> 1x PKZM 4-XDM65 + 2x PKZM 0-XC55 adapter plates + 1 x DIL M65-XSL
<b>Side module</b>		<b>PKZM0-XS</b>	Can be grouped on PKZM 0-XC45 mounting rail adapter plate and PKZM 0-XC55 for extendibility by 9 mm
<b>Connection element</b>		<b>PKZM0-XCM</b>	Connection nose for alignment of multiple mounting rail adapter plates PKZM 0-XC45 and PKZM 0-XC55

## New busbar adapters (not only) for motor-starter combinations

**xStart**



The new busbar adapters from Moeller represent an ideal extension of the xStart system. Their standard-compliant dimensions ensure that they fit on all 60 mm busbar systems from all leading manufacturers world-wide. Their UL/CSA approvals assures that they are approved both for the European and North American/Canadian markets. A 100% compatibility of the busbar adapter, e.g. to the system accessories of Wöhner the busbar manufacturer is thus provided. The new busbar adapter offers several improvements. They support the adapters of starter combinations, which have been combined with the tool-less plug connection from the xStart system. The busbar adapters are available both as individual devices as well as completed devices with motor starters. This saves the customer time and money and provides a complete solution which can be used immediately in his busbar system.

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# Busbar adapter

## for all 60 mm busbar systems



### Busbar adapter, 3-pole<sup>1</sup>







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
<b>Busbar adapter 25 A</b>  	690	25	AWG 12 (4 mm <sup>2</sup> )	45	200	1	PKZM0+ Contactor DILM7 Contactor DILM9 Contactor DILM12 Contactor DILM15 MSC-D-0,25-M7... : MSC-D-16-M15...	<b>BBA0-25</b>	Set direct starter <i>PKZM0-XDM12</i>
	690	25	AWG 12 (4 mm <sup>2</sup> )	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...	<b>BBA0R-25</b>	Set reversing starter <i>PKZM0-XRM12</i>
<b>Busbar adapter 32 A</b>  	690	32	AWG 10 (6 mm <sup>2</sup> )	45	200	2	PKZM0+ Contactor DILM17 Contactor DILM25 Contactor DILM32 MSC-D-16-M17... : MSC-D-32-M32...	<b>BBA0-32</b>	Electrical contact module <i>PKZM0-XM32 DE</i>
	690	32	AWG 10 (6 mm <sup>2</sup> )	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...	<b>BBA0R-32</b>	Electrical contact module <i>PKZM0-XM32 DE</i>  Reverse wiring set <i>DILM32-XRL</i>
<b>Busbar adapter 63 A</b>  	690	63	AWG 8 (10 mm <sup>2</sup> )	72	260	2	PKZ2+ Contactor DILM7 Contactor DILM9 Contactor DILM12 Contactor DILM17 Contactor DILM25 Contactor DILM32 Contactor DILM40	<b>BBA2L-63</b>	Electrical connector for <i>PKZ2 + DILM7...12: MVS-LB0-00M-G</i>  <i>PKZ2 + DILM17...32: MVS-LB0-0M-G</i>
	690	63	AWG 8 (10 mm <sup>2</sup> )	72	200	1	PKZ2	<b>BBA2-63</b>	
	690	63	AWG 8 (10 mm <sup>2</sup> )	55	260	2	PKZM4+ Contactor DILM17 Contactor DILM25 Contactor DILM32 Contactor DILM40 Contactor DILM50 Contactor DILM65	<b>BBA4L-63</b>	Electrical connector for <i>PKZM4+DILM17...32: MVS-LB0-0M-G</i>  <i>PKZM4+DILM40...65: PKZM4-XM65 DE</i>
	690	63	AWG 8 (10 mm <sup>2</sup> )	55	200	1	PKZM4	<b>BBA4-63</b>	
<b>Side module</b>	–	–	–	9	200	–		<b>BBA-XSM</b>	Can be attached to both sides of the BBA, for extension of the width

<sup>1</sup> Can be used on all busbars in a 60 mm system. Suitable for double T and triple T profiles using a combined adapter for 5 and 10 mm busbar thicknesses.

# Busbar adapter

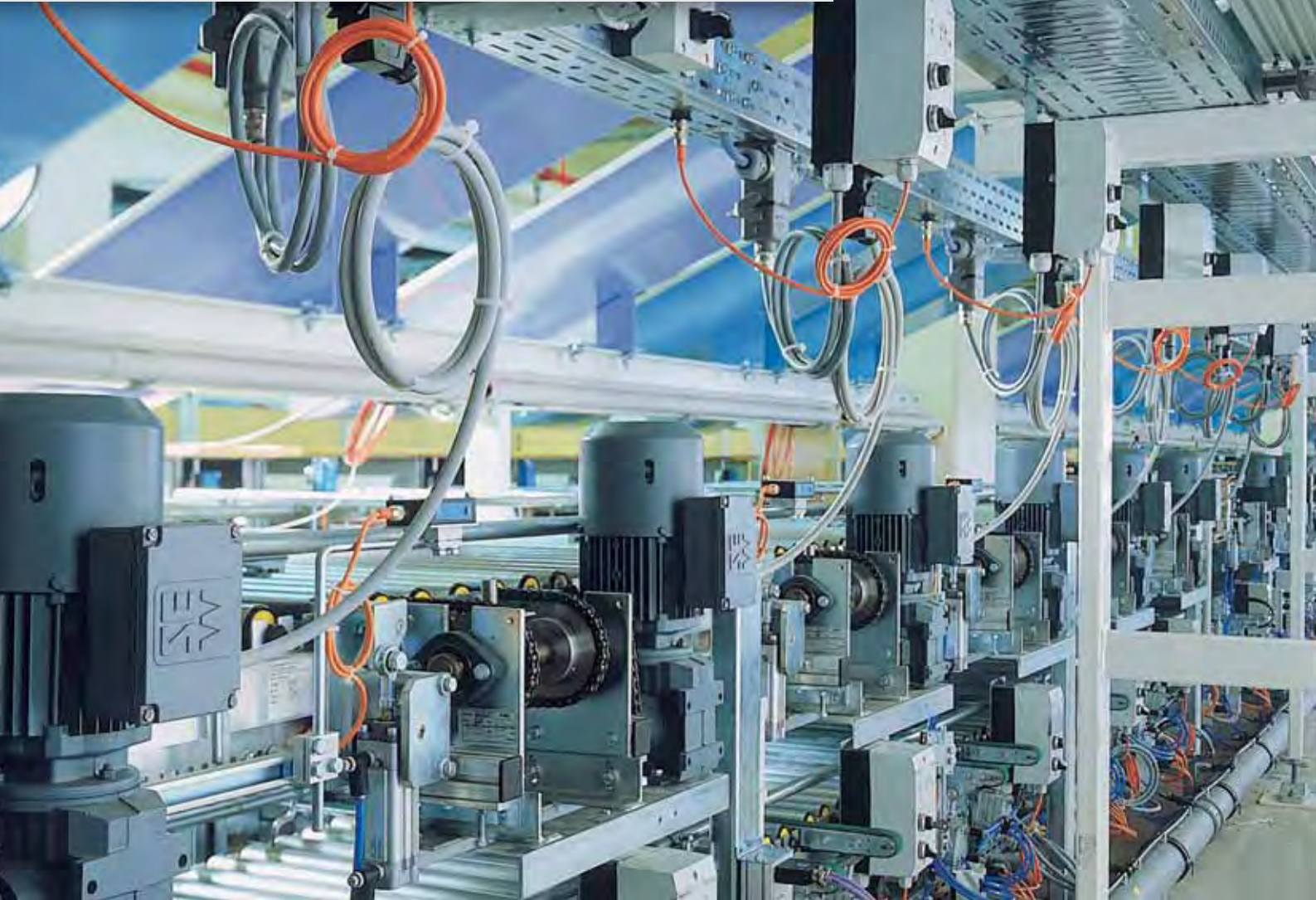
for all 60 mm busbar systems



Busbar adapter, 3-pole <sup>1</sup>									
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
<b>Busbar adapter 16 A, for springloaded terminals</b> 	690	16	AWG 14 (2.5 mm <sup>2</sup> )	45	200	2	PKZM0...C+ Contactor DILM7 Contactor DILM9 Contactor DILM12 Contactor DILM15	<b>BBA0C-16</b>	For PKZM0C... with springloaded terminals
	690	16	AWG 14 (2.5 mm <sup>2</sup> )	90	200	3	PKZM0...C+ 2 x Contactor DILM7-01 2 x Contactor DILM9-01 2 x Contactor DILM12-01	<b>BBA0RC-16</b>	For PKZM0C... with springloaded terminals
<b>Busbar adapter 25 A, universal</b> 	690	25	AWG 12 (4 mm <sup>2</sup> )	45	200	2	Mounting rail can be offset on 1.25 mm grid	<b>BBA0-25/2TS</b>	
<b>Busbar adapter 63 A, universal empty module</b> 	–	–	–	45	200	2	Mounting rail can be offset on 1.25 mm grid	<b>BBA0/2TS-L</b>	without electrical contacts as an extension of BBA... for installation of e.g. reversing starters
	–	–	–	54	260	2	Mounting rail can be offset on 1.25 mm grid	<b>BBA4/2TS-L</b>	without electrical contacts as an extension of BBA... for installation of e.g. reversing starters
<b>Busbar adapter 160 A</b> 	690	160	6 x 9 x 0.8	90	200	–	NZM1 PN1 N1 NS1	<b>NZM1-XAD160</b>	For switch with standard box terminal connection, connection to system top by supplied connection cable
<b>Busbar adapter 250 A</b> 	690	250	–	106	190	–	NZM2 PN2 N2 NS2	<b>NZM2-XAD250</b>	Connection to system optionally at top or bottom by rear side connection (+)NZM2-XXR4...
<b>Busbar adapter 550 A</b> 	690	550	–	140	270	–	NZM3 PN3 N3	<b>NZM3-XAD550</b>	Connection to system top by rear side connection (+)NZM3-XXR13

<sup>1</sup> Can be used on all busbars in a 60 mm system. Suitable for double T and triple T profiles using a combined adapter for 5 and 10 mm busbar thicknesses.

## 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 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 fieldbus 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

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## The new range up to 1600 A – New ideas for better circuit-breakers

**xEnergy**



**3-pole circuit-breaker**



**4-pole circuit-breaker**



The new 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 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, 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.

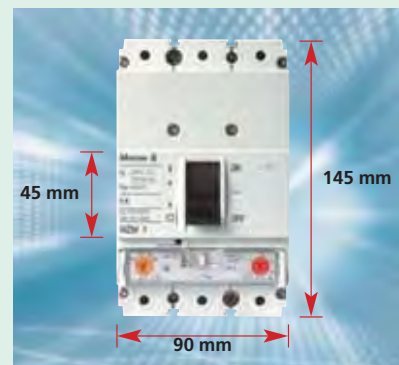


Circuit-breaker		NZM1	NZM2	NZM3	NZM4
Short-circuit breaking capacity	25 kA				
$I_{cu}$ to IEC/EN 60947	50 kA				
At 415 V	100 kA				
	150 kA <sup>1)</sup>				
Application range in A		15 – 160	15 – 250	125 – 630	315 – 1600
Nuber of poles		3/4	3/4	3/4	3/4
Rated voltage in V		525	690	690	690
Circuit-breakers for North America		NZM1-NA	NZM2-NA	NZM3-NA	NZM4-NA
Short-circuit breaking capacity	25 kA				
$I_{cu}$ to UL489	35 kA				
At 480 V	65 kA				
	100 kA				
Short-circuit breaking capacity	18 kA				
$I_{cu}$ to CSA 22.2 No 5.1	25 kA				
At 600 V	35 kA				
	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

<sup>1)</sup> Applies for NZM4: 120 kA

### More performance in a small space: NZM 1 now up to 160 A

The circuit-breaker NZM1 safely switches off short-circuit currents up to 100 kA. No other switch of such small dimensions can match this performance at a maximum rated current of 160 A. The system switch can be used as a main switch in machine controls, as an incoming circuit-breaker in service distribution boards or as an outgoing breaker in power distribution circuits. It is available as a motor-protective circuit-breaker and as a switch-disconnector.



## Excellent under load – Switch-disconnector's for safe switching under load

**xEnergy**



Switch-disconnector 3-pole



Switch-disconnector 4-pole



Even under load conditions the 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 150 000 A. The long lifetime with up to 7 500 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.

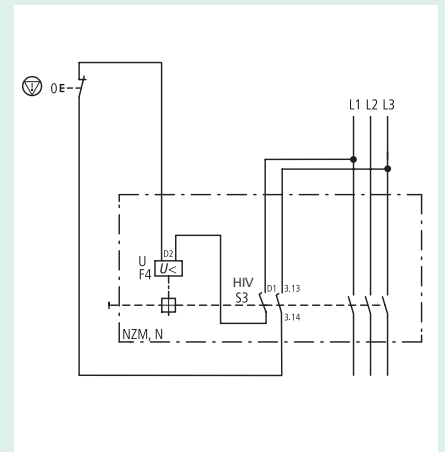


### Main switch application

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 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 range 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
<b>Switch-disconnectors for North America</b>				
	NS1-NA	NS2-NA	NS3-NA	NS4-NA
Application range in A	63 – 125	160 – 250	400 – 550	600 – 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
	Height	145	184	275
	Depth	68	103	120.5
				210/280
				401
				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



2



3



4



## 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  $I_{\Delta N} = 30 \text{ mA}$  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.

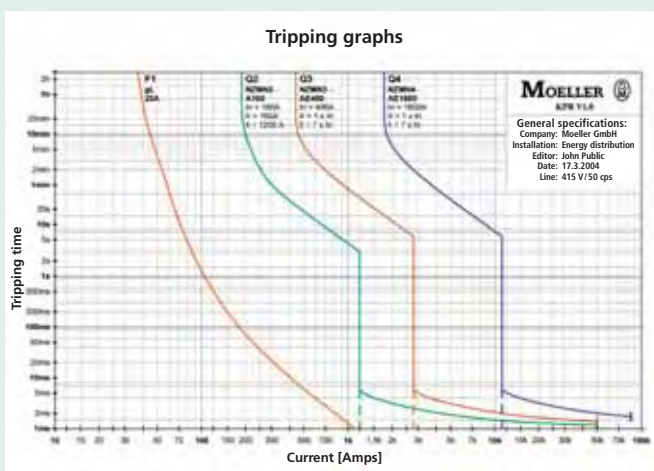
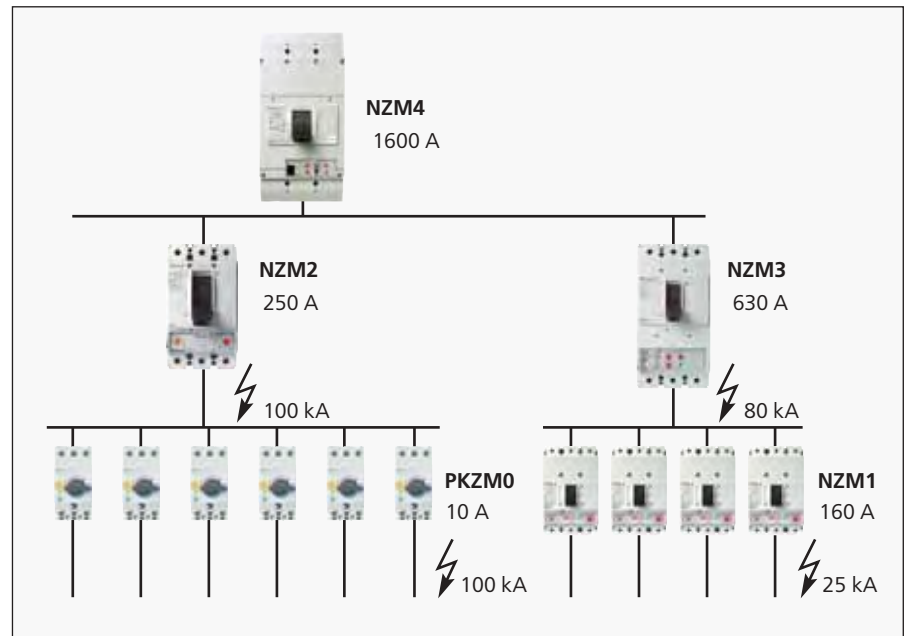
Special components simulate a thermal memory even when the switch trips during a currentless period due to a

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 250 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.



[www.moeller.net/curves](http://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 bolt connection or spring-loaded connection, for circuit-breakers or switch-disconnector's.

### The control circuit terminals – bolt- or spring-loaded connection

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 or alternatively with spring-loaded connection throughout for all control circuit terminals. This saves time when wiring all control circuit terminals.



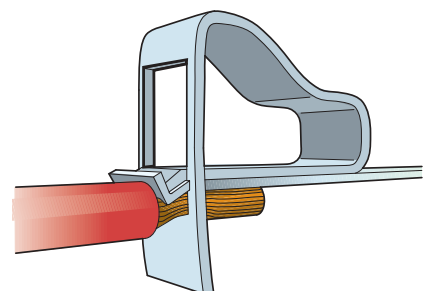
### All messages in detail – the Data Management Interface

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  $I_r$ ,  $I_r$ ,  $I_{sd}$ ,  $I^t$ , 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.



### Spring-loaded terminations – handling of the entire range with a single action

Moeller provides spring-loaded terminals universally for all control-line terminations. On contactors and motor-protective circuit-breakers they are also provided on the main circuit up to a rating of 16 A.



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## Variable operation – toggle, turn, automatic operation

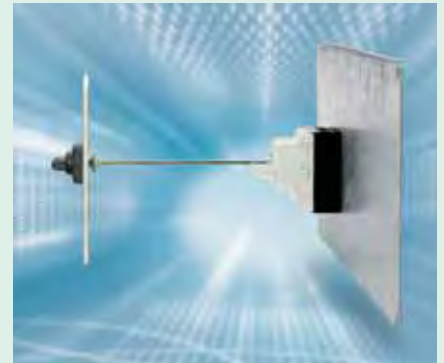


### The door coupling rotary handle – for uniform, flexible solutions

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.

### Door coupling rotary handles – ergonomic switching

Four different shaft lengths 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.



*“Circuit-breakers and switch-disconnectors from Moeller impress me because of their wider range of installation and operating features.”*





## 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.



## 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.

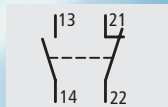
## The remote operators – simple, uniform operation

The concept of uniform functions brings about simpler operation for all remote operators. 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.



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## 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, 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

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.

### 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 or alternatively with toggle lever actuation. Additional isolated terminations for a 4th or 5th conductor are also available.



### 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.



### Interlocking and parallel operation: reasoned technology

Mechanical interlock components enable the interlocking of two or three switches, equipped with rotary handles or remote operators, 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 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.

**“You realise the competence of the people working for Moeller with every solution. All the features you require are implemented.”**



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# Clever mounting and connection increases economy



1



2



3



4



5



6

## 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.

### 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.



### 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.

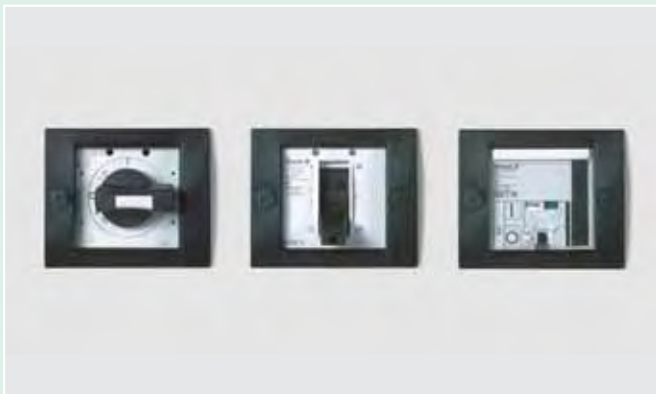
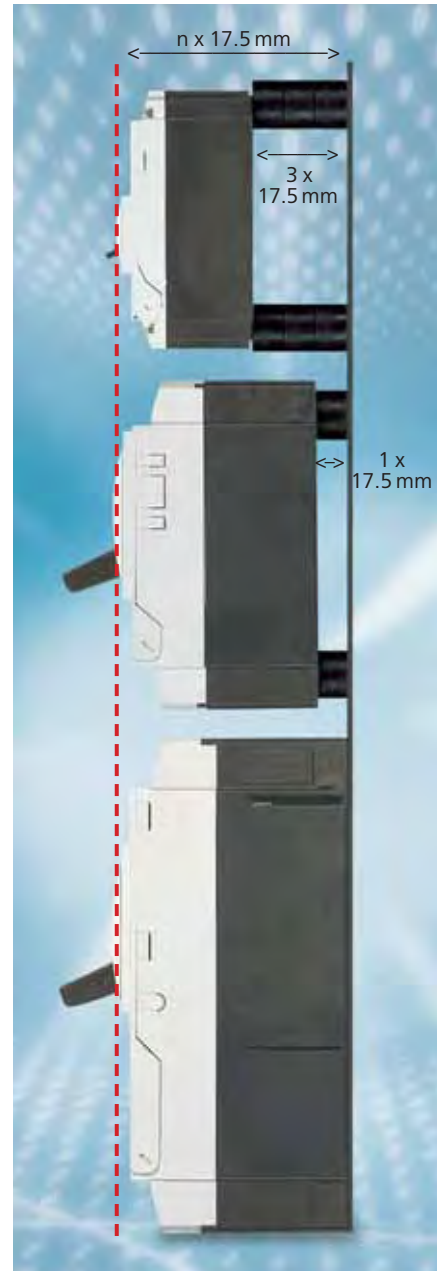
The result is a cost-effective alternative to the door coupling rotary handle with extension shaft for external operation of the circuit-breaker.

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.



### 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. The insulating surround has IP 40 degree of protection and the inscription labels can be simply clipped in.

## Diagnostics included! NZM circuit-breakers



### 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.

### 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 Moeller provide valuable insight with diagnostic information that's quickly and easily accessible with a standard PC.

**“System diagnostics was never so  
easy to implement. That's what  
I call real Plug & Work!”**



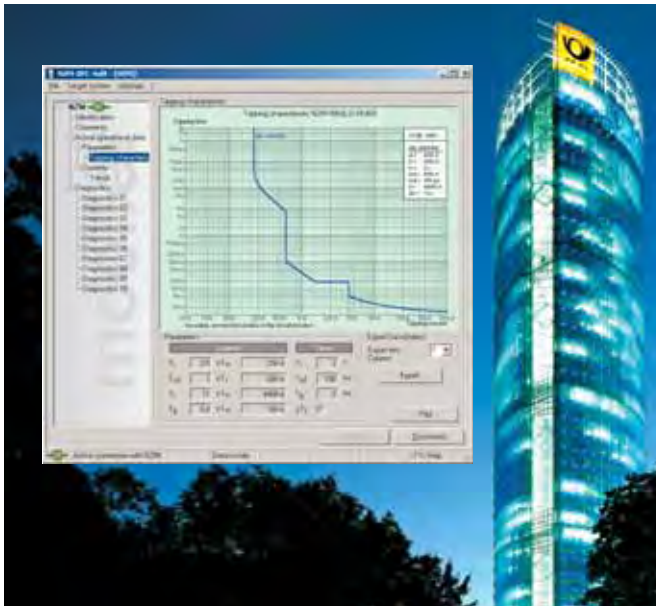


### **NZM provides diagnostic analysis after a fault that eliminates ambiguity and error!**

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.

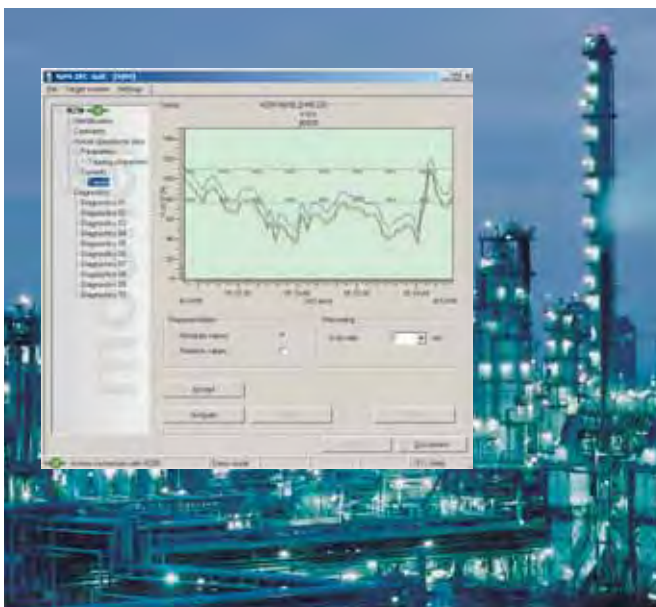
The NZM-XPC-SOFT supports nine languages for maximum safety and operating availability world-wide.



### **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.

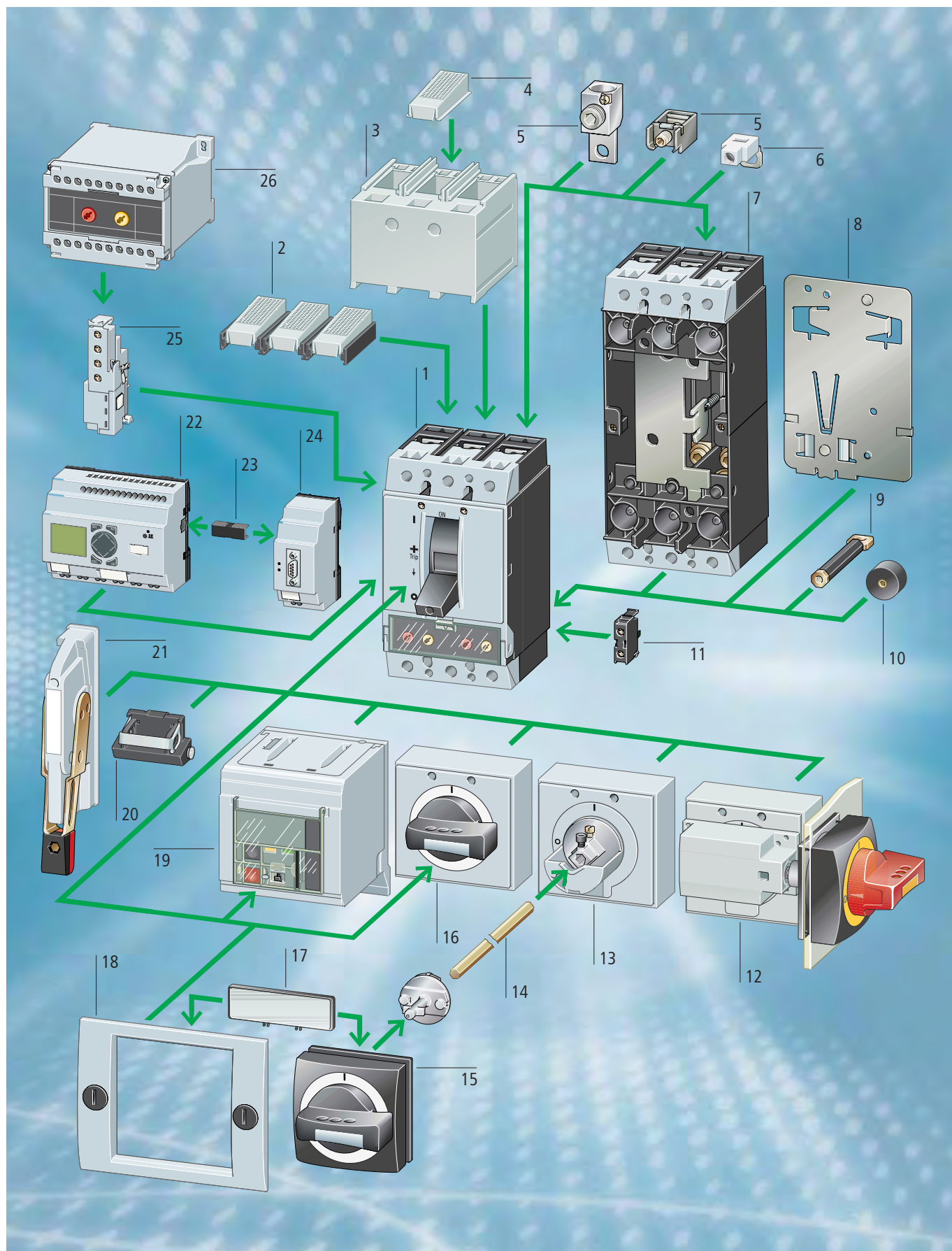
The effective values of all phases can be recorded over the time periods of minutes, hours or even days. Power distribution is therefore transparent.

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.

# System Overview

## Circuit-Breakers, Switch-Disconnectors





## Circuit-breakers, switch-disconnectors

<b>Circuit-breakers, switch-disconnectors</b>	<b>1</b>
<b>IP2X finger proof</b> For box terminals	<b>2</b>
<b>Connection shroud</b> Protection against direct contact with connection of cable lugs, busbars or when tunnel terminals are used	<b>3</b>
<b>IP2X finger proof</b> For cover	<b>4</b>
<b>Tunnel terminals for Al and Cu cables</b> Standard with control circuit terminal	<b>5</b>
<b>Box terminals</b> Standard feature of frame size 1 Mounting within the switch enclosure	<b>5</b>
<b>Control circuit terminal</b> For two connection positions top or bottom	<b>6</b>
<b>Plug-in and withdrawable unit</b>	<b>7</b>
<b>Clip plate</b>	<b>8</b>
<b>Rear side connection</b>	<b>9</b>
<b>Spacer</b>	<b>10</b>

<b>Standard auxiliary contact</b> Switches with the main contacts. Performs signalling and interlock tasks	<b>11</b>
<b>Trip-indicating auxiliary contact</b> General trip indication with trip due to overload or short-circuit as well as voltage release	<b>11</b>
<b>Main switch rotary handle for side panel mounting</b>	<b>12</b>
<b>Door coupling rotary handle</b> • lockable • with door interlock	<b>13, 15</b>
<b>Extension shaft</b> Can be cut to required length	<b>14</b>
<b>Rotary handle</b> • lockable	<b>16</b>
<b>External warning/designation label</b>	<b>17</b>
<b>Insulating surround</b> For use on the enclosure with lead through toggle lever, rotary drive and remote operator	<b>18</b>
<b>Remote operator</b> For switch on/off and reset by permanent or three-wire control	<b>19</b>

<b>Toggle level locking device</b>	<b>20</b>
<b>Side lever handle</b> In preparation	<b>21</b>
<b>Data Management Interface (DMI Module)</b> Access to diagnostics and operational data Detection of current values Parameterisation and control of the circuit-breaker with electronic releases	<b>22</b>
<b>EASY-LINK-DS data plug</b>	<b>23</b>
<b>PROFIBUS-DP interface</b>	<b>24</b>
<b>Early-make auxiliary contact</b> For interlock and load shedding circuits as well as for early-make switching of the undervoltage release with main switch/ Emergency-Stop applications	<b>25</b>
<b>Voltage release 25</b> Undervoltage release • non-delayed • off-delayed Shunt release	<b>25</b>
<b>Time delay unit for undervoltage releases</b>	<b>26</b>





### IEC/EN 60947-2 UL 489






Switch-Disconnectors	3-pole IEC		4-pole IEC		IEC 3-pole UL/CSA	
	2 switch positions <sup>1</sup>	3 switch positions <sup>2</sup>	2 switch positions <sup>1</sup>	3 switch positions <sup>2</sup>	rated current = Rated uninterrupted current $I_n = I_u$	3 switch positions <sup>2</sup>
rated current = Rated uninterrupted current  $I_n = I_u$						
Terminals standard Terminal screws as accessories						
63	PN1-63	N1-63	PN1-4-63	N1-4-63	63	NS1-63-NA
100	PN1-100	N1-100	PN1-4-100	N1-4-100	100	NS1-100-NA
125	PN1-125	N1-125	PN1-4-125	N1-4-125	125	NS1-125-NA
160	PN1-160	N1-160	PN1-4-160	N1-4-160		
Terminals standard Terminal screws as accessories						
200	PN2-200	N2-200	PN2-4-200	N2-4-200	160	NS2-160-NA
250	PN2-250	N2-250	PN2-4-250	N2-4-250	200	NS2-200-NA
400	PN3-400	N3-400	PN3-4-400	N3-4-400	250	NS2-250-NA
630	PN3-630	N3-630	PN3-4-630	N3-4-630	400	NS3-400-NA
800	–	N4-800	–	N4-4-800	600	NS3-600-NA
1000	–	N4-1000	–	N4-4-1000	800	NS4-800-NA
1250	–	N4-1250	–	N4-4-1250	1000	NS4-1000-NA
1600	–	N4-1600	–	N4-4-1600	1200	NS4-1200-NA

<sup>1</sup> I, 0 ; Cannot be remotely operated

<sup>2</sup> I, +, 0 ; Can be remotely operated with U/A voltage release










Circuit-breaker		3-pole		4-pole					
rated current = Rated uninterrupted current	Setting ranges of the release	Switching capacity at 415 V 50/60 Hz		Switching capacity at 415 V 50/60 Hz					
$I_n = I_u$ A	$I_{sd}$ A	Basic 25 kA	Standard 50 kA	Basic 25 kA	Standard 50 kA				
<b>Distribution circuit and line protection</b>									
	20 25 32 40 50 63 80 100 125 160	NZM...1-A... / NZM...2-A...: Overload release $I_r$ : $0.8 - 1 \times I_n$ Short-circuit release $I_s$ : $6 - 10 \times I_n$ Short-circuit release $I_s$ : 350 A with $I_n = 20 - 32$ A fixed	NZMB1-A20 NZMB1-A25 NZMB1-A32 NZMB1-A40 NZMB1-A50 NZMB1-A63 NZMB1-A80 NZMB1-A100 NZMB1-A125 NZMB1-A160	NZMN1-A20 NZMN1-A25 NZMN1-A32 NZMN1-A40 NZMN1-A50 NZMN1-A63 NZMN1-A80 NZMN1-A100 NZMN1-A125 NZMN1-A160	NZMB1-4-A20 NZMB1-4-A25 NZMB1-4-A32 NZMB1-4-A40 NZMB1-4-A50 NZMB1-4-A63 NZMB1-4-A80 NZMB1-4-A100 NZMB1-4-A125 NZMB1-4-A160	NZMN1-4-A20 NZMN1-4-A25 NZMN1-4-A32 NZMN1-4-A40 NZMN1-4-A50 NZMN1-4-A63 NZMN1-4-A80 NZMN1-4-A100 NZMN1-4-A125 NZMN1-4-A160			
		200 250 400 630 800 1000 1250 1600	NZMN3-AE... / NZMN4-AE...: Overload release $I_r$ : $0.5 - 1 \times I_n$ Short-circuit release $I_s$ : $2 - 12 \times I_n$	– – – – – – – –	NZMN3-AE400 NZMN3-AE630 NZMN4-AE800 NZMN4-AE1000 NZMN4-AE1250 NZMN4-AE1600	– – – – – – – –	NZMN3-4-AE400 NZMN3-4-AE630 NZMN4-4-AE800 NZMN4-4-AE1000 NZMN4-4-AE1250 NZMN4-4-AE1600		
		<b>Distribution circuit and line protection, time selectivity and generator protection</b>							
			100 160 250 400 630 800 1000 1250 1600	NZMN2-VE... / NZMN3-VE... / NZMN4-VE...: Overload release $I_r$ : $0.5 - 1 \times I_n$ Time delay setting to overcome current peaks $t_d$ : $2 - 20$ s at $6 \times I_r$ as well as infinite (oBi) Delayed short-circuit release $I_{sd}$ : $2 - 10 \times I_r$ Delay time $t_{d1}$ : Stages: 0, 20, 60, 100, 200, 300, 500, 750, 1000 ms Non-delayed short-circuit release $I_s$ : $2 - 12 \times I_n$ Switched $i^2t$ -constant function	– – – – – – – – –	NZMN2-VE100 NZMN2-VE160 NZMN2-VE250 NZMN3-VE400 NZMN3-VE630 NZMN4-VE800 NZMN4-VE1000 NZMN4-VE1250 NZMN4-VE1600	– – – – – – – – –	NZMN2-4-VE100 NZMN2-4-VE160 NZMN2-4-VE250 NZMN3-4-VE400 NZMN3-4-VE630 NZMN4-4-VE800 NZMN4-4-VE1000 NZMN4-4-VE1250 NZMN4-4-VE1600	
			<b>Motor protection</b>						
				20 25 32 40 50 63 80 100 125 160 200	NZM...1-M... / NZM...2-M... Overload release $I_r$ : $0.8 - 1 \times I_n$ Short-circuit release $I_s$ : $8 - 14 \times I_n$ Short-circuit release $I_s$ : 350 A at $I_n = 20 - 25$ A fixed	NZMB1-M20 NZMB1-M25 NZMB1-M32 NZMB1-M40 NZMB1-M50 NZMB1-M63 NZMB1-M80 NZMB1-M100 NZMB2-M125 NZMB2-M160 NZMB2-M200	NZMN1-M20 NZMN1-M25 NZMN1-M32 NZMN1-M40 NZMN1-M50 NZMN1-M63 NZMN1-M80 NZMN1-M100 NZMN2-M125 NZMN2-M160 NZMN2-M200	– – – – – – – – – – –	– – – – – – – – – – –
				220 220 350 450 550 875 1400	NZMN2-ME... / NZMN3-ME... / NZMN4-ME...: Overload release $I_r$ : $0.5 - 1 \times I_n$ Time delay setting to overcome current peaks $t_d$ : $2 - 20$ s at $6 \times I_r$ as well as infinity (oBi) Short-circuit release $I_s$ : $2 - 14 \times I_r$	– – – – – – –	NZMN2-ME220 NZMN3-ME220 NZMN3-ME350 NZMN3-ME450 NZMN4-ME550 NZMN4-ME875 NZMN4-ME1400	– – – – – – –	– – – – – – –

Circuit-breaker		3pole		
rated current = Rated uninterrupted current		Switching capacity		
	$I_n = I_u$ A	Setting ranges of the release	Basic 25 kA 480 V 18 kA 600 V	Standard 50 kA 480 V 25 kA 600 V
Distribution circuit and line protection				
 Terminals standard Terminal screws as accessories	15	NZM...1-AF...-NA Fixed overload release $I_f$ ; Adjustable short-circuit release $I_s$ ; • approx. 6 – 10 x $I_n$ (ex-factory 6 x $I_n$ ) NZM...1-AF35/40-NA: approx. 8 – 10 x $I_n$ fixed short-circuit release $I_s$ ; • 350 A at $I_n = 15 – 30$ A	NZMB1-AF15-NA	NZMN1-AF15-NA
	20		NZMB1-AF20-NA	NZMN1-AF20-NA
	25		NZMB1-AF25-NA	NZMN1-AF25-NA
	30		NZMB1-AF30-NA	NZMN1-AF30-NA
	35		NZMB1-AF35-NA	NZMN1-AF35-NA
	40		NZMB1-AF40-NA	NZMN1-AF40-NA
	45		NZMB1-AF45-NA	NZMN1-AF45-NA
	50		NZMB1-AF50-NA	NZMN1-AF50-NA
	60		NZMB1-AF60-NA	NZMN1-AF60-NA
	70		NZMB1-AF70-NA	NZMN1-AF70-NA
80	NZMB1-AF80-NA	NZMN1-AF80-NA		
90	NZMB1-AF90-NA	NZMN1-AF90-NA		
100	NZMB1-AF100-NA	NZMN1-AF100-NA		
110	NZMB1-AF110-NA	NZMN1-AF110-NA		
125	NZMB1-AF125-NA	NZMN1-AF125-NA		
 Standard terminal screws Terminals as accessories	150	NZM...2-AF...-NA Fixed overload release $I_f$ ; Adjustable short-circuit release $I_s$ ; • approx. 6 – 10 x $I_n$ (ex-factory 6 x $I_n$ )	NZMB2-AF150-NA	NZMN2-AF150-NA
	175		NZMB2-AF175-NA	NZMN2-AF175-NA
	200		NZMB2-AF200-NA	NZMN2-AF200-NA
	225		NZMB2-AF225-NA	NZMN2-AF225-NA
	250		NZMB2-AF250-NA	NZMN2-AF250-NA
 Standard terminal screws Terminals as accessories	300	NZM...3-AEF...-NA / NZM...4-AEF...-NA Fixed overload release $I_f$ ; Adjustable short-circuit release $I_s$ ; • approx. 2 – 12 x $I_n$ (ex-factory 6 x $I_n$ ) at NZM...3-AEF300...400-NA: 2 – 11 x $I_n$ at NZM...3-AEF450...600-NA: 2 – 8 x $I_n$	NZMN3-AEF300-NA	NZMH3-AEF300-NA
	350		NZMN3-AEF350-NA	NZMH3-AEF350-NA
	400		NZMN3-AEF400-NA	NZMH3-AEF400-NA
	450		NZMN3-AEF450-NA	NZMH3-AEF450-NA
	500		NZMN3-AEF500-NA	NZMH3-AEF500-NA
	550		NZMN3-AEF550-NA	NZMH3-AEF550-NA
	600		NZMN3-AEF600-NA	NZMH3-AEF600-NA
	600		NZMN4-AEF600-NA	NZMH4-AEF600-NA
	700		NZMN4-AEF700-NA	NZMH4-AEF700-NA
	800		NZMN4-AEF800-NA	NZMH4-AEF800-NA
	900		NZMN4-AEF900-NA	NZMH4-AEF900-NA
	1000		NZMN4-AEF1000-NA	NZMH4-AEF1000-NA
	1200		NZMN4-AEF1200-NA	NZMH4-AEF1200-NA
Motor protection in conjunction with contactors and overload relays with short-circuit releases without overload release				
  Terminals standard Terminal screws as accessories	1	NZM...1-S...-CNA / NZM...2-S...-CNA Adjustable short-circuit release $I_s$ ; • approx. 8 – 14 x $I_n$ (ex-factory 2 x $I_n$ ) NZM...1-S100-CNA, NZM...2-S200-CNA: 8 – 12,5 x $I_n$ Without overload release $I_f$	NZMB1-S1-CNA	NZMN1-S1-CNA
	1.6		NZMB1-S1.6-CNA	NZMN1-S1.6-CNA
	2.4		NZMB1-S2.4-CNA	NZMN1-S2.4-CNA
	4		NZMB1-S4-CNA	NZMN1-S4-CNA
	6		NZMB1-S6-CNA	NZMN1-S6-CNA
	10		NZMB1-S10-CNA	NZMN1-S10-CNA
	16		NZMB1-S16-CNA	NZMN1-S16-CNA
	25		NZMB1-S25-CNA	NZMN1-S25-CNA
	32		NZMB1-S32-CNA	NZMN1-S32-CNA
	40		NZMB1-S40-CNA	NZMN1-S40-CNA
	50		NZMB1-S50-CNA	NZMN1-S50-CNA
	63		NZMB1-S63-CNA	NZMN1-S63-CNA
	80		NZMB1-S80-CNA	NZMN1-S80-CNA
	100		NZMB1-S100-CNA	NZMN1-S100-CNA
	Standard terminal screws		125	NZMB2-S125-CNA
Terminals as accessories	160	NZMB2-S160-CNA	NZMN2-S160-CNA	
	200	NZMB2-S200-CNA	NZMN2-S200-CNA	

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## Auxiliary contacts

Version	For use with	Max. number of auxiliary contacts per switch	Contacts	Part no.
<p><b>Standard auxiliary contact (HIN)</b> Switching with the main contacts Used for indicating and interlocking tasks</p>  <p>With bolt connection</p> <p>With 3 m connecting cables instead of bolt connection.</p>	<p>NZM1(-4), 2(-4), 3(-4), 4(-4) PN1(-4), 2(-4), 3(-4) N1(-4), 2(-4), 3(-4), 4(-4)</p> <p>NZM1(-4) PN1(-4) N1(-4)</p>	<p>NZM1: 1 NZM2: 2 NZM3: 3 NZM4: 3</p>	<p>1 N/O – – 1 N/C</p> <p>1 N/O 1 N/C 2 N/O – – 2 N/C</p>	<p><b>M22-K10</b> <b>M22-K01</b></p> <p><b>NZM-XHI11L</b> <b>NZM-XHI20L</b> <b>NZM-XHI02L</b></p>
<p><b>Early-make auxiliary contacts</b> For interlock and load-shedding circuits With clamp terminal on the left-hand switch side.</p>  <p>With 3 m connecting cables instead of bolt connection.</p> <p>With bolt connection</p>	<p>NZM1(-4) PN1(-4) N1(-4)</p> <p>NZM1(-4) PN1(-4) N1(-4)</p> <p>NZM2(-4), 3(-4) PN2(-4), 3(-4) N2(-4), 3(-4)</p> <p>NZM4(-4) N4(-4)</p>		<p>2 N/O –</p> <p>2 N/O –</p> <p>2 N/O –</p> <p>2 N/O –</p>	<p><b>NZM1-XHIV</b></p> <p><b>NZM1-XHIVL</b></p> <p><b>NZM2/3-XHIV</b></p> <p><b>NZM4-XHIV</b></p>
<p><b>Trip indicating auxiliary contact (HIA)</b> General trip indication "+" with trip by voltage release, overload release or short-circuit release</p>  <p>With bolt connection</p> <p>With 3 m connecting cables instead of bolt connection.</p>	<p>NZM1(-4), 2(-4), 3(-4), 4(-4) PN1(-4), 2(-4), 3(-4) N1(-4), 2(-4), 3(-4), 4(-4)</p> <p>NZM1(-4) PN1(-4) N1(-4)</p>	<p>NZM1: 1 NZM2: 1 NZM3: 1 NZM4: 2</p>	<p>1 N/O – – 1 N/C</p> <p>1 N/O 1 N/C 2 N/O – – 2 N/C</p>	<p><b>M22-K10</b> <b>M22-K01</b></p> <p><b>NZM-XHI11L</b> <b>NZM-XHI20L</b> <b>NZM-XHI02L</b></p>

Release		Undervoltage release <sup>1</sup>		Overvoltage release <sup>2</sup>	
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), N1(-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 – 130 V DC 220 – 250 V DC	<b>NZM1-XU24AC</b> <b>NZM1-XU110-130AC</b> <b>NZM1-XU208-240AC</b> <b>NZM1-XU380-440AC</b> <b>NZM1-XU12DC</b> <b>NZM1-XU24DC</b> <b>NZM1-XU110-130DC</b> <b>NZM1-XU220-250DC</b>	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	<b>NZM1-XA12AC/DC</b> <b>NZM1-XA24AC/DC</b> <b>NZM1-XA110-130AC/DC</b> <b>NZM1-XA208-250AC/DC</b> <b>NZM1-XA380-440AC/DC</b>
With 3 m connection cable instead of screw termination. 	NZM1(-4), N1(-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	<b>NZM1-XUL24AC</b> <b>NZM1-XUL110-130AC</b> <b>NZM1-XUL208-240AC</b> <b>NZM1-XUL380-440AC</b> <b>NZM1-XUL12DC</b> <b>NZM1-XUL24DC</b> <b>NZM1-XUL110-130DC</b> <b>NZM1-XUL220-250DC</b>	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	<b>NZM1-XAL12AC/DC</b> <b>NZM1-XAL24AC/DC</b> <b>NZM1-XAL110-130AC/DC</b> <b>NZM1-XAL208-250AC/DC</b> <b>NZM1-XAL380-440AC/DC</b>
With clamp-type terminals 	NZM2(-4), N2(-4), NZM3(-4) N3(-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	<b>NZM2/3-XU24AC</b> <b>NZM2/3-XU110-130AC</b> <b>NZM2/3-XU208-240AC</b> <b>NZM2/3-XU380-440AC</b> <b>NZM2/3-XU12DC</b> <b>NZM2/3-XU24DC</b> <b>NZM2/3-XU110-130DC</b> <b>NZM2/3-XU220-250DC</b>	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	<b>NZM2/3-XA12AC/DC</b> <b>NZM2/3-XA24AC/DC</b> <b>NZM2/3-XA110-130AC/DC</b> <b>NZM2/3-XA208-250AC/DC</b> <b>NZM2/3-XA380-440AC/DC</b>
With clamp-type terminals 	NZM4(-4), N4(-4)	24 V 50/60 Hz 110 – 130 V 50/60 Hz 208 – 240 V 50/60 Hz 380 – 440 V 50/60 Hz 12 V DC 24 V DC 110 – 130 V DC 220 – 250 V DC	<b>NZM4-XU24AC</b> <b>NZM4-XU110-130AC</b> <b>NZM4-XU208-240AC</b> <b>NZM4-XU380-440AC</b> <b>NZM4-XU12DC</b> <b>NZM4-XU24DC</b> <b>NZM4-XU110-130DC</b> <b>NZM4-XU220-250DC</b>	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	<b>NZM4-XA12AC/DC</b> <b>NZM4-XA24AC/DC</b> <b>NZM4-XA110-130AC/DC</b> <b>NZM4-XA208-250AC/DC</b> <b>NZM4-XA380-440AC/DC</b>

<sup>1</sup> 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.

<sup>2</sup> switches are tripped by a voltage pulse or by the application of uninterrupted voltage

Door coupling rotary handles		
Version	For use with	Part no.
<p><b>Door coupling rotary handle</b>            Complete including rotary drive and coupling parts            With the NZM...-XT...D... as well as NZM...-XT...D...60 types,            an additional extension shaft is required.            Degree of protection IP66/NEMA 4X            Standard, black/grey</p> 	NZM1(-4), PN1(-4), N1(-4) NZM2(-4), PN2(-4), N2(-4) NZM3(-4), PN3(-4), N3(-4) NZM4(-4), N4(-4)	<b>NZM1-XTD</b>  <b>NZM2-XTD</b>  <b>NZM3-XTD</b>  <b>NZM4-XTD</b>
<p>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.</p> 	NZM1(-4), PN1(-4), N1(-4) NZM2(-4), PN2(-4), N2(-4)  NZM3(-4), PN3(-4), N3(-4) NZM4(-4), N4(-4)	<b>NZM1-XTVDV</b>  <b>NZM2-XTVDV</b>  <b>NZM3-XTVDV</b>  <b>NZM4-XTVDV</b>
<p>Red-yellow for Emergency-Stop            Lockable on handle and switch. Lockable in            0 position on handle.            Lockable door as additional feature,            locking facility on circuit-breaker in 0 position.</p> 	NZM1(-4), PN1(-4), N1(-4) NZM2(-4), PN2(-4), N2(-4)  NZM3(-4), PN3(-4), N3(-4)  NZM4(-4), N4(-4)	<b>NZM1-XTVDVR</b>  <b>NZM2-XTVDVR</b>  <b>NZM3-XTVDVR</b>  <b>NZM4-XTVDVR</b>
<p><b>Extension shaft</b>            400 mm            Max. mounting depth</p>  <p>600 mm            Max. mounting depth</p>	NZM1(-4), PN1(-4), N1(-4) NZM2(-4), PN2(-4), N2(-4) NZM3(-4), PN3(-4), N3(-4) NZM4(-4), N4(-4)  NZM1(-4), PN1(-4), N1(-4) NZM2(-4), PN2(-4), N2(-4) NZM3(-4), PN3(-4), N3(-4) NZM4(-4), N4(-4)	<b>NZM1/2-XV4</b>  <b>NZM3/4-XV4</b>  <b>NZM1/2-XV6</b>  <b>NZM3/4-XV6</b>

Connection types








	For use with	Conductor type	Conductor cross-section (applies for 3-pole and 4-pole switches)				Part no.  O=fitted at top U=fitted at bottom
			mm <sup>2</sup>	AWG/kcmil	Cu-Band mm	Copper strip mm	
	<b>Box terminal</b> NZM2, PN2, N(S)2 3-pole ≤ 160 A NZM2, PN2, N(S)2 200 A, 250 A  NZM2-4, PN2-4, N2-4 4-pole ≤ 160 A NZM2-4, PN2-4, N2-4 200 A, 250 A  max. 500 A NZM3, PN3, N(S)3 3-pole  NZM3-4, PN3-4, N3-4 4-pole  630 A	Cu cables Cu cable      Cu cables Cu cable	1 x 4 – 185 2 x 4 – 70      1 x 35 – 240 2 x 16 – 120	1 x 12 – 350      1 x 2 – 500	≥ 2 x 9 x 0.8      min. 6 x 16 x 0.8 max. 20 x 24 x 0.5   10 x 24 x 1.0 + 5 x 24 x 1.0	+NZM2-160-XKCO +NZM2-160-XKCU +NZM2-250-XKCO +NZM2-250-XKCU  +NZM2-4-160-XKCO +NZM2-4-160-XKCU +NZM2-4-250-XKCO +NZM2-4-250-XKCU  +NZM3-XKCO +NZM3-XKCU +NZM3-4-XKCO +NZM3-4-XKCU	
	<b>Shroud</b> NZM2, PN2, N(S)2 3-pole NZM3, PN3, N(S)3  NZM2-4, PN2-4, N2-4 4-pole NZM3-4, PN3-4, N3-4					NZM2-XKSA NZM3-XKSA  NZM2-4-XKSA NZM3-4-XKSA	
	<b>Screw terminal</b> 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	
	<b>Module plate</b> max. 1250A 1-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole  max. 1400A 2-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole  max. 1500A	Cu lugs   Cu lugs	1 x 120 – 300 2 x 95 – 300  2 x 95 – 185 4 x 35 – 185	1 x 250 – 600 2 x 000 – 600  2 x 000 – 350 4 x 2 – 350	2 x (10 x 40 x 1.0) 2 x (10 x 50 x 1.0)  2 x (10 x 50 x 1.0)	(2 x) 40 x 10 (2 x) 50 x 10  (2 x) 50 x 10	NZM4-XKM1 NZM4-4-XKM1  NZM4-XKM2 NZM4-4-XKM2
	<b>Module plate</b> max. 1250A 2-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole  1600A 2-hole NZM4, N(S)4 3-pole NZM4-4, N4-4 4-pole	Cu lugs	2 x 95 – 300	2 x 000 – 600	2 x (10 x 50 x 1.0)	(2 x) 50 x 10	NZM4-XKM2S-1250 NZM4-4-XKM2S-1250  NZM4-XKM2S-1600 NZM4-4-XKM2S-1600
	<b>Connection width extension</b> 630 A NZM3, PN3, N(S)3 3-pole NZM3-4, PN3-4, N3-4 4-pole 1600 A NZM4, N(S)4 3-pole  NZM4-4, N4-4 4-pole	Cu-lugs Al lugs  Cu lugs	2 x 300  4 x 300 6 x 95 – 240	2 x 500  4 x 600 6 x 000 – 500	2 x (10 x 50 x 1.0)  max. 2 x (10 x 80 x 1.0)	(2 x) 10 x 50  max. (2 x) 80 x 10	NZM3-XKV70 NZM3-4-XKV70  NZM4-XKV95 NZM4-XKV110 NZM4-4-XKV95 NZM4-4-XKV120

## 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.

All switches are 3-pole and available at rated currents of 20 to 1600 A. The circuit-breakers are on offer for various applications in the variants systems protection, cable protection, motor protection and selectively-opening circuit-breakers. The rated breaking capacity is 10 kA to 630 A and 20 kA to 1600 A rated current. 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.

The same dimensions as the standard switches simplify engineering. The entire range of accessories from the standard series can also be used.





### 3-pole circuit-breaker

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	
	3 / 0.5	10 / 0.5	20 / 0.3	3 / 0.5	20 / 0.3	10 / 0.5	20 / 0.3
1000 V kA/cos $\varphi$ $I_{cu}$							
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	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>
	<b>NZMH2-A</b>	<b>NZMN3-AE</b>	<b>NZMH4-AE</b>	<b>NZMH2-VE</b>	<b>NZMH4-VE</b>	<b>NZMN3-ME</b>	<b>NZMH4-ME</b>
	20	250	630	100	630	220	550
	25	400	800	160	800	350	875
	32	630	1000	250	1000	450	1400
	40		1250		1250		
	50		1600		1600		
	63						
	80						
	100						
	125						
	160						
	200						
	250						

### 3-pole switch-disconnector

With main switch characteristics to IEC/EN 60204 and isolating characteristics to IEC/EN 60947, VDE 660

Rated uninterrupted current $I_u$ = Rated current $I_n$	$I_u$	$I_u$	$I_u$
Ambient temperature at 100% $I_u$ Min./max. -25 / +50	<b>A</b>	<b>A</b>	<b>A</b>
	<b>N2</b>	<b>N3</b>	<b>N4</b>
	160	400	800
	200	630	1000
	250		1250
			1600

## Flexible fault current protection up to 1800 A current rating



### Protection against the dangers of electrical energy with insulation faults

The new 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.	
<b>Residual current relay</b> Pulse current sensitive 	Rated control voltage: $U_c = 230V$ A.C. (50/60 Hz) Integrated auxiliary switch (1 changeover contact)		
	Rated fault current $I_{\Delta n} = 0.03$ A	<b>PFR-003</b>	
	Rated fault current $I_{\Delta n} = 0.3$ A	<b>PFR-03</b>	
	Rated fault current $I_{\Delta n} = 0.03...5$ A Adjustable fault current and delay time  Fault current prewarning by flashing red LED	<b>PFR-5</b>	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
<b>Ring-type transducer</b> 	Internal diameter 20 mm	<b>PFR-W-20</b>	PFR-W-20 and PFR-W-30 incl. attachment clip for DIN top-hat rail
	Internal diameter 30 mm	<b>PFR-W-30</b>	
	Internal diameter 35 mm	<b>PFR-W-35</b>	PFR-W-35 and all larger transducers incl. screw fitting
	Internal diameter 70 mm	<b>PFR-W-70</b>	
	Internal diameter 105 mm	<b>PFR-W-105</b>	
	Internal diameter 140 mm	<b>PFR-W-140</b>	
Internal diameter 210 mm	<b>PFR-W-210</b>		<i>Engineering note:</i> The transducer diameter must be selected to be 1.5 times larger than the diameter of the conductor lead through (see Technical Data).

For Immediate Delivery call [KMParts.com](http://KMParts.com) at (866) 595-9616

## Circuit-breakers IZM

### A concept for a top-level performance standard

**xEnergy**



The IZM from Moeller represents a concept for open-type circuit-breakers which nowadays far exceeds the industry standard worldwide. Designed on the basis of the most up-to-date protection technology from the systems sector, these switches open up new dimensions in the rating range from 630 A to 6300 A. This refers not only to their switching capacity, but also to the functions they offer, particularly as regards communication, simplicity of handling and installation. Using IZM, you put your trust in a performance standard that will give you decisive advantages.



Circuit-breakers IZM are present in many power distribution systems in buildings and industrial applications world-wide.

### Rated current 630 A to 6300 A




The new open circuit-breakers IZM now fully cover ranges from 800 to 6300 A with frame sizes 2 and 3. The new, small frame size 1 extends the rated current range downwards to 630 A. If necessary this range can even be reduced to 250 A by exchanging the rating plug. And all this with a setting range from 0.4 to 1 x I<sub>n</sub>.

### Uniform dimensions

The IZM has a uniform component height and depth over its whole current spectrum. Only the component width varies with the number of poles and the frame size.

### Terminations

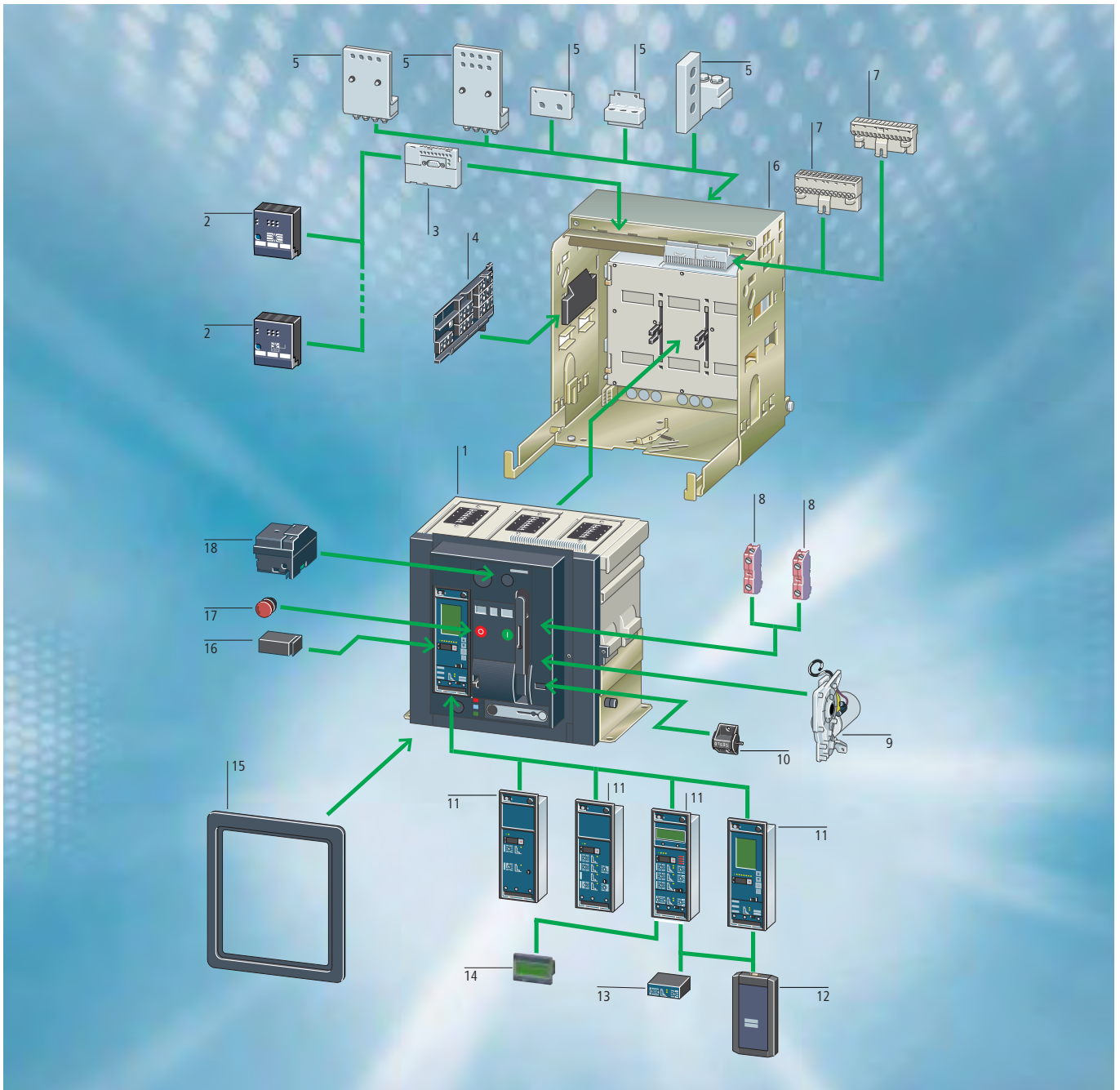
Circuit-breakers IZM up to 5000 A come with horizontal connections, and IZM 6300 A with vertical connections, as standard. The following termination options are available: vertical connection, frontally accessible connections and flanged connections.

	IZM.. 1-	IZM.. 2-	IZM.. 3-
<b>Short-circuit switching capacity</b>			
<b><math>I_{cu} = I_{cs}</math> at 440 V</b>			
50 kA			
55 kA			
65 kA			
80 kA			
100 kA			
Ranges of application, in A	250–1600	250–3200	1250–6300
Number of poles	3/4	3/4	3/4
Rated voltage, in V	690	690	690
Service life, max.	20000	15000	10000
Degree of protection with/without cover	IP 55/IP 20	IP 55/IP 20	IP 55/IP 20
Dimensions, 3-/4-pole Width	320/410	460/590	705/915
in mm			
Height	434	434	434
Depth	291	291	291

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# System overview

## Circuit-breakers IZM



- 1. Open-type circuit-breakers IZM from 630 A to 6300 A
- 2. External expansion modules
- 3. Communication module for PROFIBUS
- 4. Positioning indicator contact; module for withdrawable units
- 5. Main connection elements: front, flanged, horizontal or vertical connection

- 6. Withdrawable unit
- 7. Control circuit plug
- 8. Auxiliary contact
- 9. Motor operator
- 10. Operating cycle counter
- 11. Electronic releases (control units)
- 12. Parameterization device
- 13. Earth-fault protection module
- 14. 4-line LCD display
- 15. Door sealing frame

- 16. Rated current module (rating plug)
- 17. Emergency-Stop mushroom push-button
- 18. Closing release, voltage release

# Various control units for more flexibility



IZM..-A..



IZM..-V..



IZM..-U..



IZM..-D..

### The control electronics

Options for control units:

– Not an option, ● Standard, ○ Optional

				Standard protective functions
●	●	●	●	Overload protection $I_r$
–	–	●	●	Delay time to overcome current peaks $t_r$
–	●	●	●	Delayed short-circuit protection $I_{SD}$
●	●	●	●	Non-delayed short-circuit protection $I_i$
				Optional protective functions
–	○	●	●	Neutral conductor protection
–	○	○	○	Earth fault protection
				Add-on functions
–	–	●	●	Thermal memory
–	–	●	●	Load monitoring
–	–	●	●	Short-circuit protection, convertible to $I^2t$
–	○	●	●	N conductor protection, switchable
–	–	○	○	Measuring functions
				Parameter allocation and visual display
–	–	–	●	Remote parametrization of standard protective functions
–	–	●	●	Remote parametrization of expanded protective functions
–	–	○	–	LCD, alpha-numerical
–	–	–	●	LCD, graphical
				Communication
–	–	●	●	Internal system bus
–	–	○	○	Communication via PROFIBUS or Ethernet

The IZM is equipped as standard with the latest microprocessor-controlled electronics. Where required, the rated current range, 630 A - 6300 A, can be expanded to 250 A - 6300 A by means of a rating plug adapter. This feature enables flexible, precise matching to the power requirement in your system. There is a choice of four different control

units, providing optimum protection for your system, from straightforward system protection with overload- and short-circuit releases, to digital circuit-breakers with graphical display and the option of building time-selective networks. This is a system you can depend on.

## Connect to the future with xEnergy

**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 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 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 Moeller's partner for xEnergy and MODAN in this project. Hulanicki Bednarek and Moeller Poland have long had a good business relationship, built to a large extent on the system builder's trust in 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 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 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 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\*

- Power incomers or outgoers up to 3200 A
- For cable connection from below
- For busbar system on rear at top
- Section height 2000 mm / section depth 600 mm



Section width mm	For circuit-breakers, 3-pole, fixed installation/ drawer unit	$I_e$ up to A	$I_{cc}$ up to (400 V AC) kA	Degree of protection	Part No.
<b>Power sections for air circuit-breaker IZM, 800 - 3200 A to form 4, external operation</b>					
425	IZMB(N)1-...	800 – 1600	65	IP31	<b>XSI043</b>
				IP55	<b>XSI045</b>
600	IZMB(N)1-...	800 – 1600	65	IP31	<b>XSI063</b>
	IZMB(N, H)2-...	800 – 3200	100	IP55	<b>XSI065</b>
800	IZMB(N)1-...	800 – 1600	65	IP31	<b>XSI083</b>
	IZMB(N, H)2-...	800 – 3200	100	IP55	<b>XSI085</b>



<b>Power sections for compact circuit-breaker NZM4, 3-pole, fixed installation, 800 -1600 A to form 4 (for NZM 4 with manual or remote operator), external operation</b>					
425		800 – 1600	100	IP31	<b>XSNF0443</b>
				IP55	<b>XSNF0445</b>
600		800 – 1600	100	IP31	<b>XSNF0643</b>
				IP55	<b>XSNF0645</b>
<b>Power sections for compact circuit-breakers NZM4, 3-pole, drawer unit, 800 -1600 A to form 4 (for NZM 4 with manual operation), external operation</b>					
425		800 – 1600	100	IP31	<b>XSNW0443</b>
				IP55	<b>XSNW0445</b>
600		800 – 1600	100	IP31	<b>XSNW0643</b>
				IP55	<b>XSNW0645</b>



<b>Power sections for compact circuit-breakers NZM4, 3-pole, fixed installation, 800 -1600 A to form 2, operation behind section height door</b>					
425		800 – 1600	100	IP31	<b>XSNF0423</b>
				IP55	<b>XSNF0425</b>
600		800 – 1600	100	IP31	<b>XSNF0623</b>
				IP55	<b>XSNF0625</b>
<b>Power sections for compact circuit-breakers NZM4, 3-pole, drawer unit, 800 -1600 A to form 2, operation behind section height door</b>					
425		800 – 1600	100	IP31	<b>XSNW0423</b>
				IP55	<b>XSNW0425</b>
600		800 – 1600	100	IP31	<b>XSNW0623</b>
				IP55	<b>XSNW0625</b>

\* See FK4810-1143GB-INT for further versions

## Outgoer sections XF\*

- Outgoers with circuit-breaker PKZ and NZM, switch-fuse units and fuse-load switch units up to 630 A
- For rear busbar system top or rear bottom
- Section height 2000 mm / section depth 600 mm



Section width mm	Degree of protection	Part No.
---------------------	----------------------	----------

### Outgoer sections for horizontal, fixed installed 3 or 4-pole compact circuit-breakers NZM 1-3 up to 630 A to form 2b, for installation of mounting plates module width 600 mm

1000	IP31	XSB1023
	IP55	XSB1025
1200	IP31	XSB1223
	IP55	XSB1225



### Outgoer sections for horizontal, fixed installed 3 or 4-pole compact circuit-breakers NZM 1-3 up to 630 A to Form 4b, for installation of mounting plates module width 600 mm

1000	IP31	XSB1043
	IP55	XSB1045
1200	IP31	XSB1243
	IP55	XSB1245



### Outgoer sections for plug-in unit outgoers with 3-pole switch-fuse units up to 630 A, horizontal for external operation

1000	IP31	XSS10
1200	IP31	XSS12



### Outgoer sections for fixed installed 3-pole switch-fuse units up to 630 A, vertical for external operation

600	IP31	XSL06
800	IP31	XSL08
1000	IP31	XSL10

## Empty sections XG\*

- Mounting system for modular installation devices, terminals, circuit-breakers and fuse switch-disconnectors
- Individual fixed installation on mounting plates up to 630 A
- xStart control engineering adapter systems
- Automation engineering
- For rear busbar system on rear at top or bottom
- Section height 2000 mm / section depth 600 mm



Section width mm	Degree of protection	Part No.
---------------------	----------------------	----------

### Empty sections for customised devices

425	IP31	XSE043
	IP55	XSE045
600	IP31	XSE063
	IP55	XSE065
800	IP31	XSE083
	IP55	XSE085

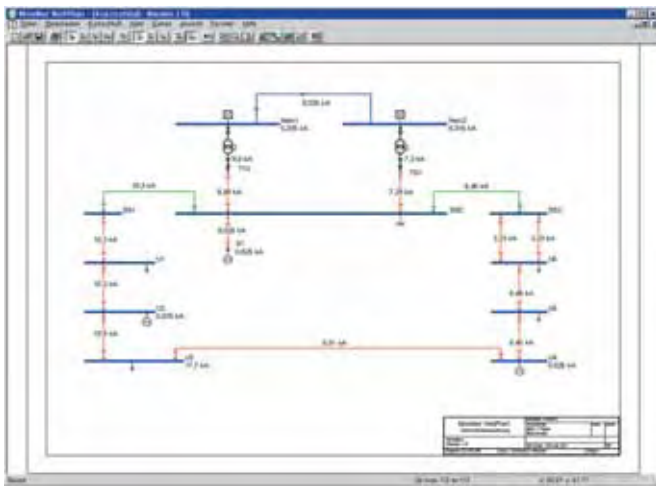
\* See FK4810-1143GB-INT for further versions

# Software Tools

Networked expertise, know-how as a competitive edge.

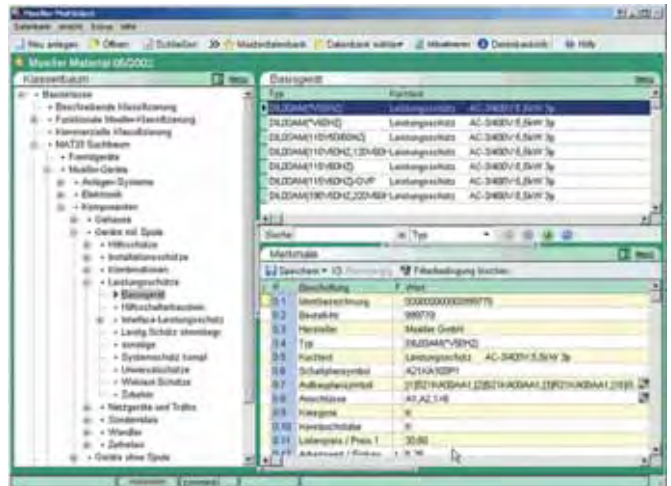
Moeller also offers a comprehensive set of tools. The software tools for planning, documentation and calculation provide all the support planners, panel builders and installation technicians need. The specially

developed Moeller Toolbox includes tools for network calculations, configuration, quotations, engineering and ordering. Using Moeller tools, which have the system-specific data already built-in, means you can work faster and more efficiently.



## NetPlan

NetPlan 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.



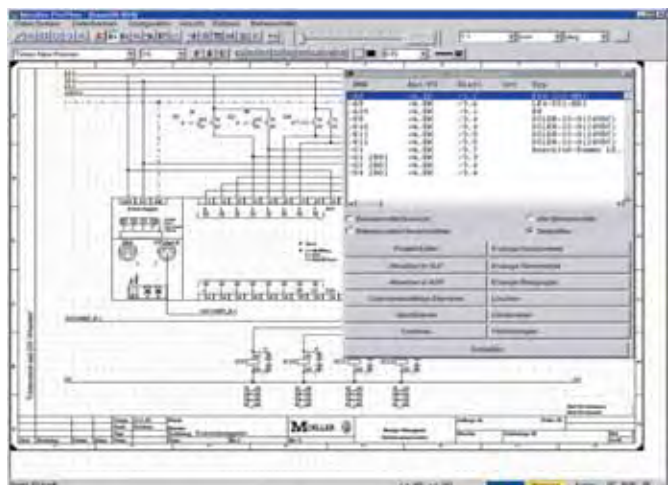
## MatSelect database

With MatSelect, you can manage all your product and material data in user-defined and standard classification.



## ConFix xEnergy

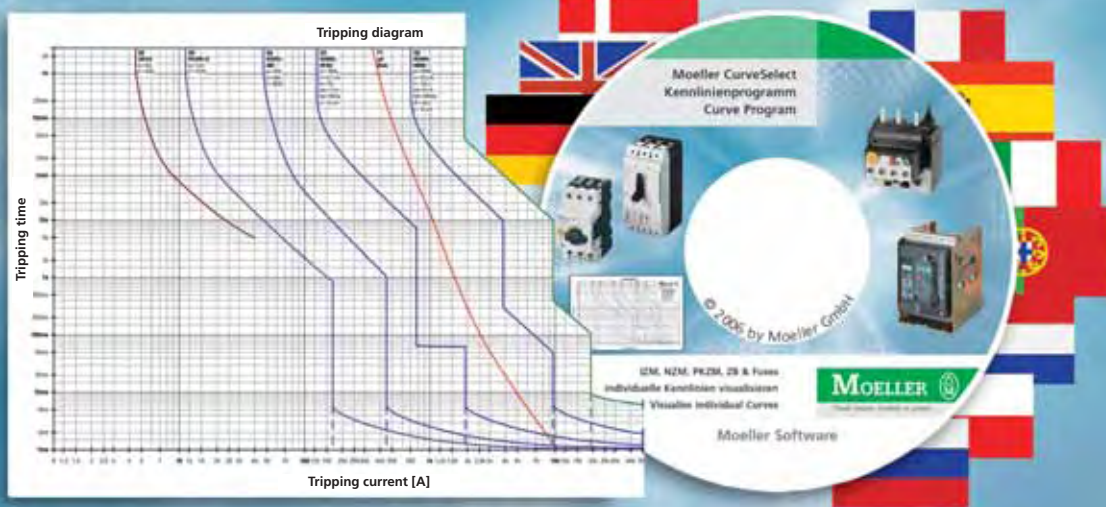
The ConFix tool helps you configure the required xEnergy switchboard system simply and quickly. In this way, you can make your own quotations and generate accurate parts lists in no time at all and at the push of a button.



## ProPlan

For the automatic generation of all types of plans, such as circuit diagrams, terminal tables, general arrangement plans, cable plans and parts lists. ProPlan is a simple and user-friendly tool that helps you create circuit diagrams faster and gives you a good overview at all times.

## Software Tool – Moeller CurveSelect



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.

www.moeller.net/curves

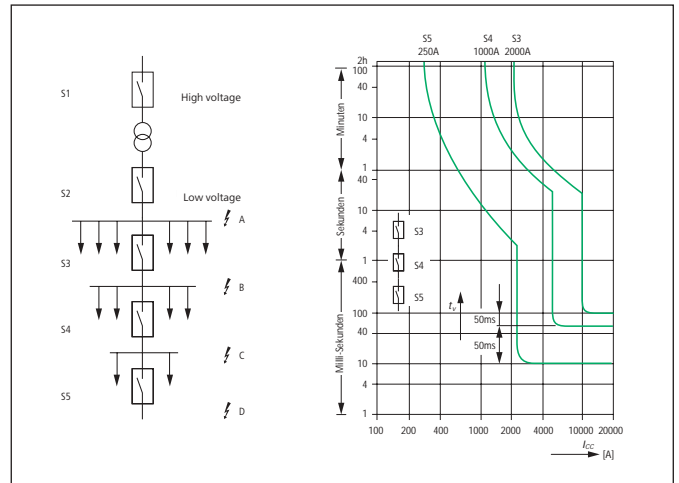
**Moeller CurveSelect – The characteristics program for protective devices**

**Software inside**

**xEnergy**  
Reliably and safely controlling, switching and managing power. In industry, in buildings and in machine construction. Innovative protection concepts. With built-in diagnostics and communication functions. Housed in modern switchgear installations.

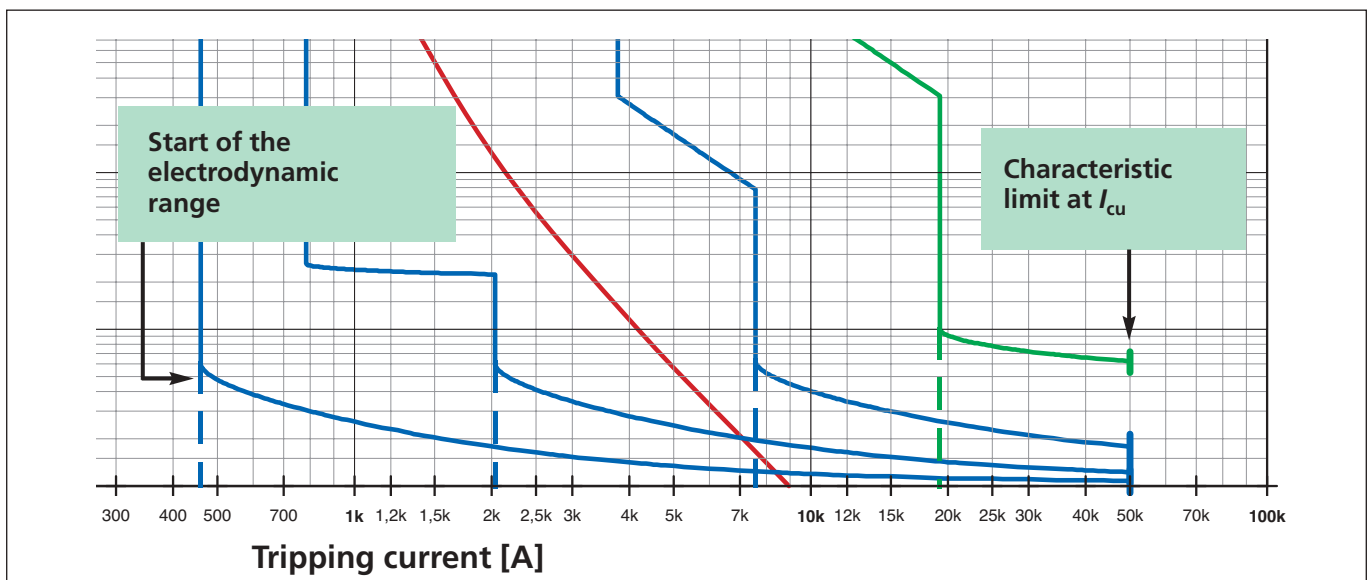
**MOELLER**

Think future. Switch to green.



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 “Moeller 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 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.

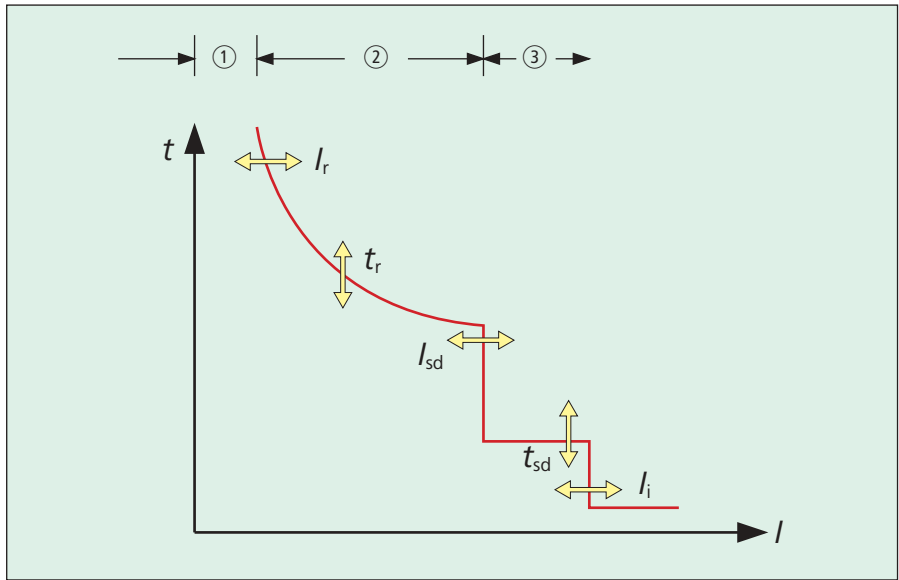
Included in the booklet is a CD-ROM with the necessary Excel file and further information. The file is also downloadable free of charge from the Moeller website. Since the Microsoft Office Excel® program is used for representation of the tripping characteristics and *individual switch settings*, it is 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

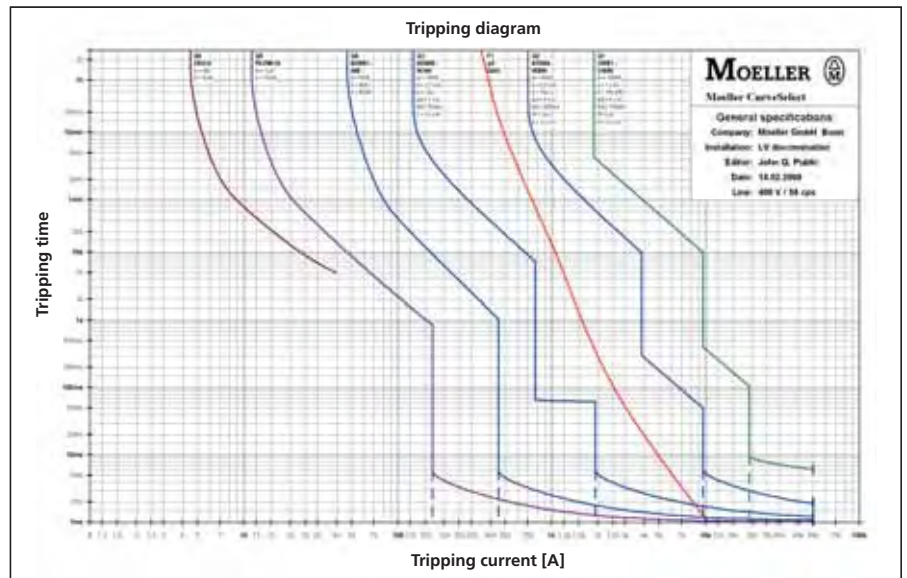
the Moeller Main Catalogue must be consulted as well. The values therein are verified by testing.



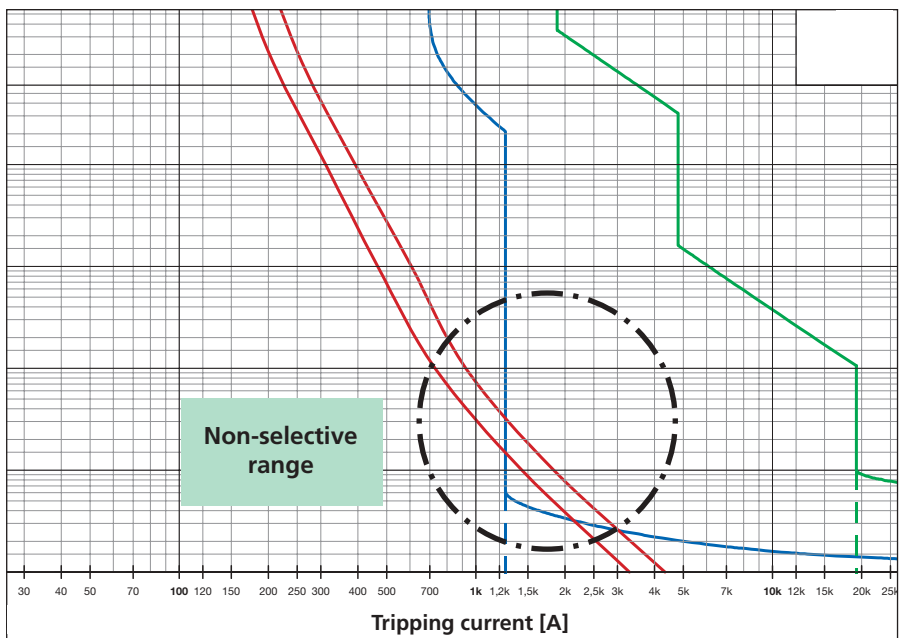
The diagram shows the possibilities of influencing the properties of the curve. Not all of the above mentioned options are available for every protective element. To find the equipment available on individual elements it is necessary to consult the Main Catalogue. These details are also shown in the 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.



**NZM**      **PKZ(M)**      **IZM**      **ZB**      **Fuses**



The booklet illustrates problematic curves and explains how to achieve selectivity between protective elements.



### 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  $\pm 20\%$  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.

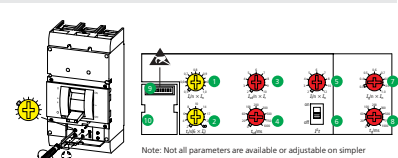
The user often does not realise what effect the settings on the switch may have or where to find information regarding the parameters to be set. The booklet contains fold out pages that explain these relationships.

www.moeller.net/curves

Setting aid for NZM circuit-breakers in IEC version  
- Type dependent rating and setting values -

Position in figure	Value	Value range	Factory default setting <i>Observe the preset scaling (stages)!</i>	Setting type	With type	Influence on tripping characteristic	Source for setting value	Possible faults
	$I_n = I_c$	Refer to the rating label of the circuit-breaker, construction-related, non-adjustable rated value			All	No influence, limit value for the switch selection	Max. required current for the application	<ul style="list-style-type: none"> <li>⚠ Caution!</li> <li>⚠ Dangerous!</li> </ul>
1	$I_r$	$0.5 \cdot I_n$ to $I_n$	$0.8 \times I_n$	Step switch	All, except switch without $I_r$	Offsets the upper starting point of the curve to the right	e.g. motor current or permissible cable loading	<ul style="list-style-type: none"> <li>⚠ Early or late trip</li> <li>⚠ Damage of the switch</li> </ul>
2	$t_r$	2-20 s and $t_n$ (= without overload release)	10 s	Step switch	NZM2_4-AE, ME and VE	Tripping time is defined for $6 \times I_r$ . If the curve is shifted upwards, the tripping time is extended; premature tripping is avoided, the tripping time may not be continuously extended. Take the thermal load of the equipment circuit into	Permissible (necessary) run-up time of the motor	<ul style="list-style-type: none"> <li>⚠ Early or late trip</li> <li>⚠ Lack of selectivity</li> <li>⚠ partly over-dimensioning of switchgear and cables is necessary</li> <li>⚠ Observe the table with max. permissible tripping times in the main catalogue!</li> </ul>
						set short-circuit reached delay time	With time selectivity: lowest network level without delay (e.g. PKZM) with each successive level having a delay setting one step greater than the previous level	<ul style="list-style-type: none"> <li>⚠ Lack of selectivity due to time stages which are too low</li> </ul>

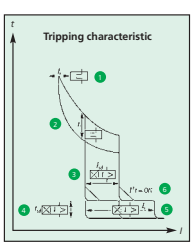
Small setting aid  
- notes for avoiding faults -



Note: Not all parameters are available or adjustable on simpler protective devices.

Adjustable parameters:

- 1 overload release  $I_r$
- 2 time delay setting to overcome current peaks  $t_r$
- 3 delayed short-circuit release  $I_{sd}$
- 4 delay time  $t_{sd}$  (relative to  $I_{sd}$ )
- 5 non-delayed short-circuit release  $I_i$
- 6  $I_r$ -setting On/Off
- 7 earth-fault protection  $I_{\Delta}$  (optional)
- 8 earth-fault release delay time  $t_{\Delta}$
- 9 LED overload warning with  $I_r$  70 / 100 / 120 %
- 10 data interface



The figure indicates the influence of the adjustable parameters.

www.moeller.net/curves

NZM circuit-breakers in IEC version  
rating and setting values -

Value range	Factory default setting <i>Observe the preset scaling (stages)!</i>	Setting type	With type	Influence on tripping characteristic	Source for setting value	Possible faults
$4 \times I_n$ or not available	$12 \times I_n$	Step switch	All	Must protect the weakest element in the circuit against destruction (emergency brake)	Setting dependent on the incoming supply short-circuit rating and permissible peak currents. Observe the necessary neutralization (IEC 60364)	<ul style="list-style-type: none"> <li>⚠ Caution!</li> <li>⚠ Dangerous!</li> </ul>
off	off	on / off	NZM3_4-VE	The tripping time is increased, in dependence on the max. permissible $I_r$ value of the switch	Selectivity consideration with the following fuse	<ul style="list-style-type: none"> <li>⚠ Missing selectivity with fuses</li> </ul>
$1 \times I_{sd}$		Step switch	Optional with NZM3_4-AE, ME, VE	No influence	Situation related, reasonable values to be estimated for fire protection; time-staging enables earth-fault selectivity	<ul style="list-style-type: none"> <li>⚠ Too sensitive, faulty trips, no selectivity</li> </ul>
600 ms		Step switch		No influence		<ul style="list-style-type: none"> <li>⚠ with danger of trip is setting too high</li> </ul>
	Stage "Alarm" LED (at 70 % of $I_r$ light from 100 % slow flash and fast flash)		NZM2_4-AE, ME, VE	No influence		<ul style="list-style-type: none"> <li>⚠ Early warning of trip not observed</li> </ul>
	10 Data interface for laptop or data management interface DMI		NZM2_4-AE, ME, VE	Enables supplementary parametric programming	See above notes for parametric values	<ul style="list-style-type: none"> <li>⚠ See above, Notes about parametric values</li> </ul>

Fundamental representation using NZM4 example, details and value ranges may deviate in individual cases. See valid main catalogue. Observe the peculiarities with 4-pole switches and IT electrical power networks.

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.



## Protection for All Applications – Safety up to 125 A



# 15 kA

to IEC / EN 60947



Industry, system builders and the trade sector worldwide place their trust in 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 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 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**

Moeller offers a broad range of modular installation devices for the control circuit and for switching, as well as for signalling and alarms. These include mains isolating switches, ON/OFF switches, control switches, push-buttons, with or without illumination, or basic indicator lights, timers, light intensity switches, buzzers or measuring devices. All these devices are suitable for DIN-rail mounting and offer tangible installation and wiring benefits for industrial applications.



**Lightning and surge protection**

The range of lightning and surge arresters with modern triggered spark gaps of Type SPI in the B arrester range enable economical and space-saving installation options. The previously required de-coupling from the C arresters using inductivities is no longer necessary. Plug-fit surge arresters of Class C allow the inserts to be exchanged without tools. This convenient arrangement is also available for the precise protection of Class D. A comprehensive range of busbar material, specifically designed for surge protection simplifies mounting.



**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. 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



### Greater installation security

The new miniature circuit-breakers Xpole Industrial FAZ are notably convenient to connect. The 25mm<sup>2</sup> 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 new 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.

### 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 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.

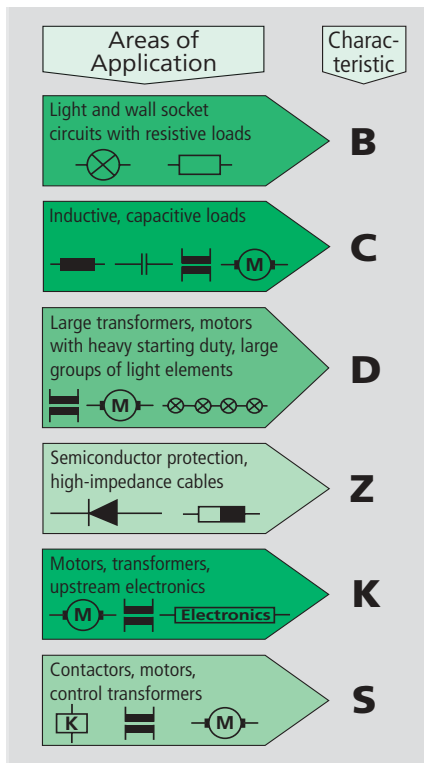


Generous wiring space due to compact 80mm dimension

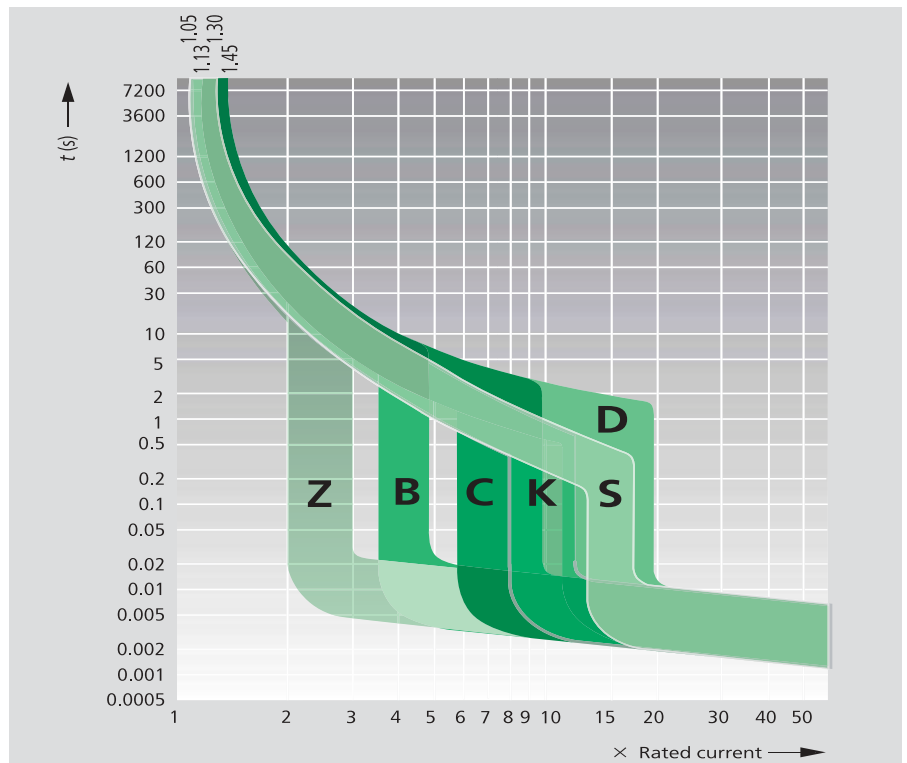


### Simple snap-fitting

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 miniature 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 Moeller offers enhanced cable protection due to its narrower bimetal tripping range for overload protection.

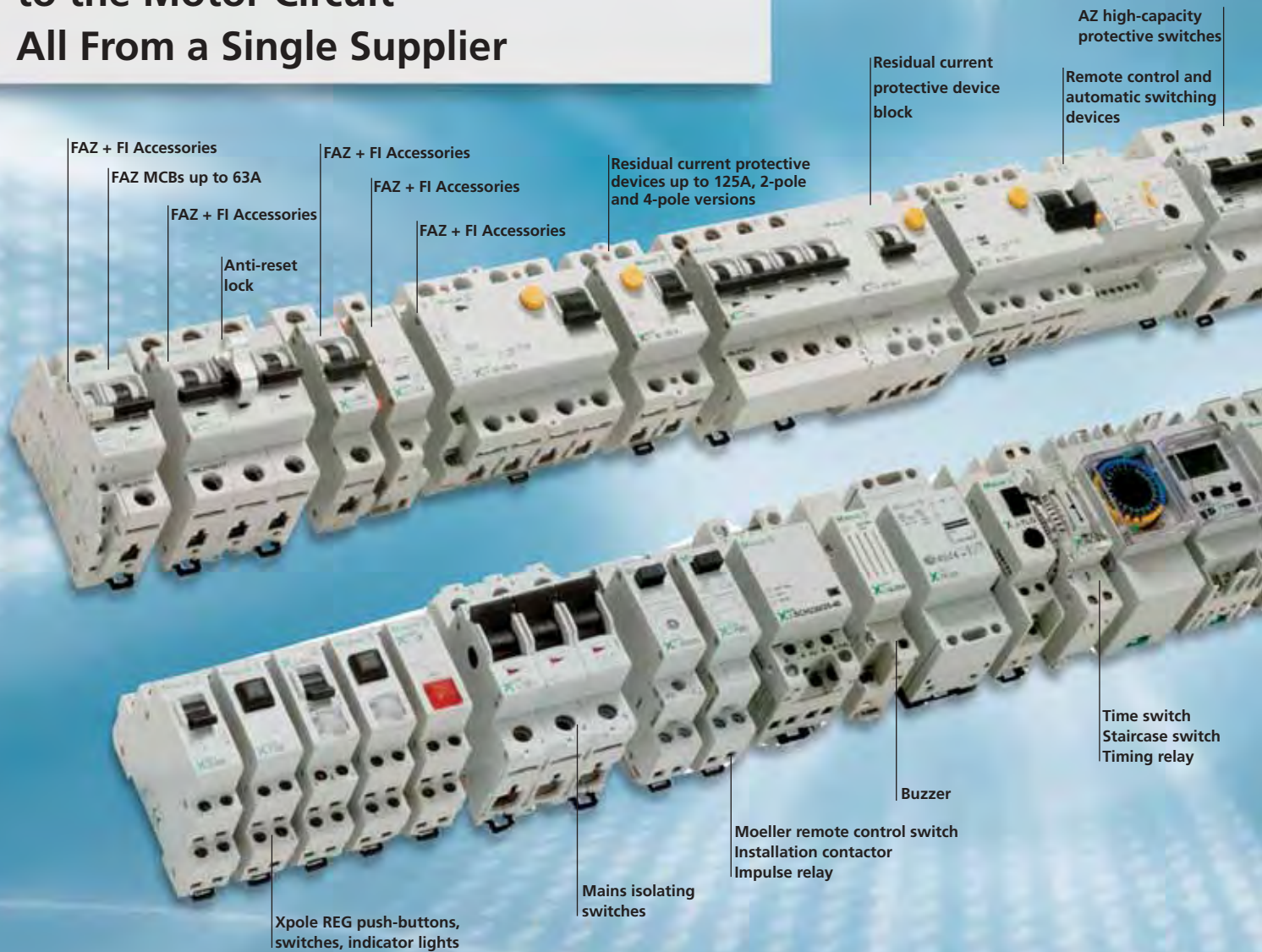
### Safety for control circuits

The control circuit protective switch with S characteristic is designed for the protection of control circuits with high inrush currents. At  $13$  to  $17 \times I_n$ , 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 circuit-breakers 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. It includes high-capacity miniature circuit-breakers AZ up to 125 A rated current and up to 25 kA switching capacity. The miniature circuit-breakers Xpole Industrial FAZ with a switching capacity of 15 kA, in single- and multi-pole version, are a new product. 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.

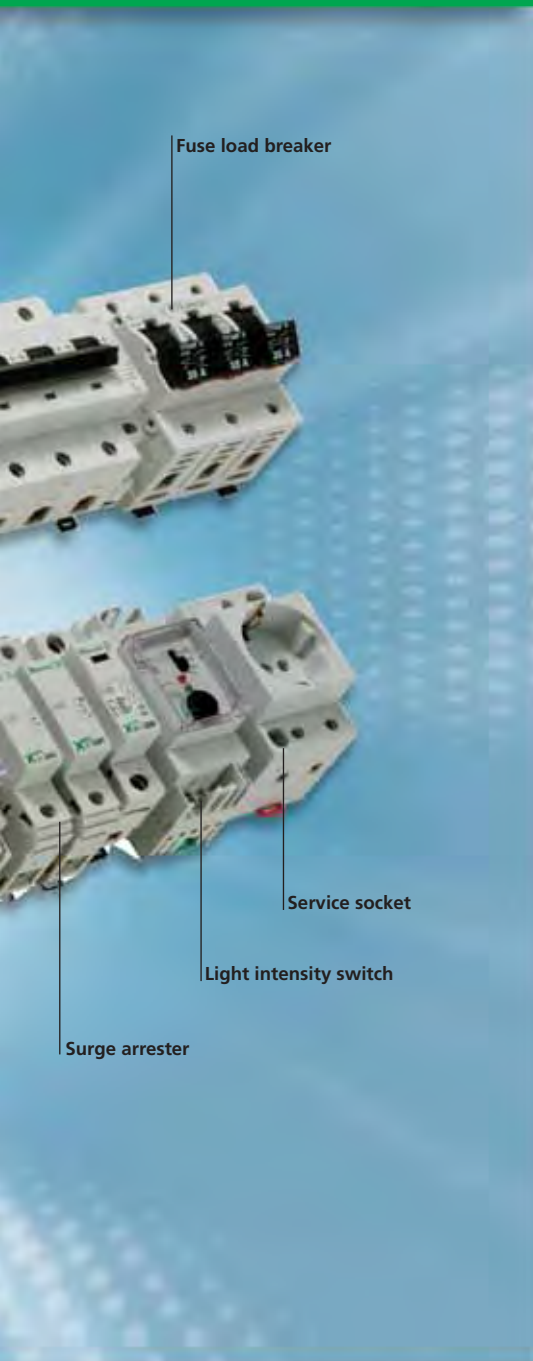
## Comprehensive residual current protection

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. 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
<b>Standard</b>	IEC/EN1008/1009	IEC/EN1008/1009 VDE 0664 Part 10	VDE 0664 Part 100/ Part 200	IEC/EN1008/1009 VDE 0664 Part 10	IEC/EN1008
<b>Characteristic</b>	AC sensitive	Pulse-current sensitive	sensitive for AC fault currents	Selectively-operating	Inverter-proof
<b>Application range</b>	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 and medical instruments	Tripping delay: 200ms 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
<b>Regulation</b>	VDE 0100 no	VDE 0100 Part 410 and 700 ff	VDE 0100 Part 410 and 700 ff		
<b>Comment</b>	For export except Germany, Netherlands, Switzerland, Denmark	Mandatory in Germany, Netherlands, Switzerland, Denmark. In other countries for special 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

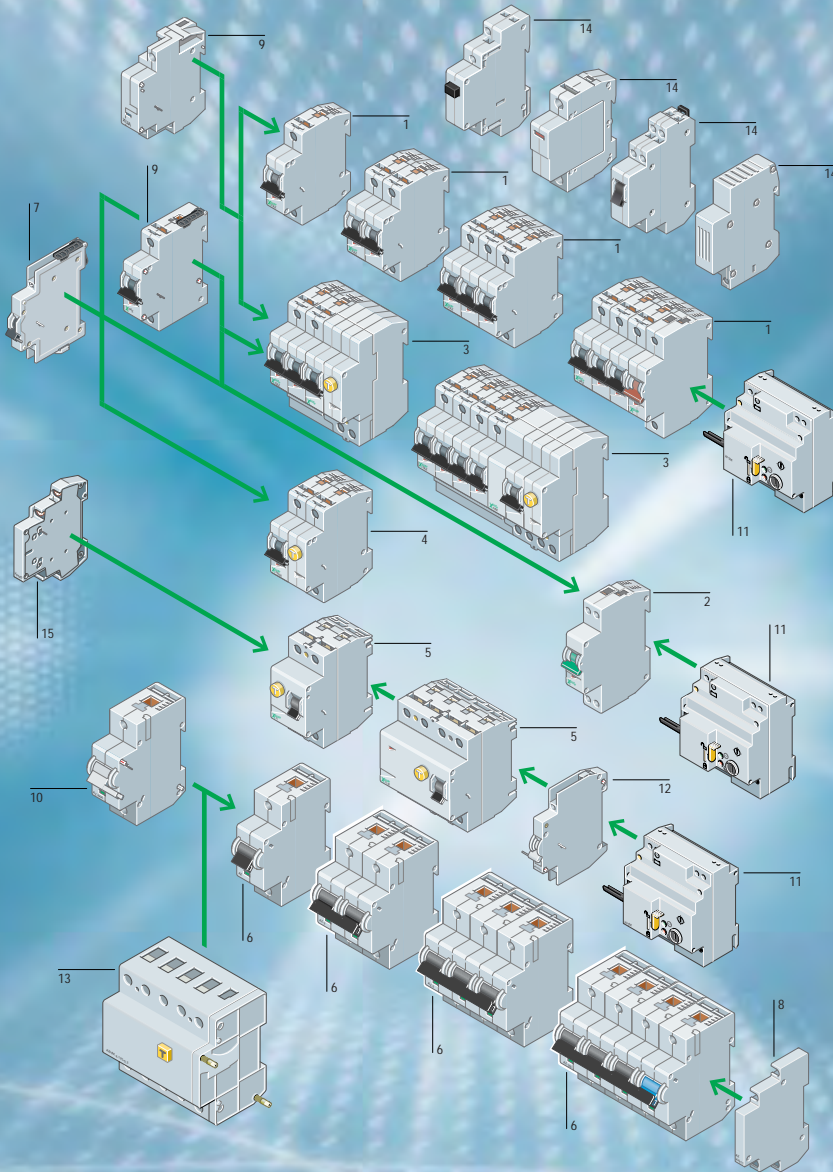
U type RCCBs remain unaffected by leakage currents from filters, for example in inverter circuits. Such leakage currents are typically of a frequency range of 100 to 300 Hz and often cause nuisance tripping of RCCBs. While the U type RCCB trips properly in the frequency range around 50 Hz, it is significantly 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 Part 100 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.

# Xpole Industrial – a Complete System



- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Miniature circuit-breakers FAZ</li> <li>2. Miniature circuit-breakers FAZ-PN</li> <li>3. Residual-current protective modules for fitting to FAZ</li> <li>4. PKNM combined RCD/MCD device</li> <li>5. Residual-current circuit-breakers</li> <li>6. Miniature circuit-breakers AZ</li> <li>7. Auxiliary contacts FAZ</li> <li>8. Auxiliary contacts AZ</li> </ul> | <ul style="list-style-type: none"> <li>9. Voltage releases FAZ</li> <li>10. Voltage releases AZ</li> <li>11. Remote switching module</li> <li>12. Trip-indicating auxiliary contacts</li> <li>13. Residual-current protective modules for fitting to AZ</li> <li>14. Rail-mounted service installation devices</li> <li>15. Auxiliary contacts FI</li> </ul> |
|--|--|

## Miniature circuit-breakers

Characteristic	Number 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			FAZ/FIP-XSV
Wiring material			EVG-1PHAS/12MODUL
1-phase/12 modules			EVG-3PHAS/12MODUL
3-phase/12 modules			Z-GB-10/3P-3TE
1-phase/1000 mm long			





### 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

\*Suitable for frequency inverters

### 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-DW
B	2	16 A	PKNM-16/1N/B/003-A-DW



### Surge arresters

Arrester class	Number of poles	Version	Part no.
B	1	50 kA	SPI-50/NPE
B+C	1	12.5 kA	SPB-12/280
B+C	3	12.5 kA	SPB-12/280/3
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 M	Z-SW/S
	16 A / 1 M signal lamp	Z-SWL230/S
	16 A / 1 C/O	Z-SW/W
Pushbuttons	16 A / 1 M	Z-PU/S
	16 A / 1M + 1B	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 / 1M	Z-S230/S
	12 V / 1M	Z-S12/S
	230 V / 1M	Z-R230/S
	230 V / 2M	Z-R230/SS
Installation contactors	25 A / 4M	Z-SCH230/25-40
	40 A / 4M	Z-SCH230/40-40
	63 A / 4M	Z-SCH230/63-40
Staircase timers	with Stop function	Z-TLE
	with prewarning function	Z-TLK
Time switches	Synchronous/Day/1 channel	SU-GS/1W-TA
	Digital/Week/1 channel	Z-SDM/1K-WO
	Digital/Week/2 channel	Z-SDM/2K-WO
Multi-function timing relay	230 V / 1C/O	Z-ZRMF/W
Hours-run counter	230 V / 50 Hz	BSZ/230
Light intensity switch	230 V / 1M	DS-GS/1S
Bell	230 V / 50 Hz	Z-GLO230
Plug socket	Schuko	Z-SD230
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. 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 Moeller's transformers meet the requirements of all international standards and regulations. Furthermore, customers benefit from the prompt delivery of 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

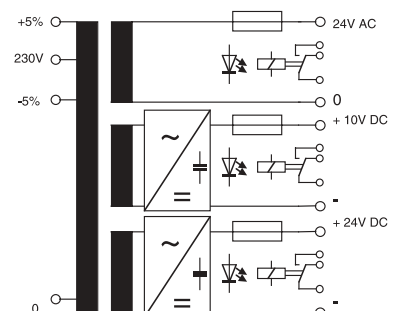
Moeller can supply exactly the ideal motor-protective circuit-breaker for protecting its transformers. Thanks to its high-speed short-circuit release it can withstand virtually any inrush current. For example, a suitable protective device and the primary current required by the relevant standards are 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

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 tapings 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  $\leq 50$  V.



## 3 in 1 – three in one

STI, STZ, DTI, 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.

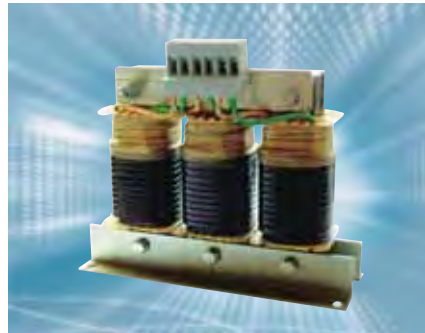
### VA rating

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 tapings, the VA rating is the sum of



### Even more functionality through accessories: the matching transformers

A large number of accessories are available to enhance the functionality of Moeller matching transformers. Transformers mounted in special steel enclosures offer additional touch protection. IP 65 enclosures are available for applications requiring additional protection. The standard winding isolation can also be provided with additional screening (screen winding) between the primary and secondary circuit. A special isolating coating ensures that transformers are suitable for ambient conditions with a high relative humidity. Inrush current limiters attached directly to the primary terminal reduce inrush current and make it easier to protect transformers against short-circuits.



### Motor reactors are used on the output of the frequency inverters

Motor reactors reduce the slew rate of the output voltage ( $du/dt < 500V/\mu s$ ), as well as motor noise and heating. The use of motor reactors enables the permissible motor cable lengths to be extended up to a max. of 200 m. Connection of a reactor to the output of the frequency inverter is recommended with parallel operation of several motors.



### Economic operation with starting transformers

Starting transformers DTA are a special type of economy transformer. Starting transformers are used as current limiters for starting three-phase induction motors, thus eliminating supply voltage dips, for example, with weak networks and larger motors. Of course, Moeller can also produce customized transformers if the type of transformer a customer needs is not available in our catalogue. Regardless of whether a transformer is needed for lighting a runway or for a wind-power station, or whether a miniature transformer or a transformer for high output is required, Moeller applies its extensive technical expertise to achieve top-quality results.

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.

## Emergency-Stop Safety Components, Safety for Man and Machinery



Emergency-Stop is now state-of-the-art, providing safety for Man and the machine. Moeller offers a wide range of Safety Components for the protection of Man, machines and production goods in emergency situations. It is the purpose of an Emergency-Stop device to deflect or minimize the risk as quickly as possible and optimally in the event of an emergency arising. In accordance with the Machine Directive 98/37/EG, an Emergency-Stop device must be fitted on all machines/systems, with the exception of machines on which an Emergency-Stop device would not reduce the risk, i.e. machines carried and operated by hand. A distinction is made between two STOP categories: STOP category 0, i.e. immediate stopping, and STOP category 1, i.e. controlled stopping. The appropriate STOP category must be chosen according to the assessment of the least risk in each case.



### Aims

The Emergency-Stop equipment on systems and machinery is implemented using one or more Emergency-Stop command devices in accordance with the Machine Directive. The main purpose of the equipment is quickly and safely to remove the hazard arising from malfunctioning of the machine, caused by disturbance in the production sequence or by human behaviour. Shutting down the entire machine is a practical way of removing such a hazard. Adjacent machines or sections of plant are also shut down via the Emergency-Stop equipment on the main machine or system, in case their continued operation represents a risk. In the event of an emergency, safety takes absolute priority over production.

### Function

The Emergency-Stop signal is passed to the control system via a clearly marked Emergency-Stop command device, i.e. a red actuating element on, as far as possible, a yellow background. The Emergency-Stop function is triggered by a single action of a single person. Dangerous situations and movements are switched Off as quickly as possible. The Emergency-Stop is effective in any mode of operation. The Emergency-Stop actuator latches when activated and remains in the latched position until it is deliberately released. The restart of the machine or system must be effected by a Start command and not by the release of the Emergency-Stop actuator.

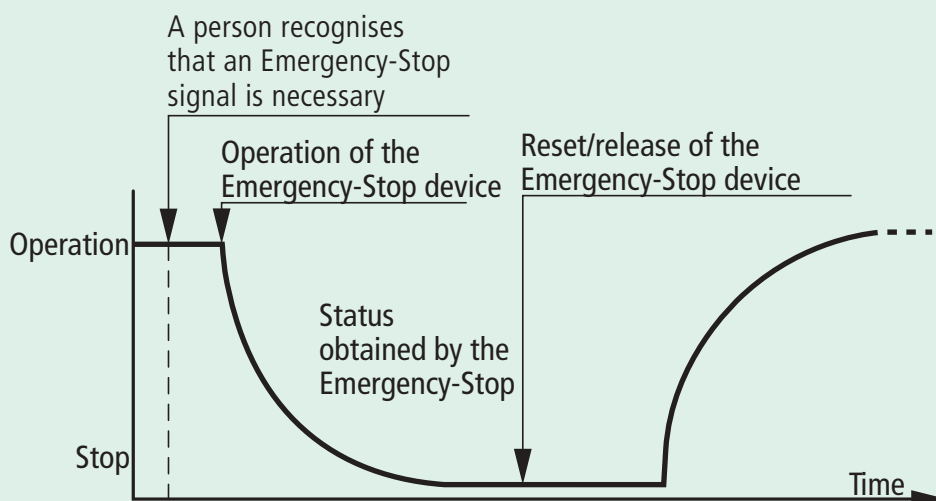
### Application

Emergency-Stop elements are shaped and fitted on the machine or system in such a way that they can be quickly and intuitively actuated in the event of danger. The Emergency-Stop equipment is engineered and designed in such a way that it correctly switches Off the machine or system. All Emergency-Stop actuating elements are freely accessible and their actuation must not be impeded by measures against unintentional operation. The Emergency-Stop function is reserved for hazardous situations and must not be used to shut down the machine or system in any other eventuality.

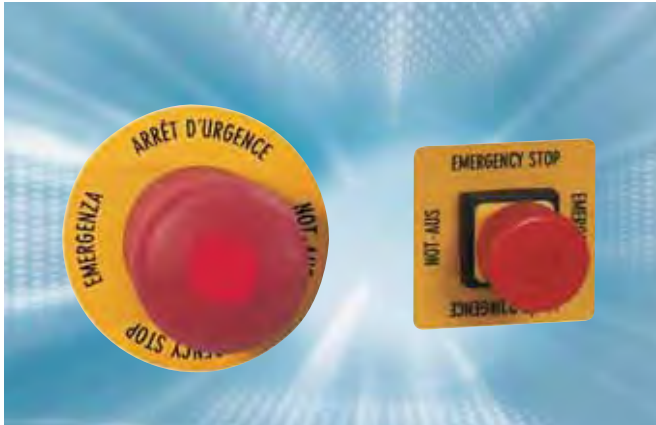


[www.moeller.net/safety](http://www.moeller.net/safety)

### Functional sequence in an Emergency-Stop situation in accordance with EN 418



For Immediate Delivery call [KMParts.com](http://KMParts.com) at (866) 595-9616



### Emergency-Stop buttons from the RMQ-Titan or RMQ 16 ranges

Both these ranges offer a number of different Emergency-Stop buttons with a high degree of protection for practical application. These Emergency-Stop buttons are tamper-proof. Illuminated buttons in particular increase the safety since visual recognition of the Emergency-Stop is even quicker and shortens the reaction time.



### Foot and palm switches FAK

Foot and palm switches FAK have a particularly large actuator surface, as well as being tamper-proof. Actuation can be effected using the hand, the arm, the foot, etc. The simple and versatile mode of operation makes for quick reaction in case of emergency. The FAK is exceptionally impact resistant, with a very high degree of ingress protection, IP 69K, i.e. it is the ideal device for application in harsh environments.



### Position switches LS-Titan and Emergency-Stop buttons RMQ-Titan

The position switches LS-Titan and the Emergency-Stop button from the RMQ-Titan range provide the ideal link to the Emergency-Stop actuating element. These devices are quick and straightforward to fit, as well as being highly reliable in operation, -properties that are critical for use on machines and systems. They have degree of protection IP 66, which allows them to be used in a wide range of applications.



### AS-Interface emergency-stop button



The Emergency-Stop buttons which are a feature of every system can be connected to the AS-i network via a safe AS-i slave. Depending on the device design – surface mounting enclosure or flush mounting – the electronics are located in the device or are clipped on as an AS-i safety adapter to conventional components of the RMQ-Titan range





**Rotary switches T and switch-disconnectors P with Emergency-Stop function**

The use of rotary T switches or switch-disconnectors P as mains isolating devices with Emergency-Stop function is suitable for many applications. These components in the range from 6.5 kW to 132 kW are extremely robust and compact in construction. The handle directly operates the contacts and can be locked in the Off position using three individual padlocks.



**Main switches with overload and short-circuit protection, as well as Emergency-Stop function, using the motor-protective circuit-breaker PKZ**

Manufacturing and processing machines, nowadays are often constructed from several autonomous units whose individual power requirement is fairly low and does not need a high switching capacity. The Emergency-Stop function can thus be set up simply and safely using a motor-protective circuit-breaker. The PKZ can be either actuated directly by hand using the Emergency-Stop mushroom button, or via the breaker mechanism in conjunction with an undervoltage release. In the latter case, the supply voltage to the undervoltage release that acts on the breaker mechanism is interrupted by operation of the Emergency-Stop button, and the mechanism trips the switch. The PKZ can be re-closed only after the button has been released.



**Circuit-breakers NZM and switch-disconnectors N – the Emergency-Stop switches for high currents**

Circuit-breakers NZM and switch-disconnectors N are used wherever large loads must be switched and protected. In many applications, these switches form part of the Emergency-Stop equipment. In the event of an emergency, the switches can be operated directly by means of the handle and disconnect the load, the system or the machine directly in all poles. An alternative method of disconnection in the event of danger is de-energization of the circuit-breakers and switch-disconnectors via their breaker mechanisms. Here, the supply voltage to the undervoltage release that acts on the breaker mechanism is interrupted by operation of an Emergency-Stop button, and the mechanism trips the switch. Once the button has been released, the circuit-breaker or switch-disconnector can be re-closed.



#### Safety relay ESR 4 for monitoring of the safety circuits

The electronic safety relays ESR4... are an important component of the safety equipment. In fault-free operation, the safety-relevant circuits are monitored by the electronics after the switch on command and the enable paths are enabled via the relay. The enable paths are interrupted immediately or after a time-delay – depending on the application – when the switch-off command is received, as well as during a fault with an earth fault, short-circuit or wire breakage. The devices feature a redundant design and provide safety for man and machine.

You can choose between the following safety relays:

- Emergency-Stop
- Protective door
- Light barrier
- Two-hand control
- Delay time
- Contact expansion



#### Safety for persons and processes door safety switch LS...ZB and 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 LS-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 0-ZB and LS 4-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 driven switching elements and 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.



### 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 N/C contact) conform to IEC EN 60947-4-1 Annex F 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 typical tasks for contactor relays. 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 Annex L. They can be used to safely implement control functions in safety-relevant system sections.



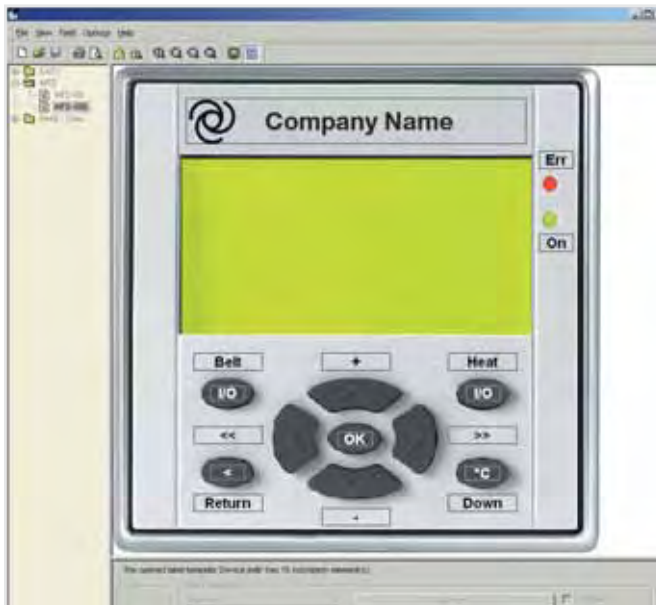
### The contactor monitoring relay CMD

Two contactors must be connected in series for conventional safety-related shutdown to safety category 3 and 4 for compliance to the EN 954-1. This is a particularly expensive solution, especially with large contactors. This is where the CMD comes into play. The CMD has the function of monitoring 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 drops-out, after a short delay the CMD will trip the upstream circuit-breaker / motor-protective circuit-breaker / switch-disconnector using an undervoltage release. The CMD has a safety-related design, as it must guarantee reliable shutdown of a "welded contactor" in safety applications in combination with the circuit-breaker / motor-protective circuit-breaker / switch-disconnector. In these applications, it replaces the series connection of two contactors. All components satisfy safety category 3 to EN954-1.

## Flexible Laser Inscriptions and Symbols with Labeleditor Software

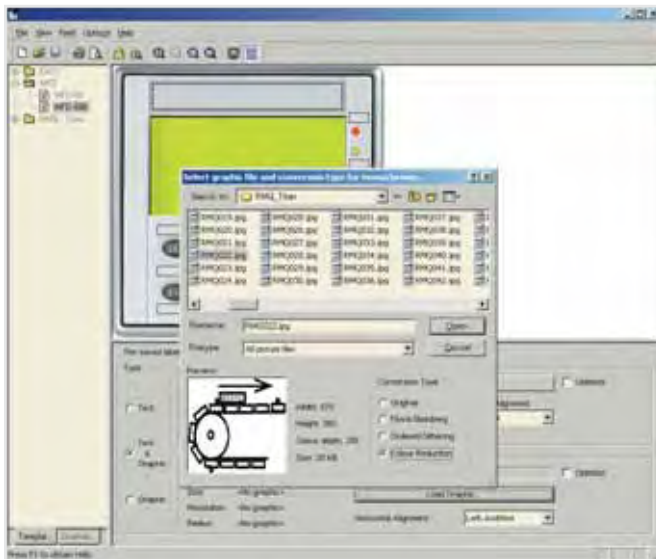


Moeller's Labeleditor is a flexible and inexpensive solution for labelling control circuit devices RMQ-Titan, RMQ 16, control relays easy and the multi-function display MFD-Titan quickly and to perfection. The Labeleditor software enables you to create your own company and project-related inscriptions 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 Moeller, where it is used in our factories for laser etching the required inscriptions or selected symbols on the device.



### Advertise company names and logos on the multi-function display MFD-80-B

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 software shows you immediately an on-screen preview of how the inscription texts and symbols will actually look like on the device. 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 multi-function 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.

# Creating Flexible Customer Solutions

Effective customised solutions for applications in industry, building services management and trades.



Send Label Template

Label Template Information

Company Name:  (\*)

Town:  (\*)

Contact:  (\*)

Tel. No.:

File Name:  (x)

Device Type:  (x)

After you have sent your label template to Moeller Manufacturing (email: [rmq@moeller.net](mailto:rmq@moeller.net)) notify your Moeller sales office of

**RMQ\_TITAN\_42557.zip**

This file name  
Only then can Moeller manufacturing assign the label template to the appropriate order.

(\*) Mandatory  
(!) Optional  
(x) Cannot be changed

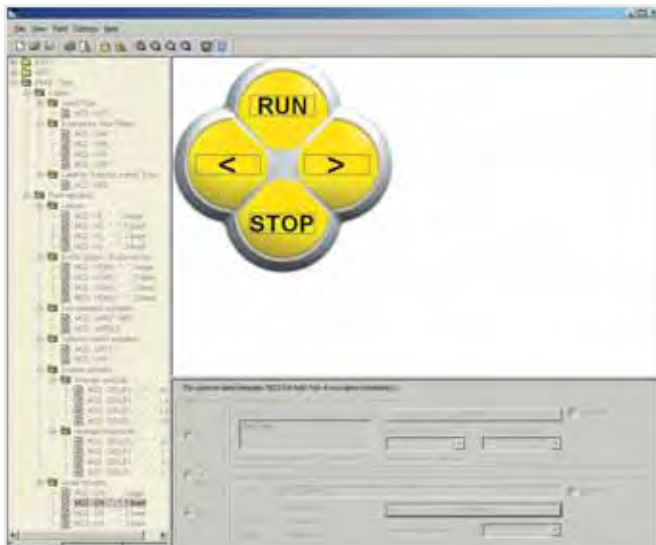
## Sending your label template to Moeller with a few clicks of the mouse

Once you have created your label template you simply send it to the appropriate 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 Moeller Electric GmbH or to an electrical wholesaler. The filename becomes part of the article ordered.

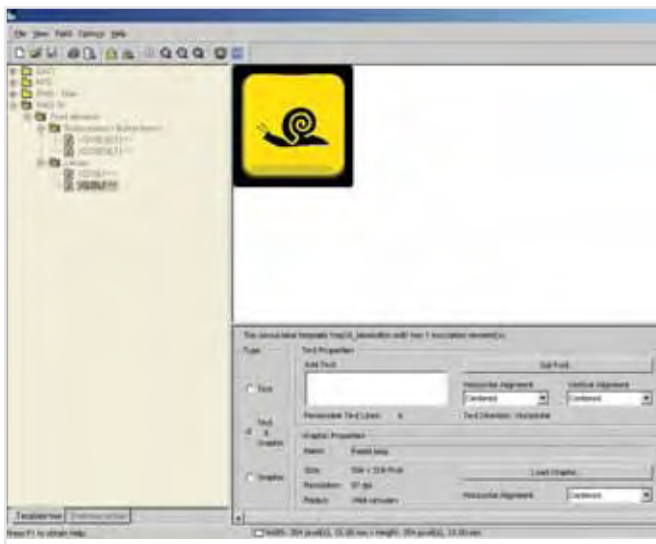
The following basic articles can be selected:

- MFD Combination
- EASY Combination
- M22 Combination
- M16 Combination



### 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:



### 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](http://www.moeller.net/en/support/index.jsp)  
Search term: Labeleditor

## 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. Moeller provides the knowledge required for export compliance for foreign directives and guidelines in the main catalogue and in special publications.





Circuit-breakers NZM feature all the most important approvals. These include North America, China and the approvals for the classification societies.

In the last few years, 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 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.







Moeller type suffix for order type	Type of existing approval	Approval mark	
-NA	This device is an individual device <i>UL</i> and <i>CSA</i> approved		
FORM CDN	The device is approved as a <i>CSA</i> approved single device.		
FORM USA	The device is approved as a <i>UL</i> approved single device.		
-CNA	The device has components approved to <i>UL</i> , the conditions of approval (Table 2) must be observed during use. The device is approved as a <i>CSA</i> approved single device.		

Table 1:  
The approval variants commonly used by Moeller and their markings on the nameplates of the devices. See Table 2 also.

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Two different product-dependent solutions have resulted for 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, 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, 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.

### 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



Listed Industrial Control Equipment <b>without limitations</b>	Recognized Component Industrial Control Equipment <b>partly with limitation</b>
<ul style="list-style-type: none"> <li>• Device approved for “field wiring”</li> <li>• “factory wiring” is included in “field wiring”</li> </ul> <p>i.e.</p> <ul style="list-style-type: none"> <li>- for installation in controls, which are fully wired ex-factory or in workshops</li> <li>- sale of single devices is permitted in the USA</li> </ul>	<ul style="list-style-type: none"> <li>• Devices are approved as modules for “factory wiring”</li> </ul> <p>i.e.</p> <ul style="list-style-type: none"> <li>- devices chosen to suit the operational conditions and selected by qualified personnel</li> <li>- for installation in controls, which are completely wired and tested ex-factory or in workshops by suitably qualified personnel</li> </ul>
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”

applications in North America, even though they have been proven millions of times in the IEC world.

### • Export from IEC countries to North America

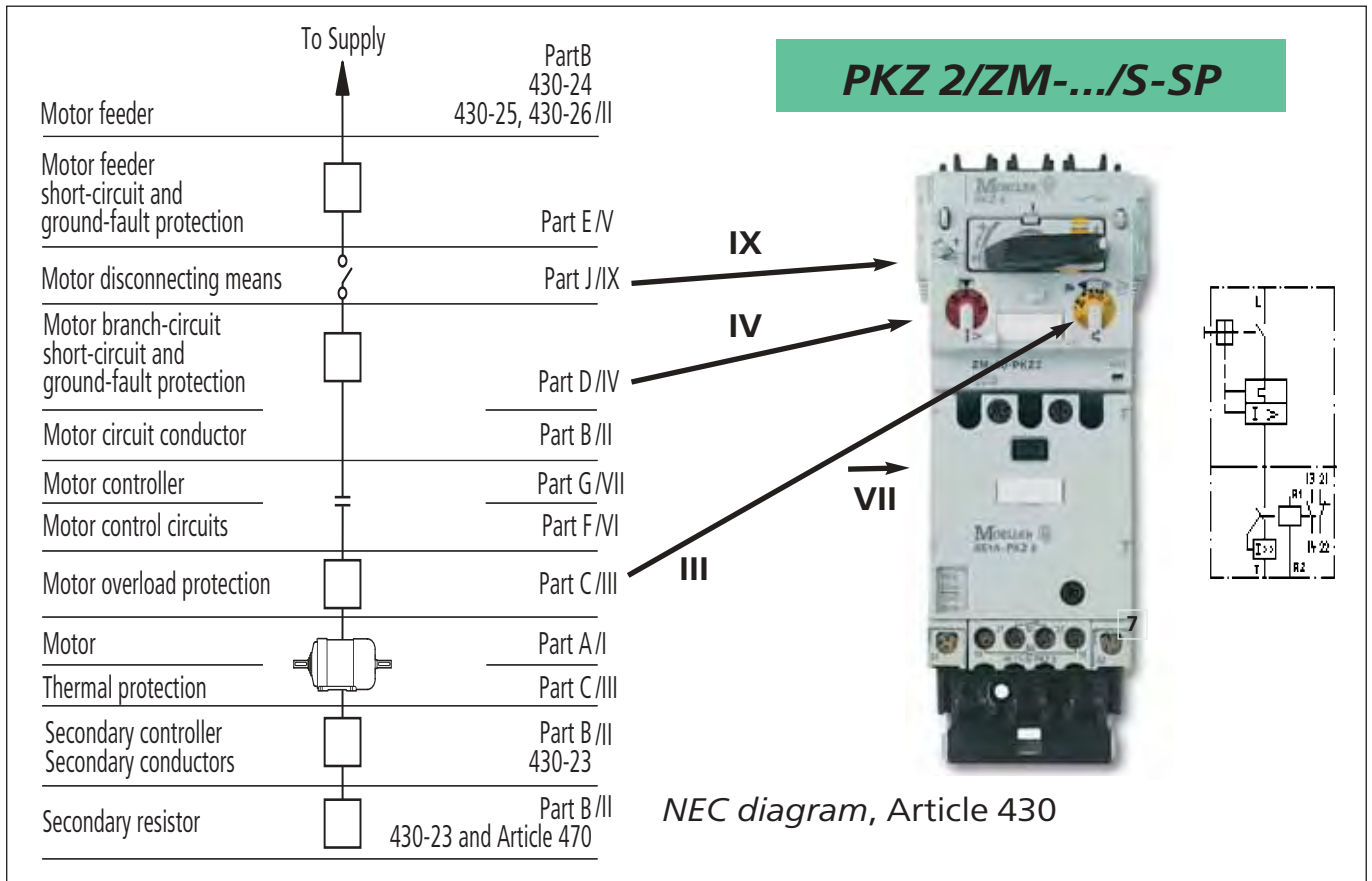
The export of many Moeller components occurs indirectly in conjunction with machines and systems, which are build for example, in Germany and Europe. Usually, the exporting machine manufacturers are only interested in manufacturing

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



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. Moeller can advise you with special knowledge concerning export to North America.

available in a version which can be operated on 50 Hz and 60 Hz power networks. Differences in voltage can be overcome using a matching transformer. The comprehensive and traditional 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. 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](http://www.moeller.net) with the following Quicklink-IDs: 928en, 950en and 951en and in the "Switchgear for world markets" section in the main catalogue.

# Services with Special Customer Proximity

**Advisory Service**



**Training**



**Field Service**



**Partner Support**



## Field Service – fast and reliable

Our customers worldwide value Moeller's Field Service, which they know they can always rely on, thanks to its wide range of services. The range of services offered not only covers components such as switchgear, controllers, motor starters and control circuit devices, but also customized system solutions and installations for power distribution.

The Field Service can offer fast and competent support in the event of emergencies such as with machine and installation stoppages. For example this may involve a circuit-breaker fault in the main feeder of a hospital or the failure of a controller in a production line. The Field Service can also provide tailored service, maintenance and advisory support contracts that offer both reliability and flexibility.

We offer a three-step concept that matches the requirements at hand and provides our customers with a clear procedure for all service requirements.

In **Step 1** we equip and train your service team to meet your particular requirements and needs.

In **Step 2** the Moeller representative responsible offers you competent service onsite.

In **Step 3** we provide you with a team of specialists from the Head Office in Bonn.

The individual needs of our customers are at the center of our worldwide Field Service offer. Just request our support when you need us: We will be glad to help you, whether by phone, by e-mail, via the internet or onsite. The success of our customers is also our success.

### Moeller GmbH

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- Moeller Solutions –  
Automation Solutions and Applications
- Field Service
- Electronic catalogue  
Selection and ordering documents  
for industrial switchgear, automation  
systems, drives and power distribution

### Product information for automation technology:

- Compact control easy Control,  
operating and control relays easy Relay/easy MFD
- Modular I/O system XI/ON
- Modular PLCs XC 100/200
- Visualization and control devices XV 200/400

Company: \_\_\_\_\_

Name: \_\_\_\_\_

Given name: \_\_\_\_\_

Department/Function: \_\_\_\_\_

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Telephone: \_\_\_\_\_

e-mail: \_\_\_\_\_



<http://www.moeller.net/publication>

# Electronic Catalogue 2006

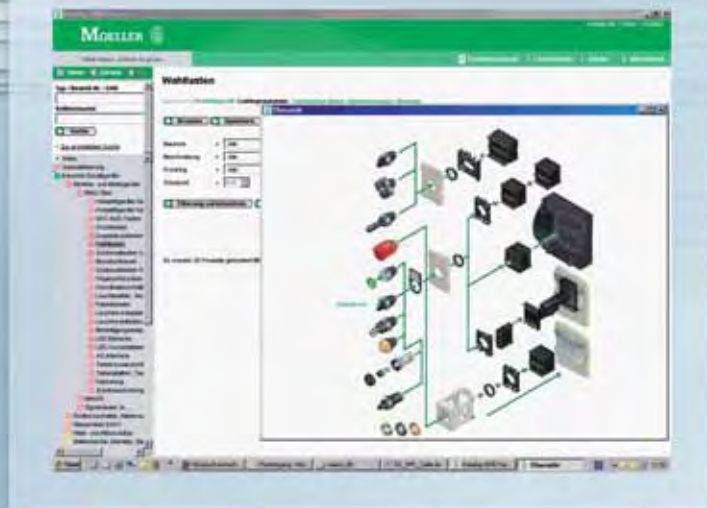
New functions and new contents

<http://catalog.moeller.net>



- **Optical User Guidance**

Links to accessories via the system overview



- **Visual User Guidance**

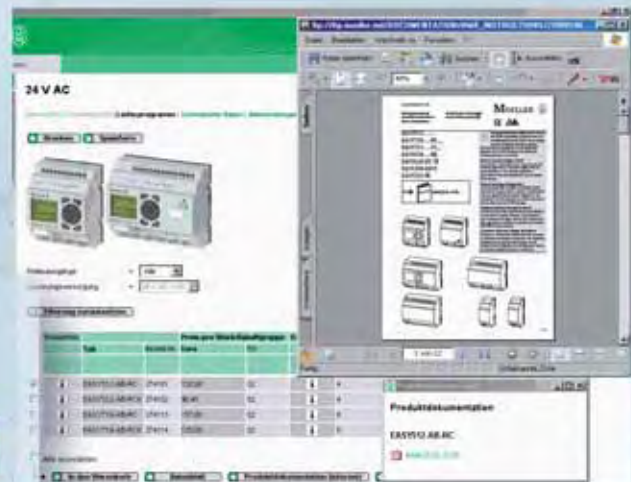
Clear parallel display of range for fast orientation



- **Compact information: The Product Range**  
Simple and fast search for products via selection possibility of product characteristics



- **Links to Product Documentation**  
Assembly Instructions, AWAs and Manuals AWBs, can be to product level downloaded from the Internet



- **Notes concerning up to date products**  
With obsolete devices the successor is also offered



- **Notes up to date products**  
**Circuit-breaker**  
The up to date product is displayed with selection relevant product characteristics



- **Improved shopping basket concept**  
Transfer of shopping basket to text processing or mail program with appendix as Excel file



## Electronic Catalogue <http://catalog.moeller.net>

In the electronic catalogue you can find over 15000 products from:

- Industrial Switchgear
- Automation systems, Drives
- Power distribution systems with many product photos and data sheets in the Internet or on CD-ROM with prices!

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## Rated currents of three-phase motors (guidelines for squirrel-cage motors)

### Minimum fuse size for the protection of three-phase motors

The maximum size is governed by the requirements of the associated switchgear or overload relay

Motor rating			230 V			400 V			500 V			690 V		
			Rated motor current	Fuse		Rated motor current	Fuse		Rated motor current	Fuse		Rated motor current	Fuse	
				DOL start	Y/Δ		DOL start	Y/Δ		DOL start	Y/Δ		DOL start	Y/Δ
kW	cos φ	η(%)	A	A	A	A	A	A	A	A	A	A	A	
0.06	0.7	58	0.37	2	–	0.21	2	–	0.17	2	–	0.12	2	–
0.09	0.7	60	0.54	2	–	0.31	2	–	0.25	2	–	0.18	2	–
0.12	0.7	60	0.72	4	2	0.41	2	–	0.33	2	–	0.24	2	–
0.18	0.7	62	1.04	4	2	0.6	2	–	0.48	2	–	0.35	2	–
0.25	0.7	62	1.4	4	2	0.8	4	2	0.7	2	–	0.5	2	–
0.37	0.72	66	2	6	4	1.1	4	2	0.9	2	2	0.7	2	–
0.55	0.75	69	2.7	10	4	1.5	4	2	1.2	4	2	0.9	4	2
0.75	0.79	74	3.2	10	4	1.9	6	4	1.5	4	2	1.1	4	2
1.1	0.81	74	4.6	10	6	2.6	6	4	2.1	6	4	1.5	4	2
1.5	0.81	74	6.3	16	10	3.6	6	4	2.9	6	4	2.1	6	4
2.2	0.81	78	8.7	20	10	5	10	6	4	10	4	2.9	10	4
3	0.82	80	11.5	25	16	6.6	16	10	5.3	16	6	3.8	10	4
4	0.82	83	14.8	32	16	8.5	20	10	6.8	16	10	4.9	16	6
5.5	0.82	86	19.6	32	25	11.3	25	16	9	20	16	6.5	16	10
7.5	0.82	87	26.4	50	32	15.2	32	16	12.1	25	16	8.8	20	10
11	0.84	87	38	80	40	21.7	40	25	17.4	32	20	12.6	25	16
15	0.84	88	51	100	63	29.3	63	32	23.4	50	25	17	32	20
18.5	0.84	88	63	125	80	36	63	40	28.9	50	32	20.9	32	25
22	0.84	92	71	125	80	41	80	50	33	63	32	23.8	50	25
30	0.85	92	96	200	100	55	100	63	44	80	50	32	63	32
37	0.86	92	117	200	125	68	125	80	54	100	63	39	80	50
45	0.86	93	141	250	160	81	160	100	65	125	80	47	80	63
55	0.86	93	173	250	200	99	200	125	79	160	80	58	100	63
75	0.86	94	233	315	250	134	200	160	107	200	125	78	160	100
90	0.86	94	279	400	315	161	250	200	129	200	160	93	160	100
110	0.86	94	342	500	400	196	315	200	157	250	160	114	200	125
132	0.87	95	401	630	500	231	400	250	184	250	200	134	250	160
160	0.87	95	486	630	630	279	400	315	224	315	250	162	250	200
200	0.87	95	607	800	630	349	500	400	279	400	315	202	315	250
250	0.87	95	–	–	–	437	630	500	349	500	400	253	400	315
315	0.87	96	–	–	–	544	800	630	436	630	500	316	500	400
400	0.88	96	–	–	–	683	1000	800	547	800	630	396	630	400
450	0.88	96	–	–	–	769	1000	800	615	800	630	446	630	630
500	0.88	97	–	–	–	–	–	–	–	–	–	491	630	630
560	0.88	97	–	–	–	–	–	–	–	–	–	550	800	630
630	0.88	97	–	–	–	–	–	–	–	–	–	618	800	630

#### Notes

The rated motor currents apply to normal, internally-ventilated and enclosed fan-cooled three-phase motors at 1500 rpm.

D.O.L. starting: Maximum starting current 6 x rated motor current. Maximum starting time 5 seconds.

Y/Δstarting: Maximum starting current 2 x rated motor current. Maximum starting time 15 seconds. Set the overload relay in the phase lead to 0.58 x rated motor current.

Rated fuse currents for Y/Δstarting also apply to the three-phase motors with slip-ring rotors.

Use a larger fuse if the rated current or starting current is higher and/or if the starting time is longer.

The table applies to "slow" and "gL" fuses (VDE 0636)

**LV h.b.c. fuses with aM characteristics, select fuse size to match rated current.**

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