

Motor-protective circuit-breakers

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Motor-protective circuit-breakers

Overview

Definition

Motor-protective circuit-breakers are circuit-breakers used for the switching, protection and isolation of circuits primarily associated with motor loads. At the same time, they protect these motors against destruction from locked-motor starting, overload, short-circuit and phase-failure in three-phase power supplies. They have a thermal trip block (PKZ) or an electronic release (PKE) for

protecting of the motor winding (overload protection) and an electromagnetic release (short-circuit protective device).

The following accessories can be fitted to motor-protective circuit-breakers:

- Undervoltage releases,
- Shunt release,
- Auxiliary contact,
- Trip-indicating auxiliary contact.

Motor-protective circuit-breakers at Eaton

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PKZM01

The PKZM01 motor-protective circuit-breaker up to 25 A is supplied with the pushbutton actuator. The fitted mushroom button is available for emergency-off actuation on simple machines. The PKZM01 is primarily installed in surface-mounted or flush-mounted enclosures. Many accessories of the PKZM0 can be used.

PKZM4

The PKZM4 motor-protective circuit-breakers are a modular and efficient system for switching and protecting motor loads up to 63 A. It is the “big brother” of the PKZM0 and can be used with almost all PKZM0 accessory parts.

PKZM0

The PKZM0 motor-protective circuit-breaker is a modular and efficient system for switching and protecting motor loads up to 32 A and transformers up to 25 A.

Versions:

- Motor-protective circuit-breakers
 - Transformer-protective circuit-breaker
- Description → Section “The motor-protective circuit-breakers PKZM01, PKZM0 and PKZM4”, page 6-4

PKE

PKE for motor and distribution circuit protection

The PKE is a modular and efficient system for protecting, switching and signalling of motors and systems in low-voltage switchgear systems up to 65 A, consisting of:

- Motor-protective circuit-breaker basic units
- Trip blocks

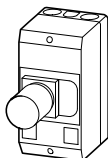
Description → Section “Motor and system protection with PKE”, page 6-5

Motor-protective circuit-breakers

Overview

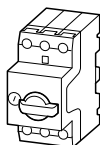
PKZM01

Circuit-breakers in surface mounting enclosure



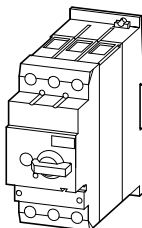
PKZM0

Circuit-breakers up to 32 A



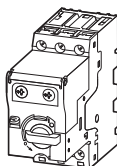
PKZM4

Circuit-breakers up to 63 A



PKE

Circuit-breakers with electronic wide-range overload protection



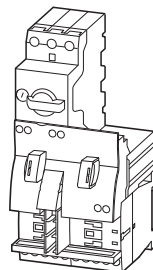
MSC-D

DOL starters



MSC-R

Reversing starters



MSC-DEA

DOL starters (for SmartWire-DT)



Motor-protective circuit-breakers

PKZM01, PKZM0 and PKZM4 – description

The motor-protective circuit-breakers PKZM01, PKZM0 and PKZM4

The PKZM01, PKZM0 and PKZM4 with their bimetal releases with a current-dependent delay offer a proven technical solution for motor protection. The releases offer phase failure sensitivity and are temperature compensated. The rated currents of the PKZM0 up to 32 A are divided up into 15 ranges, 14 ranges on the PKZM01 and 7 on the PKZM4 up to 63 A. The installation (motor) and the supply cable are reliably protected and motor startup is ensured by the short-circuit releases, permanently set to $14 \times I_N$. The phase failure sensitivity of the PKZM0 and PKZM4 enables them to be used for the protection of Ex e motors. An ATEX certificate has been awarded. The motor-protective circuit-breakers are set to the rated motor current in order to protect the motors.

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The following accessories complement the motor-protective circuit-breaker for the various secondary functions:

- Undervoltage release U,
- Shunt release A,
- Standard auxiliary contact NHI,
- Trip-indicating auxiliary contact AGM.

Motor-protective circuit-breakers

PKE – description

Motor and system protection with PKE

The PKE achieves its modularity by combining the motor or system-protective circuit-breaker with various accessories. The exchangeable motor-protective trip blocks with electronic wide range overload protection (current range 1:4) are available as a standard or enhanced version for connection to SmartWire-DT. This results in numerous application options and adaptation to widely differing requirements.

The circuit-breaker

The PKE circuit-breaker consists of:

- Basic device, 3 types for 12 A, 32 A and 65 A and
- Pluggable trip block.

There is a choice of trip blocks:

- Motor protective trip blocks (5 variants for the range 0.3 to 65 A)
- System protective trip block (for the range 5 to 36 A)

All trip blocks are provided with adjustable overload releases.

Overload from ... to...:

- Motor protective trip blocks:
also with adjustable tripping classes (CLASS 5, 10, 15 and 20) for protecting heavy starting motors.
- System protective trip block:
also with adjustable short-circuit release 5 to $8 \times I_n$.

The phase failure sensitivity of PKE allows for the use in the protection of Ex e motors.

An ATEX certificate has been awarded.

The motor-protective circuit-breakers are set to the rated motor current in order to protect the motors.

The following accessories of PKZM0 complement the motor-protective circuit-breaker PKE for the various secondary functions:

- Undervoltage release U,
- Shunt release A,
- Standard auxiliary contact NHI,
- Trip-indicating auxiliary contact AGM.

Standards

The PKE motor-protective circuit-breaker is compliant with IEC/EN 60947 and VDE 0660. The PKE also meets the requirements for isolation and main switch functions stipulated in EN 60204.

Motor-protective circuit-breakers

PKM0, PKZM0-...-T, PKZM0-...-...C – description

Motor-protective circuit-breakers without overload release

PKM0

The PKM0 motor-protective circuit-breaker is a protective switch for starter combinations or for use as a basic unit in a short-circuit protective switch in the range 0.16 A to 32 A. The basic device is without overload release, but equipped with short-circuit release. This

circuit-breaker is used for protection of resistive loads where no overloading is to be expected.

These protective switches are also used in motor-starter combinations with and without reclosing lockout, where an overload relay or a thermistor overload relay is used as well.

Transformer-protective circuit-breakers

PKZM0-...-T

The transformer-protective circuit-breaker is designed for protecting transformer primaries. The short-circuit releases in the types from 0.16 A to 25 A are permanently set to $20 \times I_n$. The response ranges of the short-circuit releases are higher here than with motor-protective circuit-breakers in order to cope with the even higher inrush currents of idling transformers without tripping. The overload release in the PKZM0-T is set to the rated current of the transformer primary. All the PKZM0 system accessories can be combined with the PKZM0-T.

PKZM0-...-...C

The PKZM0 features a version with springloaded terminals. A version with springloaded terminals on both sides, and a combined version which features springloaded terminals on the outgoer side only can be chosen. The conductors can be connected here without ferrules. The connections are maintenance-free.

Motor-protective circuit-breakers

MSC Motor starters – description

Motor starter combinations

The MSC motor-starter combinations are available up to 32 A. Motor starters up to 16 A consist of a PKZM0 or PKE motor-protective circuit-breaker and a DILM contactor. Both are connected by a tool-less mechanical connection element. Furthermore, a plug-in electrical connector is used to establish the connection with the main circuit wiring. The PKZM0 or PKE motor-protective circuit-breaker and the DILM contactors up to 16 A are provided with the relevant interfaces for this purpose.

The MSC motor-starter combinations from 16 A consist of a motor-protective circuit-breaker PKZM0 or PKE and a contactor DILM. Both are fitted to a top-hat rail and mechanically and electrically interconnected by a connector element.

The MSC is available as a MSC-D DOL starter and as a MSC-R reversing starter.

The combinations of PKZM4 or PKE65 with the proven DILM contactors are available for motor ratings over 15 kW/400 V.

Motor-protective circuit-breakers

PKZM0 and PKZM4 – current limiters

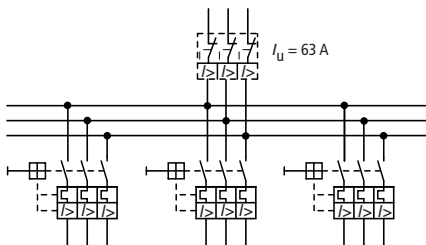
CL-PKZ0

The current limiter module CL-PKZ0 is a short-circuit protective device specially developed for the PKZM0 and PKZM4 for non-intrinsically-safe areas. The CL module has the same base area and uses the same terminations as the PKZM0. When they are mounted on a top-hat rail alongside one another, it is possible to connect them using B3...-PKZ0 three-phase commoning links. The switching capacity of the series connected PKZM0 or PKZM4 + CL is 100 kA at 400 V. In the event of a short-circuit, the contacts of

the motor-protective circuit-breaker and CL will open. While the current limiter returns for the closed rest position, the motor protective-circuit breaker trips via the instantaneous release and produces a permanent isolating gap. The system is ready to operate again, once any defect has been rectified. The current limiter can conduct an uninterrupted current of 63 A. The module may be used for individual or group protection. Any direction of incoming supply may be used.

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Individual and group protection using CL-PKZ0



Use the BK25/3-PKZ0 for terminals $> 6/4 \text{ mm}^2$

For grouped connection with three-phase commoning link B3...PKZ0. Observe load factors in accordance with VDE 0660-600-2.

Examples:

PKZM0-16, PKZM4-16 or	PKZM0-16/20, PKZM4-16/20 or	PKZM0-20, PKZM4-20 or	PKZM0-25, PKZM4-25
$4 \times 16 \text{ A} \times 0.8$ $= 51.2 \text{ A}$	$2 \times (16 \text{ A} + 20 \text{ A})$ $\times 0.8 = 57.6 \text{ A}$	$3 \times 20 \text{ A} \times 0.9$ $= 54 \text{ A}$	$2 \times 25 \text{ A} \times 0.9$ $= 45 \text{ A}$

Motor-protective circuit-breakers

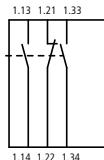
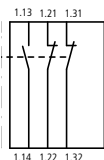
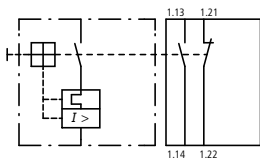
PKZM01, PKZM0, PKZM4 and PKE – auxiliary contacts

Auxiliary contacts and standard auxiliary contacts NHI for PKZM01, PKZM0 PKZM4 and PKE

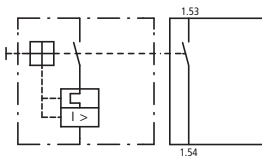
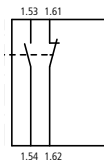
They switch at the same time as the main contacts. They are used for remote indication of the operating state, and

interlocking of switches between one another. They are available with screw connections or springloaded terminals.

Side mounted:



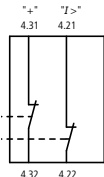
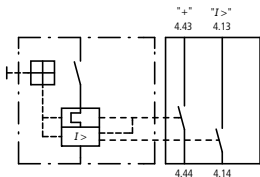
Integrated:



AGM trip-indicating auxiliary contacts for PKZM01, PKZM0 PKZM4 and PKE

These provide information about the reason for the circuit-breaker having tripped. In the event of a voltage/overload release (contact 4.43-4.44 or 4.31-4.32) or short-circuit release (contact 4.13-4.14 or

4.21-4.22) two potential-free contacts are actuated independently of one another. It is thus possible to indicate the difference between short-circuit and overload.



Motor-protective circuit-breakers

PKZM01, PKZM0, PKZM4 and PKE – trip blocks

Voltage releases

These operate according to the electromagnetic principle and act on the switch mechanism of the circuit-breaker.

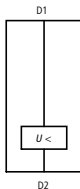
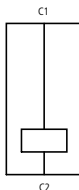
Undervoltage release

These switch the circuit-breaker off when no voltage is present. They are used for safety tasks. The U-PKZ20 undervoltage release, which is connected to voltage via the VHI20-PKZ0 or VHI20-PKZ01 early-make auxiliary contacts, allows the circuit-breaker to be switched on. In the event of power failure the undervoltage release switches the circuit-breaker off via the switch mechanism. Uncontrolled restarting of machines is thus reliably prevented. The safety circuits are proof against wire breaks.

The VHI-PKZ0 cannot be used together with the PKZM4!

Shunt releases

These switch the circuit-breaker off when they are connected to voltage. Shunt releases can be provided in interlock circuits or for remote releases where voltage dips or interruptions are not to lead to unintentional switch off.

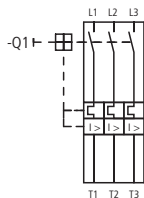


Motor-protective circuit-breakers

PKZM01, PKZM0, PKZM4 and PKE – block diagram

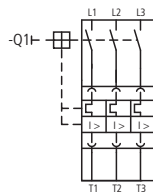
Motor-protective circuit-breakers PKZM01, PKZM0 and PKZM4

Manually operated motor starter



Motor-protective circuit-breakers PKE

Manually operated motor starter



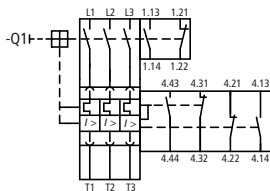
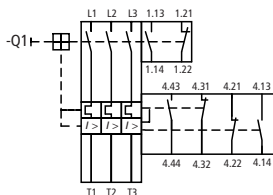
Motor-protective circuit-breakers

PKZM01, PKZM0, PKZM4 and PKE – block diagram

Motor-protective circuit-breakers with auxiliary contact and trip-indicating auxiliary contact

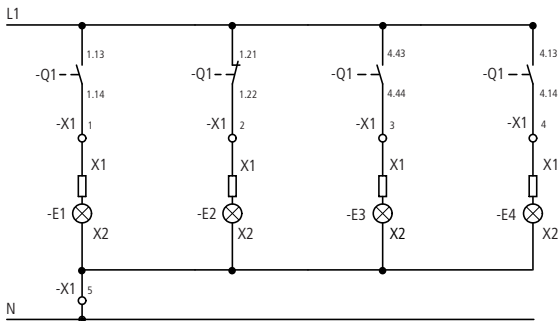
PKZM01(PKZM0-...)(PKZM4-...) +
NHI11-PKZ0 + AGM2-10-PKZ0

PKE... + NHI11-PKZ0 + AGM2-10-PKZ0



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For differential fault indication (Overload or short-circuit)



E1: circuit-breaker ON
E2: circuit-breaker OFF

E3: general fault, overload release
E4: short-circuit release

Motor-protective circuit-breakers

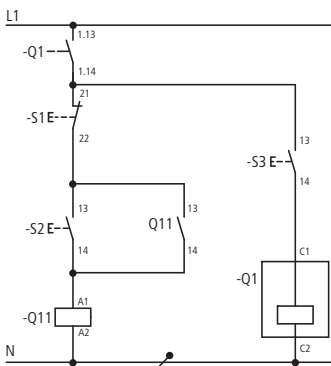
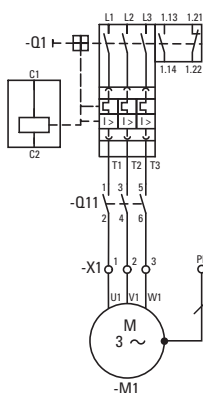
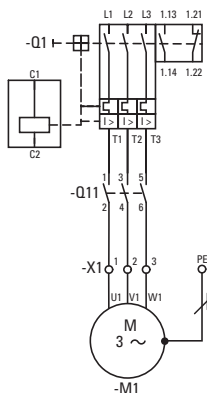
PKZM01, PKZM0, PKZM4 and PKE – block diagram

Remote switch off via shunt release

Motor starters with auxiliary contact and shunt release

PKZM0-... + DILM... + A-PKZ0

PKE... + A-PKZ0



S1: OFF
S2: ON
S3: OFF circuit-breaker

Notes
