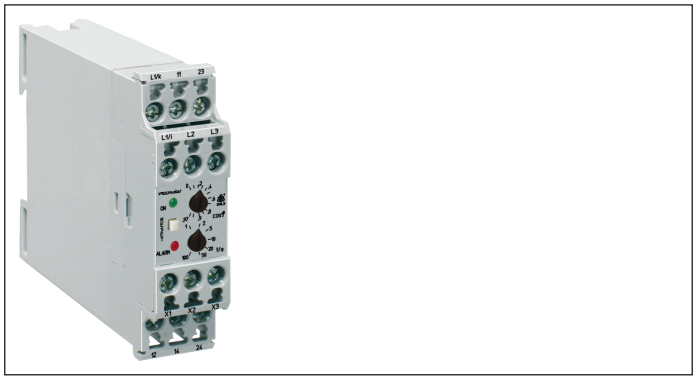
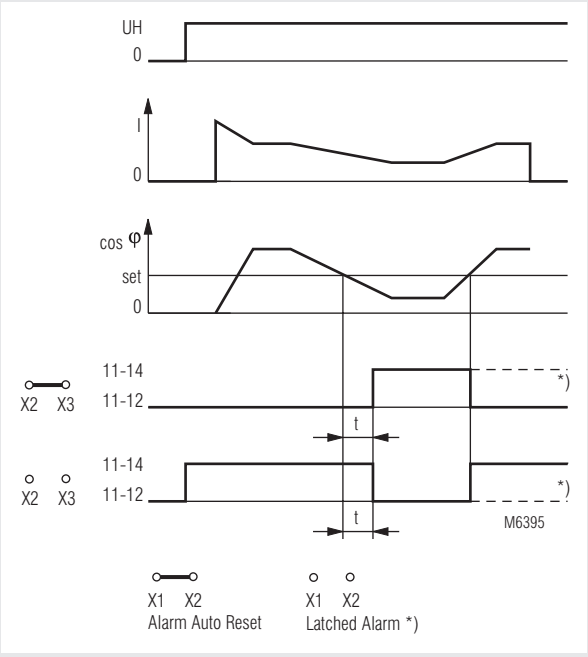
VARIMETER
Underload Monitor
MK 9065

Translation of the original instructions

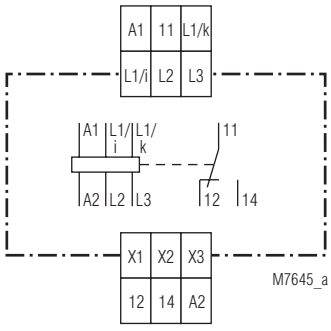
DOLD



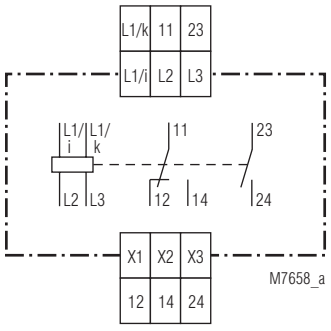
Function Diagram



Circuit Diagrams



MK 9065.11



MK 9065.20

- According to IEC/EN 60255, DIN VDE 0435-303
- Detection of underload (cos φ)
- Current ranges up to 10 A
- Adjustable response value
- Programmable functions:
  - Automatic or manual reset
  - Closed or open circuit operation
- Manual remote reset
- Adjustable operate delay up to 100 s
- For single and 3-phase AC-systems without neutral
- Independent of phase sequence
- Also for 400 Hz systems
- MK 9065.11 can be used for motors with frequency converters 2 ... 200 Hz)
- Optionally with sealable cover
- Green indicator LED for operational mode
- Red indicator LED for underload monitoring
- Width 22.5 mm

Approvals and Markings

CE

Applications

Monitors underload and no load on squirrel cage motors e.g.
- Fan monitoring (broken belt)
- Filter monitoring (blocked filter)
- Pump monitoring (blocked valve, dry running)

Indicators

Green LED:	On, when supply connected
Red LED:	On, when underload detected

Function

The underload monitor MK 9065 measures the phase shift between voltage and current. The phase angle changes with changing load. This measuring method is suitable to monitor asynchronous motors on underload and no load independent of motor size. In some cases the cos φ does not change much with load change on the motor, e.g.:

- Small load change on oversized motor
- Single phase chaded-pole and collector motors

In these cases we recommend the use of motor load monitor BA 9067.

Programmable by bridging terminals:
- X1 - X2 bridged: Alarm not stored (auto reset)
- X1 - X2 open: Stored alarm: Reset by external or internal reset button
- X2 - X3 bridged: Open circuit operation (relay energized on underload)
- X2 - X3 open: Closed circuit operation (relay de-energized on underload)

When setting the MK 9065 in a system with frequency converters please note that the cos φ varies with the frequency.

Technical Data

Input (L1-L2-L3)

Nominal voltage U_N:	(= Motor voltage)	
MK 9065.11:	AC or 3 AC 15 ... 690 V	
MK 9065.20:	AC or 3 AC 110 ... 127 V, 220 ... 240 V, 380 ... 415 V	
Voltage range:	0.8 ... 1.1 U_N	
Nominal frequency of U_N		
MK 9065.11:	2 ... 200 Hz	
MK 9065.20:	45 ... 400 Hz	
Nominal consumption:	2 VA	
Current range (L1/i-L1/k):	0.1 ... 2 A	0.5 ... 10 A*
Internal resistance (L1/i-L1/k):	Approx. 30 mΩ	Approx. 10 mΩ
Consumption (L1/i-L1/k):	Max. 0.12 VA	Max. 1.1 VA
Short time overload:	See diagram (for 2 A range reduced)	
	* for higher currents use external current transformer (see connection diagram)	
	Suitable current transformers: 1 A or 5 A types, class 3, with necessary load capacity	

Setting Ranges

Setting range cos φ:	0 ... 0.97 infinite variable
Operate delay t_v:	Approx. 1 ... 100 s infinite variable

Auxiliary circuit

Auxiliary voltage U_H (A1 - A2)		
MK 9065.11:	AC 110 ... 127 V, 220 ... 240 V, 380 ... 415 V	
MK 9065.20:	$U_H = U_N$	
Voltage range:	0.8 ... 1.1 U_H	
Frequency range:	45 ... 400 Hz	

Output

Contacts		
MK 9065.11:	1 changeover contact	
MK 9065.20:	1 changeover contact, 1 NO contact	
Thermal current I_{th}:	4 A	
Switching capacity		
To AC 15		
NO contact:	3 A / AC 230 V	IEC/EN 60947-5-1
NC contact:	1 A / AC 230 V	IEC/EN 60947-5-1
Electrical life		IEC/EN 60947-5-1
To AC 15 at 3 A, AC 230 V:	5×10^5 switching cycles	
Short-circuit strength		
Max. fuse rating:	4 A gG / gL	IEC/EN 60947-5-1
Mechanical life:	30×10^6 switching cycles	

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 50°C with a distance of ≥ 10 mm to the next units a max. ambient temperature of 60°C is possible	
Clearance and creepage distances		
Rated impulse voltage / pollution degree:	4 kV / 2	IEC 60664-1
EMC		
Electrostatic discharge:	4 kV (air)	IEC/EN 61000-4-2
Fast transients:	4 kV	IEC/EN 61000-4-4
Surge voltages		
Between		
wires for power supply:	2 kV	IEC/EN 61000-4-5
Between wire and ground:	4 kV	IEC/EN 61000-4-5
Interference suppression:	Limit value class B	EN 55011
Degree of protection		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz	IEC/EN 60068-2-6

Technical Data

Climate resistance:	20 / 050 / 04	IEC/EN 60068-1
Terminal designation:	EN 50005	
Wire connection:	2 x 1.5 mm² solid or 2 x 1.0 mm² stranded wire with sleeve DIN 46228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60999-1
Mounting:	DIN rail	IEC/EN 60715
Weight:	155 g	

Dimensions

Width x height x depth:	22.5 x 82 x 99 mm

Standard Type

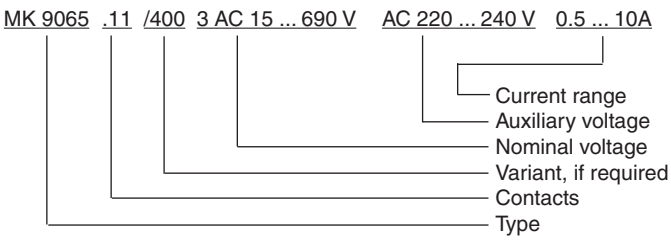
MK 9065.20 3 AC 380 ... 415 V 0.5 ... 10 A 1 ... 100 s

Article number:	0045108
• Output:	1 changeover contact, 1 NO contact
• Nominal voltage U_N:	3 AC 380 ... 415 V
• Current range:	0.5 ... 10 A
• Width:	22.5 mm

Variants

MK 9065.11:	Output 1 changeover contact, auxiliary supply separated from measuring input, standard unit can be used also with frequency converters
MK 9065.20:	Model with 1 changeover contact and 1 separate NO contact, auxiliary supply is taken from measuring input, cannot be used with frequency converters
MK 9065. _ _ /400:	With transparent sealable cover

Ordering example for variants



Characteristics

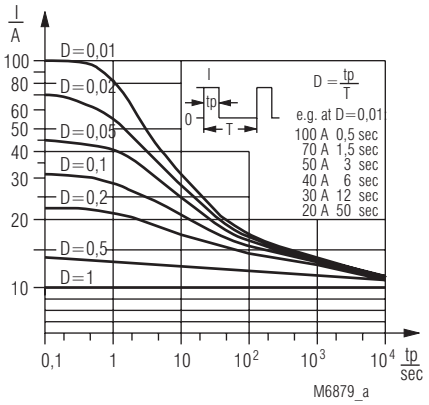
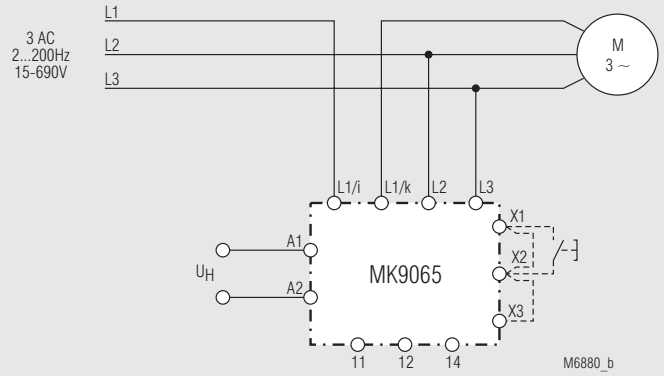


Diagram for short-time overload of the current input L1/i-L1/k (0.5 ... 10 A)

Connection Examples

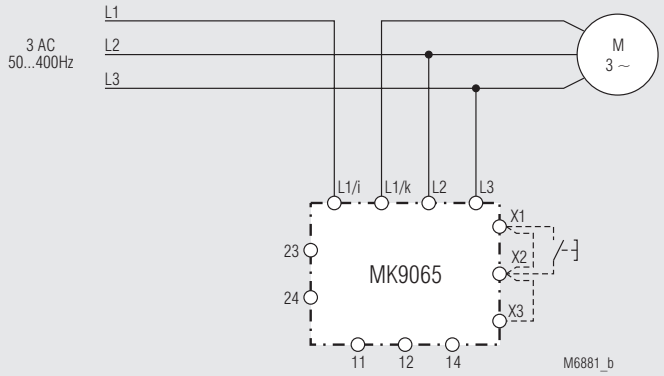


X1 - X2 open: stored alarm (reset with internal or external button)
X1 - X2 bridged: Alarm not stored (Auto reset)

X2 -X3 open: closed circuit operation
X2 -X3 bridged: open circuit operation

Standard circuit with MK 9065.11

Connection Examples



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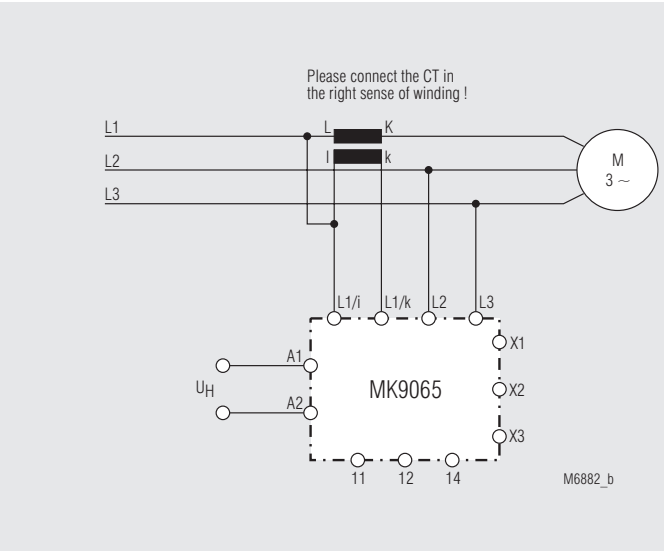
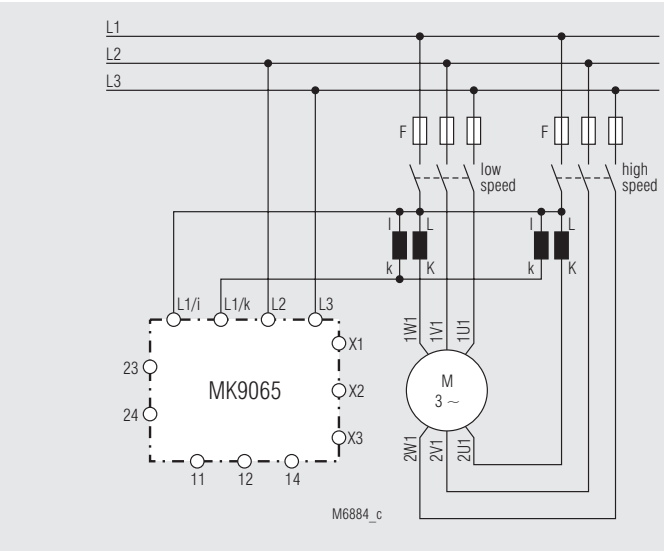
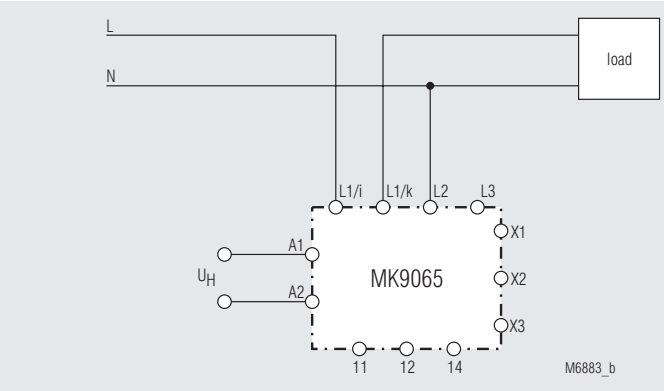


Connection Example for MK 9065.11 with current transformer



Connection Example for MK 9065.20 for motors with separate windings



Connection Example for MK 9065.11 with single phase connection