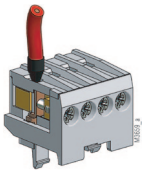
VARIMETER
Thermistor Motor Protection Relay
MK 9163N, MK 9163N-ATEX

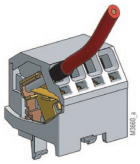
0245068

MK 9163N

Options with Pluggable Terminal Blocks



Screw terminal
(PS/plugin screw)

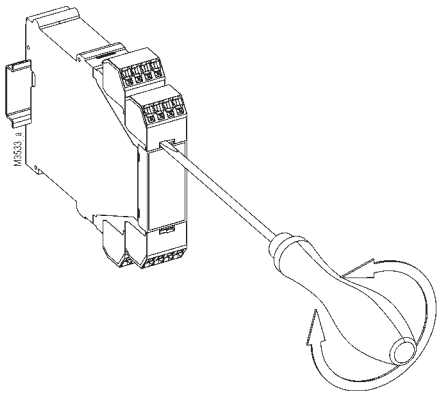


Cage clamp terminal
(PC/plugin cage clamp)

Notes

Removing the terminal blocks with cage clamp terminals

1. The unit has to be disconnected.
2. Insert a screwdriver in the side recess of the front plate.
3. Turn the screwdriver to the right and left.
4. Please note that the terminal blocks have to be mounted on the belonging plug in terminations.



Your advantages
- Reliable temperature monitoring of motors
- Preventive maintenance
- For better productivity
- Rapid fault location

Features
- According to DIN EN 60947-5-1, DIN EN 60947-8, DIN EN 60079-14, DIN EN 61508, DIN EN 50495, DIN EN 13849
- Monitioring of
  - overtemperature
  - broken wire detection in sensor circuit
  - short circuit detection in sensor circuit
- 1 input for 1 to 6 PTC-resistors
- De-energized on trip
- LED-indicator for
  - auxiliary supply
  - state of contact
- Output with 2 changeover contacts
- As option with manual reset, internal reset button and external remote reset X1/X2
- Wire connection: also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46 228-1/-2/-3/-4
- As option with pluggable terminal blocks for easy exchange of devices
  - with screw terminals
  - or with cage clamp terminals
- Width 22.5 mm

Approvals and Marking

CE | Ex [1)] | cULus [2)] Canada / USA | PG AE68

[1)] For devices with ATEX-approval
Directive 94/9/EG
EU-Test certificate no.
03 ATEX 3117 Ex II (2) GD

[2)] for MK 9163N.12/61

Application

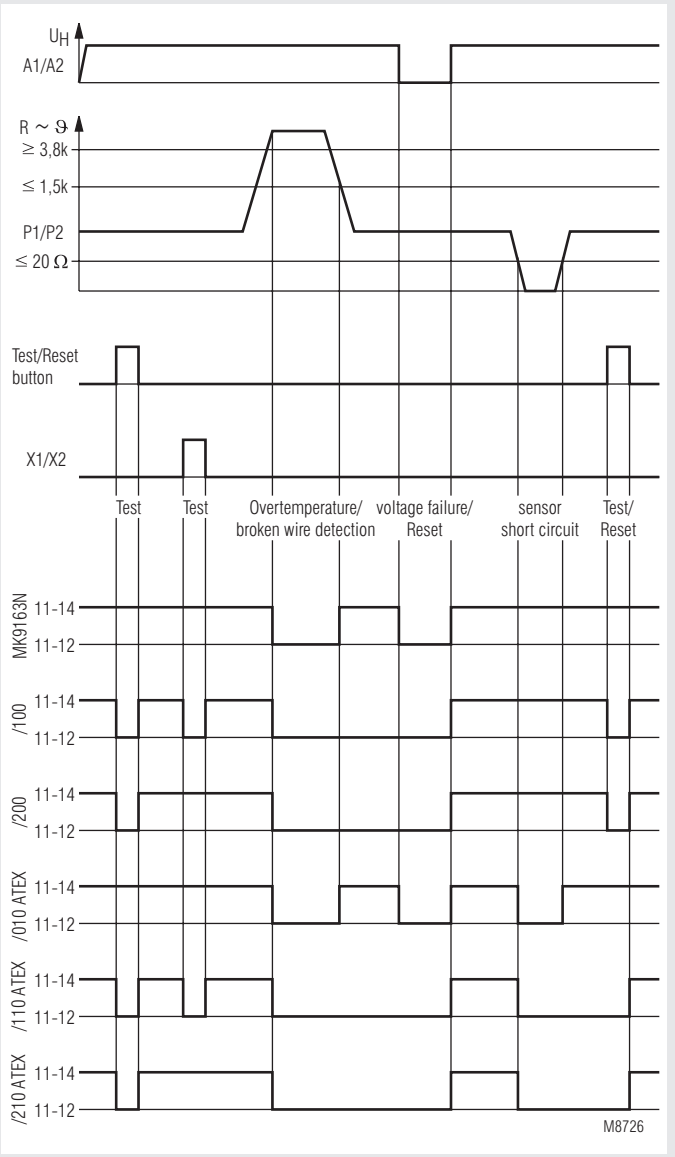
- To protect against thermal overload of motors caused by high switching frequency, havy duty starting, phase failure on one phase, bad cooling, high ambient temperature
- Temperature monitoring of bearings, transmissions, oil and cooling liquids.

Devices with ATEX-approval:
To monitor the temperatur of explosion proof motors with protection degree "increased safety" EX "e" DIN EN 60079-7 and pressure proof enclosure EX "d" DIN EN 60079-1. The thermistor motor protection relay protects normal and explosion proof motors against overheating caused by overload according to DIN EN 60079-14 and DIN EN 60079-0, DIN EN 60079-31 (dust ex).

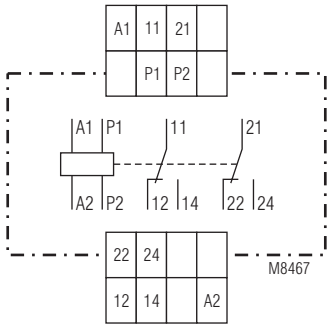
Function

If one of the sensors in the measuring circuit reaches the response temperature (or broken wire is detected), the device indicates failure. This failure is stored in the device with manual reset, even if the temperature goes back to normal. The unit can be reset by pressing the Test/Reset button, by bridging X1/X2 for a short moment or by disconnecting the auxiliary supply for a short time.
Test/Reset button:
Besides the reset function this button provides in normal operation a test facility. The unit indicates fault as long as the button is activated (see also under "Variants").

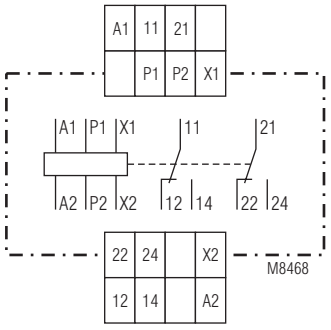
Function Diagram



Circuit Diagrams



MK 9163N.12,
MK 9163N.12/010-ATEX



MK 9163N.12/100, MK 9163N.12/200,
MK 9163N.12/110-ATEX,
MK 9163N.12/210-ATEX

Indicators

green LED:	on, when auxiliary supply connected
red LED:	on, when overtemperature or broken wire, short circuit is detected

Technical Data

Input Circuit

Response value:	3.2 ... 3.8 kΩ
Release value:	1.5 ... 1.8 kΩ
Broken wire detection:	> 3.8 kΩ
Short circuit on measuring circuit:	< 20 Ω
Loading of measuring circuit:	< 5 mW (bei R = 1.5 kΩ)
Measuring voltage:	≤ 2 V (bei R = 1.5 kΩ)

Auxiliary Circuit

Auxiliary voltage U_H:	AC/DC 24 V	
	AC 110, 230, 400 V	50 / 60 Hz
Voltage range:	AC 0.8 ... 1.1 U_H	
at 10 % residual ripple:	DC 0.9 ... 1.25 U_H	
at 48 % residual ripple:	DC 0.8 ... 1.1 U_H	
Nominal consumption:	AC: 1.5 VA	
	DC: 0.85 W	
Nominal frequency:	50 / 60 Hz	
Frequency range:	45 ... 65 Hz	
Max. bridging time on failure of aux. supply:	20 ms	
Operate delay:	< 40 ms	
Release delay:	< 100 ms	

External Remote Reset X1/X2

Function:	External remote reset X1/X2 with NO contact (voltage free)
Remark:	This input is not galvanic separated from measuring input P1/P2

Output

Contacts:

MK 9163N, MK 9163N-ATEX:	2 changeover contacts
Thermal current I_{th}:	5 A

Switching capacity MK 9163N

to AC 15		
NO contacts:	2 A / AC 230 V	IEC/EN 60 947-5-1
NC contacts:	1 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13:	1 A / DC 24 V	IEC/EN 60 947-5-1

Switching capacity MK 9163N-ATEX

to AC 15:	3 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13:	2 A / DC 24 V	IEC/EN 60 947-5-1

Electrical life		
at 4 A, AC 230 V, cosφ = 0.6:	1.5 x 10^6 switching cycles	
Short-circuit strength		
max. line circuit breaker:	C 16 A	DIN EN 60 947-5-1
Mechanical life:	≥ 30 x 10^6 switching cycles	

General Data

Operating mode:	Continous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
rated impuls voltage / pollution degree:	4 kV / 2	IEC/EN 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply		
at AC 230 V:	2 kV	IEC/EN 61 000-4-5
at DC 24 V:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
Interference suppressions:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Technical Data

Housing:	Thermoplastic with V0-behaviour according to UL subject 94
Vibration resistance:	Amplitude 0.2 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6
Climate resistance:	20 / 060 / 04 IEC/EN 60 068-1
Terminal designation:	EN 50 005
Wire connection	DIN 46 228-1/-2/-3/-4
Screw terminals (integrated):	1 x 4 mm² solid or 1 x 2.5 mm² stranded ferruled or 2 x 1.5 mm² stranded ferruled or 2 x 2.5 mm² solid
Insulation of wires or sleeve length:	8 mm
Plug in with screw terminals	
max. cross section for connection:	1 x 2.5 mm² solid or 1 x 2.5 mm² stranded ferruled
Insulation of wires or sleeve length:	8 mm
Plug in with cage clamp terminals	
max. cross section for connection:	1 x 4 mm² solid or 1 x 2.5 mm² stranded ferruled
min. cross section for connection:	0.5 mm²
Insulation of wires or sleeve length:	12 $^{\pm 0.5}$ mm
Wire fixing:	Plus-minus terminal screws M 3.5 box terminals with wire protection or cage clamp terminals
Mounting:	DIN rail IEC/EN 60 715
Weight:	160 g

Dimensions

Width x height x depth	
MK 9163N:	22.5 x 90 x 102 mm
MK 9163N PC:	22.5 x 111 x 102 mm
MK 9163N PS:	22.5 x 104 x 102 mm

Safety Related Data

Values according to EN 61508 / EN 50495:		
SIL:	1	
HFT:	0	
SFF:	35,4	%
PFD_G:	1,4 x 10^{-2}	
DC_{avg}:	0	%
Mode of operation:	low demand mode	
Architecture:	1oo1	
Proof Test:	1 year	
Values according to EN 13849:		
Category:	1	
PL:	c	
$MTTF_d$:	69,0	a
DC_{avg}:	0	%

Standard Type

MK 9163N.12/110-ATEX	AC 230 V 50/60 Hz
Article number:	0056453
• with Test/Reset button	
• Output:	2 changeover contacts
• Nominal voltage U_N:	AC 230 V
• Width:	22.5 mm

Variants

MK 9163N.12 / _ _ _ _ _ _ _ _

- _ _ _ _ ATEX with approval
- _ _ _ 0 free
- _ _ 0 without short circuit detection
- _ _ 1 with short circuit detection (ATEX)
- _ 0 without RESET
- _ 1 with RESET and test function via built in button and X1/X2
- _ 2 with RESET and test function via built in button, at X1/X2 RESET function only

Available variants
MK 9163N.12
MK 9163N.12/100
MK 9163N.12/200
MK 9163N.12/010 ATEX
MK 9163N.12/110 ATEX
MK 9163N.12/210 ATEX

Ordering example for variants

MK 9163N .12 _ _ / _ _ _ ATEX AC/DC 230 V 50/60 Hz

- 50/60 Hz Nominal frequency
- AC/DC 230 V Nominal voltage
- ATEX Variant, if required
- _ _ / _ _ _ Type of terminals
  without indication:
  terminal blocks fixed, with screw terminals
  PC (plug in cage clamp):
  pluggable terminal blocks with cage clamp terminals
  PS (plug in screw):
  pluggable terminal blocks with screw terminals
- .12 Contacts
- MK 9163N Type

Manufacturing Data

Each unit is marked with the manufacturing date e.g. "Bj. KW 49/02". The unit had been produced in week 49 – 2002.

Additional Remarks and Safety Instructions

Use on motors in explosion hazardous areas
Thermal protection on motors that are equipped with PTC sensors according to DIN 44 081 or DIN 44 082 or DIN EN 60034-11 type A (DIN EN 60947-8). When used on motors of protection degree EEX "e" EEX "d" only the sonsor wire leads through the Ex-area. The motor proteciton relay has to be mounted outside the Ex-area, but monitors devices operated in the Ex-area.

Safety integrity level SIL 1
To fulfil SIL 1 a cyclic function test of the protection device has to be provided. This can be done manually during manintenance (see below).

The function test must be carried out at least once a year.

Test facilities for set-up and manintenance
A test of the unit can be made by simulating the resistance oon the sonsor input. During maintenance these tests can also be made.

- Test of short circuit detection: Bridge sensor input (this test is possible without disconnection of the sensor).
- Test of broken wire detection: Disconnect sensor wire.
- Test of overtemperature function: Change restistance on input from low 50 ... 1500 Ω to 4 kΩ.

The RESET button can also be used for test purpose (see Function Diagram)

Installation
The DC 24 V version has no galvianic separation between auxiliary supply (A1, A2) and the sensor circuit (P_1, P_2). These units are only allowed to be connected to transformers according to DIN EN 61 558 or to battery supply.

Wiring
The sensor and control wires have to be installed separately from the motor wires. When strong inductive or capacitve influence is expected from parallel installed high courrent wires, screened wire should be used.

Wire length
The max. wire length of the sensor circuit is:

Diameter (mm^2):	4	2.5	1.5	0.5
max. wire length (m):	2 x 550	2 x 250	2 x 150	2 x 50

Safety remarks

- Installation, test as well as exchange of the unit have to be made by persons qualified according the relevant safety standard for the application.
- The safety standards for motors EEX "e" and EEX "d" areas have to be observed (Directive 94/9/EG and DIN EN 0 079-14).
- The response of the motor protection relay must lead to disconnection also when the motor is controlled by an inverter, if necessary by extra circuits. In this case the sensing wires have to be wired se- parately. The use of wires of the motor xupply or other manins circuit wires is not permitted.
- If units are used without no-voltage safe reset function, the restart of the motor before the failure is removed, must be disabled by extra measures if it could lead to a dangerous situation.
- The unit must only be opende by the manufacturer.
- The unit must only be exchanged against equivalent devices properly marked according to the relevant standards.
- The permitted ambient conditions must be observed.
- Units that show obvious transport damage must not be used in safety relevant applications.

Application Example