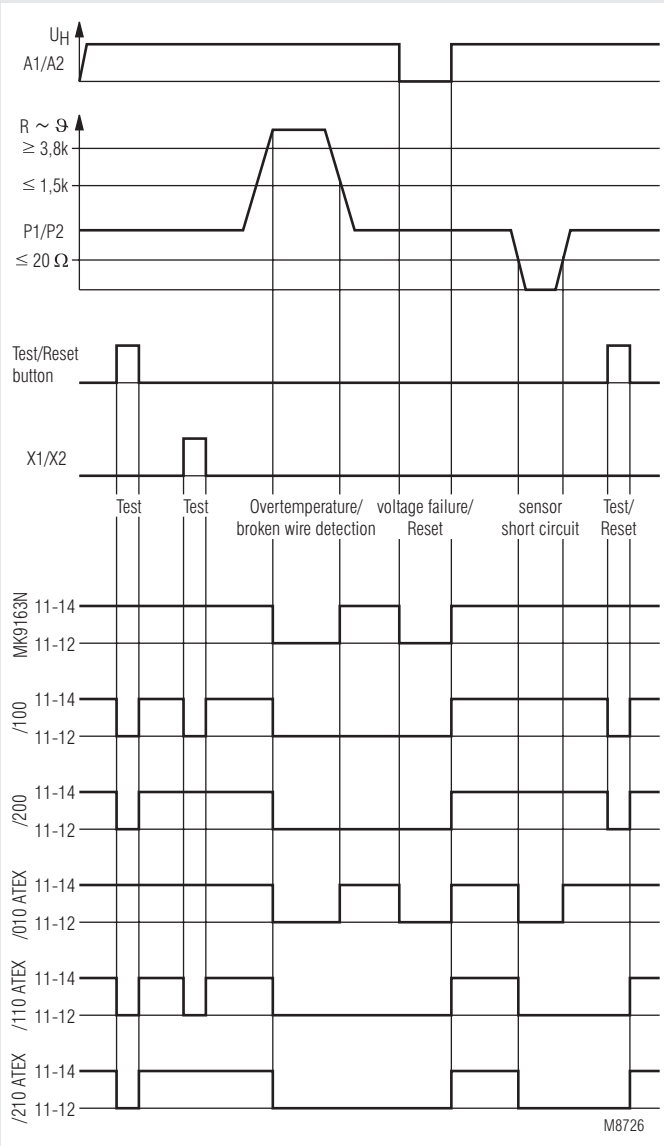
VARIMETER EX
Thermistor Motor Protection Relay
MK 9163N, MK 9163N-ATEX

0245068



MK 9163N

Function Diagram



Your advantages
- Reliable temperature monitoring of motors
- 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 Markings

A025518

[1] For devices with ATEX-approval Directive 94/9/EG
EU-Test certificate no.
03 ATEX 3117 II (2) G [Ex e] [Ex d] [Ex px] [Ex n]
II (2) D [Ex tb] [Ex tc]

[2] Approval not for all variants; on request

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.

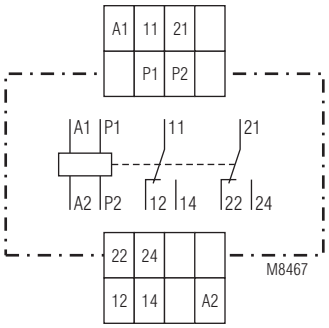
Devices with ATEX-approval:
Temperature monitoring of explosion protected Motors by „extended safety“ EX e DIN EN 60079-7, „pressure proof enclosure“ EX d DIN EN 60079-1 or „overpressure enclosure“ Ex px in gas containing atmosphere as well as „protection by enclosures“ Ex t DIN EN 60079-31 in dust containing atmosphere. The thermistor Motor protection relay protects Standard and Explosion proof Motor against overheating due to overload accoding to DIN EN 60079-14 and DIN EN 60079-0.

Function

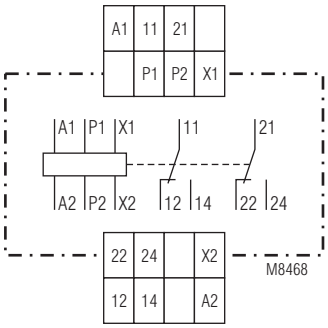
If one of the sensors in the measuring circuit reaches the response temperature (or broken wire is detected), the device indicates failure. This failure is stored in the device with manual reset, even if the temperature goes back to normal. The unit can be reset by pressing the Test/Reset button, by 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").

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.

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	

Technical Data

General Data

Operating mode:	Continous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
rated impulse 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
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	
Fixing torque:	max. 0.8 Nm	
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

Technical Data

Safety Related Data

Values according to EN 61508 / EN 50495

SIL:	1 (Typ B)	
T_1 (Proof Test Intervall):	2	a
HFT:	0	
SFF:	36,6	%
PFD_G:	7,83 x 10^{-3}	
λ_{du} [FIT]:	894	
λ_{dd} [FIT]:	0	
λ_{su} [FIT]:	516	
λ_{sd} [FIT]:	0	
Mode of operation:	low demand mode	
Architecture:	1001	

Values according to EN 13849:

Category:	1	
PL:	c	
MTBF:	81	a
$MTTF_d$:	63,8	a
DC_{avg}:	0	%

The a.m. data for functional safety is valid for an ambient temperature of 40°C respecting also selfheating.
Data for other ambient temperatures are available on request.

Ordering example for variants

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

- Nominal frequency
- Nominal voltage
- 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
- Contacts
- Type

CCC-Data

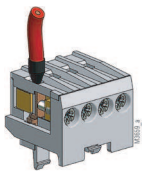
Thermal current I_{th}: 4 A

Switching capacity

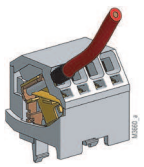
to AC 15:	1,5 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13:	1 A / DC 24 V	IEC/EN 60 947-5-1

Technical data that is not stated in the CCC-Data, can be found in the technical data section.

Options with Pluggable Terminal Blocks



Screw terminal
(PS/plugin screw)



Cage clamp terminal
(PC/plugin cage clamp)

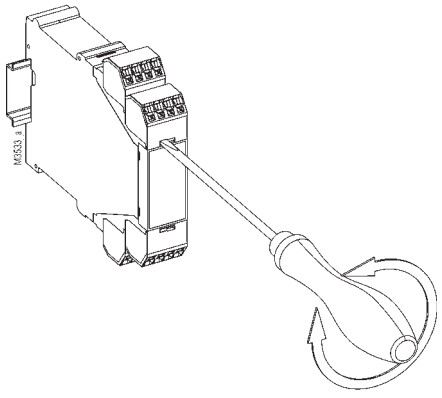
Standard Type

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	

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.



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

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 EX and EX 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 all 2 years.

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 instructions

- Installation, test and replacement may only be carried out by qualified specialist staff and the applicable safety rules must be observed. The data for functional safety in explosion hazardous areas have to be respected.
- Details of the motor supplier and the details about the explosion protection from the EC-type examination certificates for explosion proof motors have to be respected.
- For the test and the maintenance of motor protection devices for explosion proof machines, the EN 60079-17 and the safety rules that result from the motor application and the corresponding type of protection have to be respected (EC ATEX Directive 94/9/EC and DIN EN 60079-14).
- The motor protection relay has to switch off the motor immediately also when it is controlled by an inverter. The control circuit must allow this. In this case the sensor wires must be lead separately. The use of wires inside the motor connection cable is not allowed.
- If variants are used that have no no-voltage safe reset function additional measures have to be applied in order to disable safely the restart of the motor until the fault is removed if this leads to a dangerous situation.
- The relay must only be opened by the manufacturer.
- The relay must only be replaced by equivalent devices marked according to the relevant safety rules.
- The permitted ambient conditions must be observed.
- Devices that show obvious transportation damage must not be used in safety relevant applications.

Application Example

