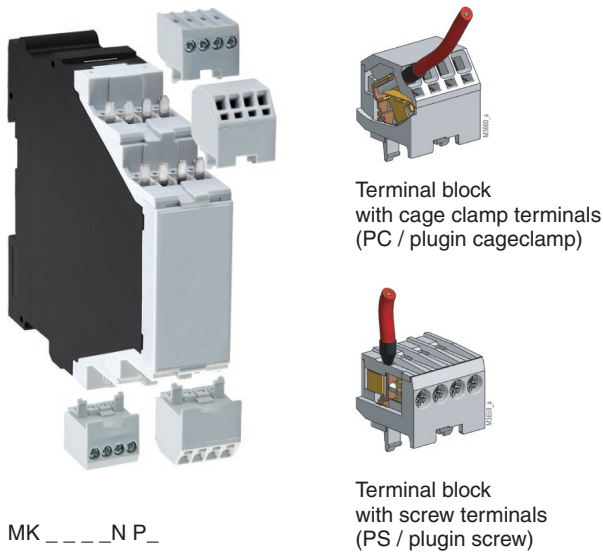




- According to DIN EN 60 947-8, DIN EN 60 079-14
- Monitoring of
  - overtemperature
  - broken wire detection in sensor circuit
  - short circuit detection in sensor circuit
- 1 input for 1 to 6 PTC-resistors
- De-energized on trip
- LED-indicator for
  - auxiliary supply
  - state of contact
- Output 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 mm<sup>2</sup> stranded ferruled, or 2 x 2.5 mm<sup>2</sup> 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

### Options with pluggable terminal blocks



### Approvals and marking



<sup>1)</sup> For devices with ATEX-approval  
Directive 94/9/EG  
EU-Test certificate no. 03 ATEX 3117



<sup>2)</sup> Ex II (2) GD  
<sup>2)</sup> for MK 9163N.12/61

### Application

To protect against thermal overload of motors caused by high switching frequency, heavy starting, phase failure on one phase, bad cooling, high ambient temperature.

#### Devices with ATEX-approval:

To monitor the temperature of explosion proof motors with protection degree "increased safety" EX "e" DIN EN 60079-7 VDE 0170-6 and pressure proof enclosure EX "d" DIN EN 50018 VDE 0170/0171. The thermistor motor protection relay protects normal and explosion proof motors against overheating caused by overload according to DIN EN 60079-14 VDE 0165-1 and DIN EN 61241-0, DIN EN 61241-1 (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").

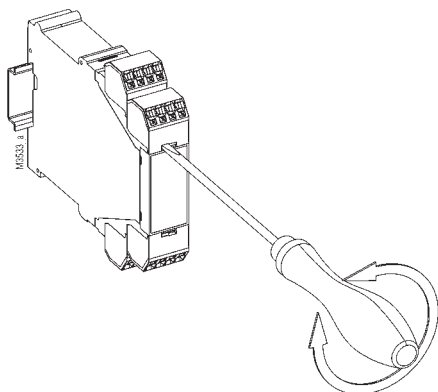
### Indicators

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

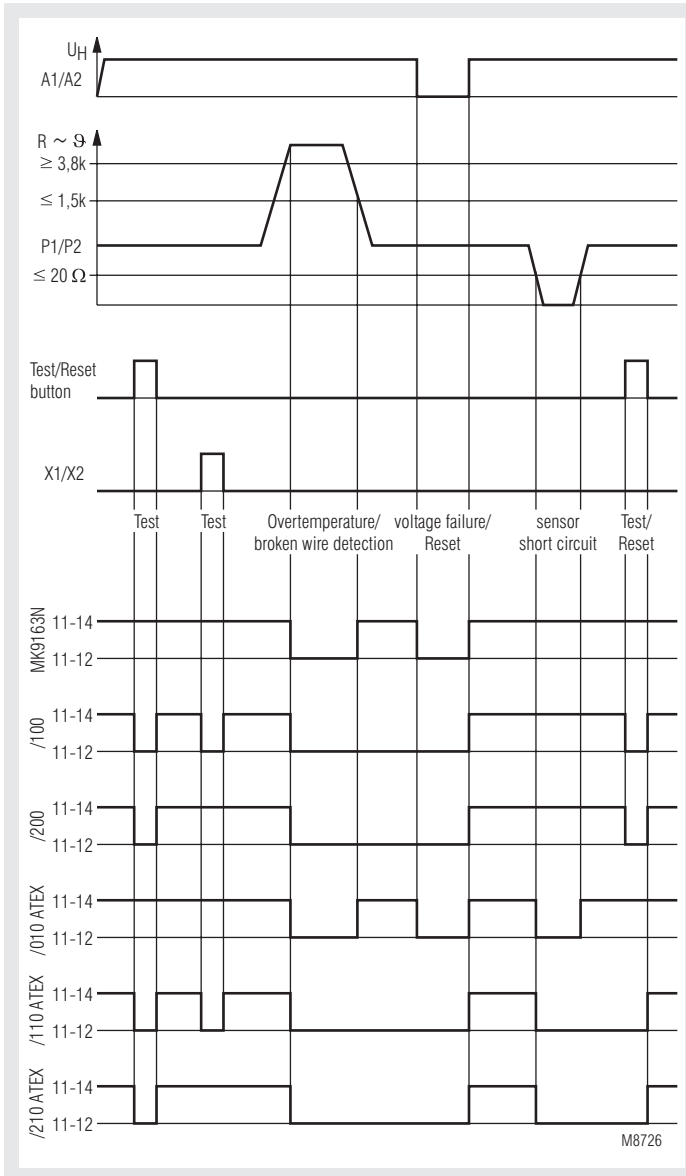
### Notes

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.

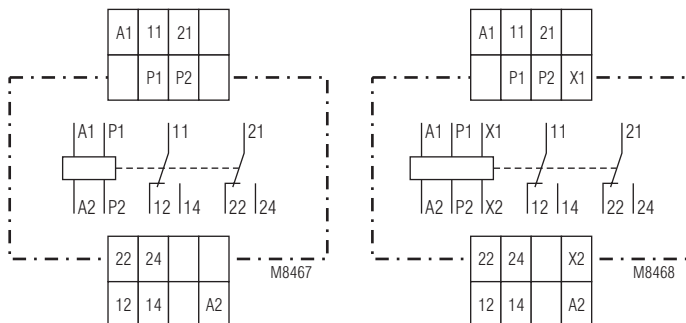


## Function diagramm



M8726

## Circuit diagram



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

## Technical Data

### Input circuit

<b>Response value:</b>	3.2 ... 3.8 k $\Omega$
<b>Release value:</b>	1.5 ... 1.8 k $\Omega$
<b>Broken wire detection:</b>	> 3.8 k $\Omega$
<b>Short circuit on measuring circuit:</b>	< 20 $\Omega$
<b>Loading of measuring circuit:</b>	< 5 mW (bei R = 1.5 k $\Omega$ )
<b>Measuring voltage:</b>	$\leq$ 2 V (bei R = 1.5 k $\Omega$ )

### Auxiliary circuit

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

### External remote reset X1/X2

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

### Output

<b>Contacts:</b>	MK9163N, MK9163N-ATEX: 2 changeover contacts
<b>Thermal current <math>I_{th}</math>:</b>	5 A
<b>Switching capacity</b>	
to AC 15:	3 A / AC 230 V DIN EN 60 947-5-1
to DC 13:	2 A / DC 24 V DIN EN 60 947-5-1
<b>Electrical life</b>	
at 4 A, AC 230 V, $\cos\phi = 0.6$ :	1.5 x 10 <sup>6</sup> switching cycles
<b>Short-circuit strength</b>	
max. line circuit breaker:	C 16 A DIN EN 60 947-5-1
<b>Mechanical life:</b>	$\geq$ 30 x 10 <sup>6</sup> switching cycles

### General Data

<b>Operating mode:</b>	Continuous operation
<b>Temperature range:</b>	- 20 ... + 60°C
<b>Clearance and creepage distances</b>	
rated impuls voltage / pollution degree:	4 kV / 2 DIN EN 60 664-1
<b>EMC</b>	
Electrostatic discharge:	8 kV (air) DIN EN 61 000-4-2
HF-irradiation:	10 V / m DIN EN 61 000-4-3
Fast transients:	4 kV DIN EN 61 000-4-4
Surge voltages between wires for power supply	
at AC 230 V:	2 kV DIN EN 61 000-4-5
at DC 24 V:	1 kV DIN EN 61 000-4-5
between wire and ground:	4 kV DIN EN 61 000-4-5
Interference suppressions:	Limit value class B DIN EN 55 011
<b>Degree of protection</b>	
Housing:	IP 40 DIN EN 60 529
Terminals:	IP 20 DIN EN 60 529
<b>Housing:</b>	Thermoplastic with V0-behaviour according to UL subject 94
<b>Vibration resistance:</b>	Amplitude 0.2 mm, frequency 10 ... 55 Hz, DIN EN 60 068-2-6
<b>Climate resistance:</b>	20 / 060 / 04 DIN EN 60 068-1
<b>Terminal designation:</b>	DIN EN 50 005

## Technical Data

<b>Wire connection</b>	DIN 46 228-1/-2/-3/-4	
<b>Screw terminals (integrated):</b>	1 x 4 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled or 2 x 1.5 mm <sup>2</sup> stranded ferruled or 2 x 2.5 mm <sup>2</sup> solid	
Insulation of wires or sleeve length:	8 mm	
<b>Plugin with screw terminals</b>		
max. cross section for connection:	1 x 2.5 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled	
Insulation of wires or sleeve length:	8 mm	
<b>Plugin with cage clamp terminals</b>		
max. cross section for connection:	1 x 4 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled	
min. cross section for connection:	0.5 mm <sup>2</sup>	
Insulation of wires or sleeve length:	12 <sup>+0.5</sup> mm	
<b>Wire fixing:</b>	Plus-minus terminal screws M 3.5 box terminals with wire protection or cage clamp terminals	
<b>Mounting:</b>	DIN rail	IEC/EN 60 715
<b>Weight:</b>	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

## 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 <sub>N</sub> :	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	PS /	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 (plugin cage clamp):
					plugable terminal blocks
					with cage clamp
					terminals
					PS (plugin screw):
					plugable terminal blocks
					with screw terminals
					Contacts
					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 VDE 0660-303, DIN EN 60947-8). When used on motors of protection degree EEX "e" EEX "d" only the sensor wire leads through the Ex-area. The motor protection relay has to be mounted outside the Ex-area, but monitors devices operated in the Ex-area.

### Required classification according to DIN V 19 250: AK 3

### Category according to DIN EN ISO 13849-1: 2

To fulfil the category 2 a cyclic function test of the protection device has to be provided. This can be done manually during maintenance (see below).

### Test facilities for set-up and maintenance

A test of the unit can be made by simulating the resistance on the sensor 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 resistance on input from low 50 ... 1500  $\Omega$  to 4 k $\Omega$ .

The RESET button can also be used for test purpose (see function diagram)

### Installation

The DC 24 V version has no galvanic separation between auxiliary supply (A1, A2) and the sensor circuit (P<sub>1</sub>, P<sub>2</sub>). 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 capacitive influence is expected from parallel installed high current wires, screened wire should be used.

### Wire length

The max. wire length of the sensor circuit is:

Diameter (mm <sup>2</sup> ):	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 separately. The use of wires of the motor supply or other mains 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 opened 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

