

Operating Manual MS220Vi and MSR220Vi

updated: 2019-02-28 Su

- PTC Thermistor Relay
- TMP tripping device with circuit for temperature sensors in ignition protection type "i"



marking see type plate - EC-type-examination certificate PTB 07 ATEX 2055

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1 Display and control elements

MS220Vi

without electronic reclosing lock
Alarm (red) ON (green)



MSR220Vi

with electronic reclosing lock (disconnectible)
Alarm (red) ON (green) build in key „reset“ (blue)



2 Pre-Adjustment

No settings are necessary on the devices. The tripping temperature is determined solely by the response temperature of the connected PTC thermistors.

Depending on the number of PTC thermistors the following tripping temperatures and reset temperatures arise related to TNF (detector operating temperature):

	Tripping temperature	Reset temperature
1 PTC thermistor	TNF + 15 K	TNF + 5 K
3 PTC thermistors in series	TNF + 5 K	TNF – 5 K
6 PTC thermistors in series	TNF	TNF – 20 K

3 Application and brief description

Ziehl PTC thermistor relays protect motors, transformers, machines and equipment against thermal overload. Used in conjunction with respective PTC thermistors they provide a reliable temperature protection in the temperature range 60 °C up to 180 °C.

ZIEHL PTC thermistor relays are conform to EN 60947-8. PTC-thermistors according DIN 44081 and DIN 44082 shall be connected. PTC thermistors are suitable for the installation into windings of electrical machines, bearings and transformers as well as to monitor the temperature of coolant, airflow and gases.

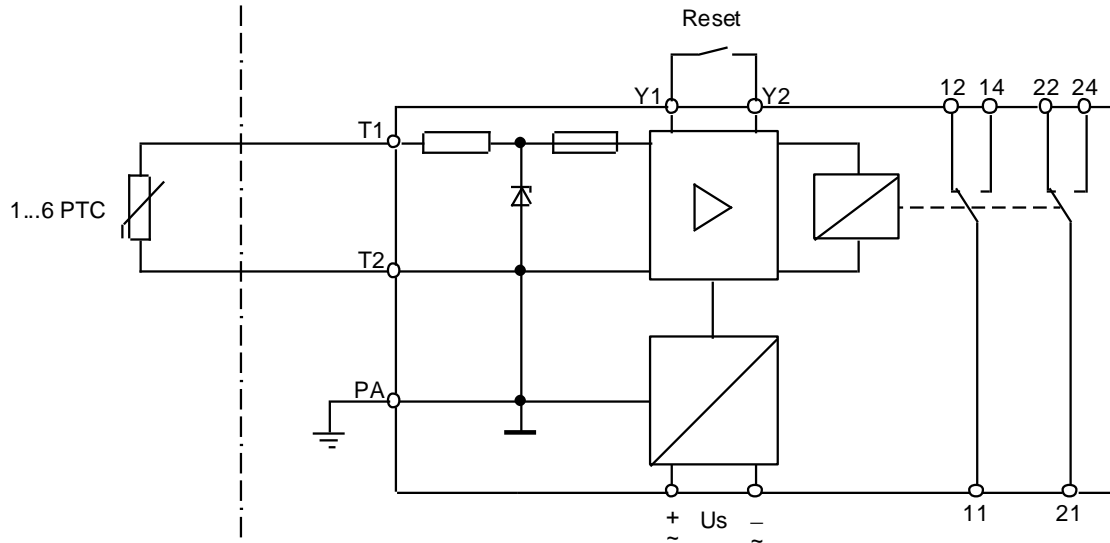
II (1) G [Ex ia Ga] IIC
II (1) D [Ex ia Da] IIIC

TMP tripping devices MS 220 Vi und MSR 220 Vi are build as associated electrical equipment with type of protection intrinsic safety "i". All functions in the TMP tripping device serve to protect non-explosive-protected equipment and explosive-protected equipment in regular operation and in case of failure. The devices monitor electrical apparatus for explosive gas atmospheres (Zone 0, 1 und 2) and electrical apparatus for use in the presence of combustible dust (Zone 20, 21 and 22). Installation only in safe area.

To limit the maximum surface temperatures, TMP tripping relay must be installed according to the requirements and documentation. The power supply must be switched off either directly or indirectly. Reset should admissible by hand only.

Hazardous area

Safe area



4 Summary of features

- 1 thermistor circuit for 1...6 PTC thermistors
- Short-circuit detection within the thermistor circuit
- Output relay with 2 change-over contacts (co)
- Operating status display with LED

A current monitors continuously the resistance of the sensors. In cold state, the resistance is $<250 \Omega$ per sensor (sensor circuit $< 1.5 \text{ k}\Omega$). The relay has picked up and contacts 11/14 and 21/24 are closed. The resistance of the sensor rises rapidly at nominal response temperature NRT. The relay releases at a resistance of $3...4 \text{ k}\Omega$ and contacts 11/12 and 21/22 close. The devices also switch off in the case of sensor or line short-circuit ($< \text{approx. } 20\Omega$) or sensor or line interruption. MS types switch on automatically when the temperature has decreased approx. $5 \text{ }^\circ\text{C}$. MSR types with electronic reclosing lock store shutdown and require a RESET (push built-in button or external with terminals Y1/Y2 closed or by return of supply voltage). Storage is not non-volatile. With terminals Y1/Y2 bridged, the electronic reclosing lock is deactivated. Then the devices work like type MS.

5 Connection plan

Ex = area of potentially explosive atmosphere

PTC = Thermistor sensor

Us = supply voltage

S1 = external Reset

S2 = pushbutton OFF

S3 = pushbutton ON

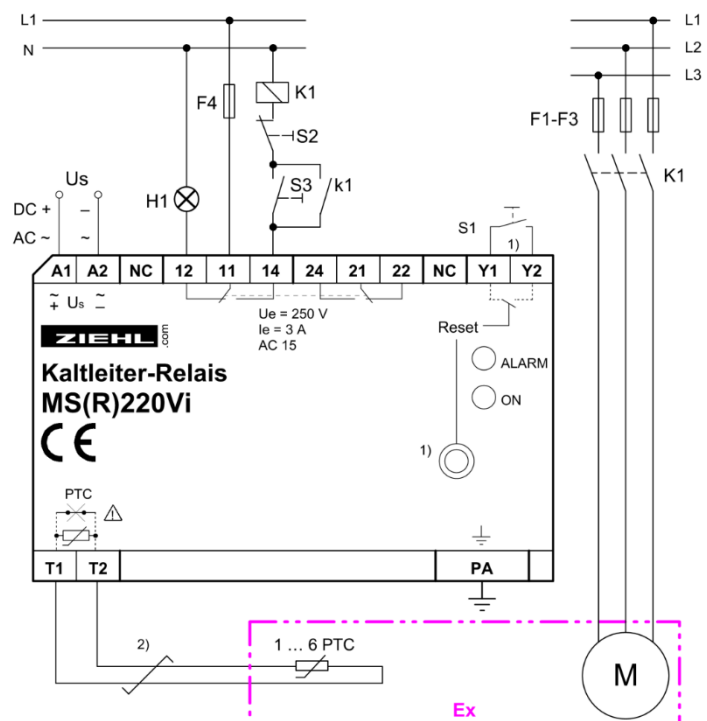
H1 = trip alarm

F1-F4 = fuses

K1 = contactor

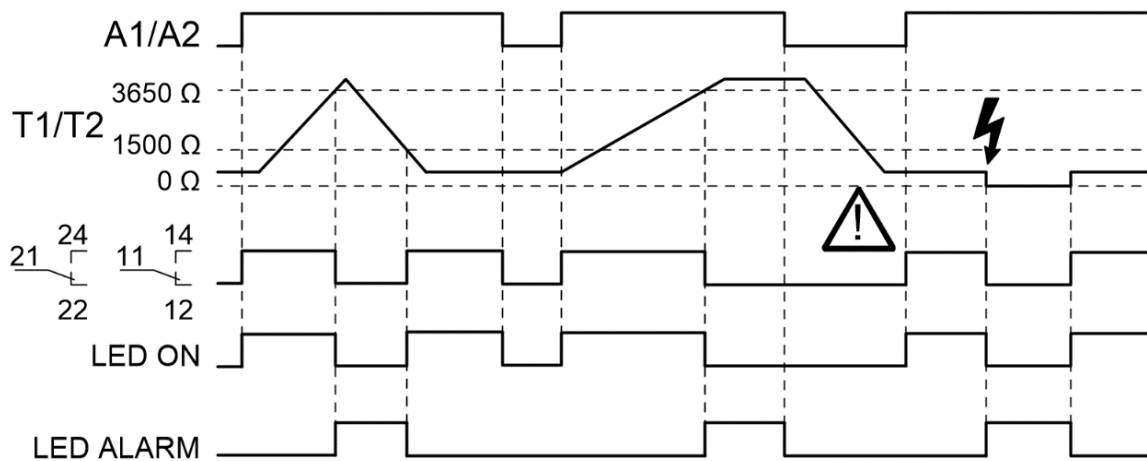
1) only MSR

2) twisted lines

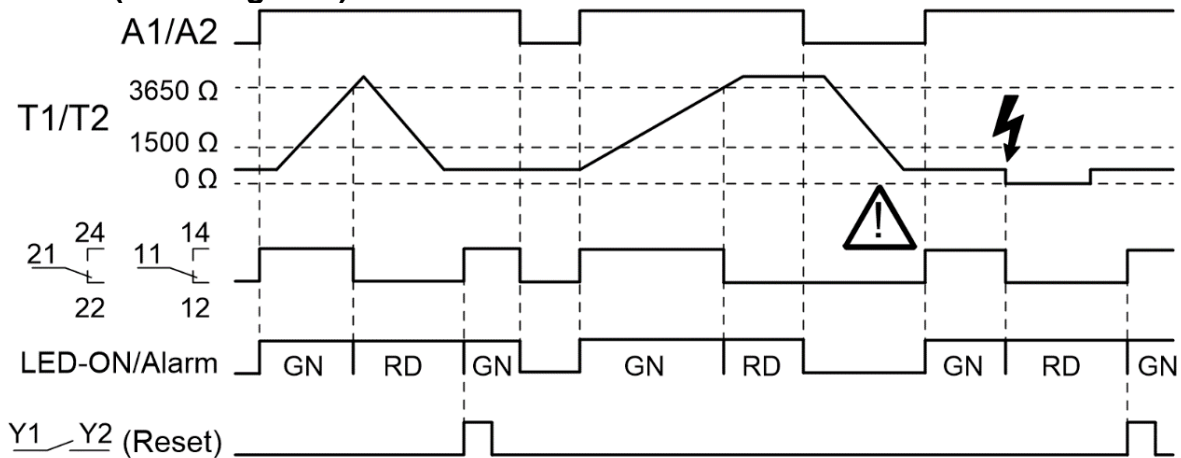


6 Functional diagram

MS 220 Vi (automatic reset)



MSR 220 Vi (reclosing lock)



Caution! The released relay switches on automatically after a voltage dip.

7 Important notes!



Attention!
Observe safety rules and standards. Notice safety remarks!



DANGER!
Hazardous voltage!
Will cause death or serious injury. Turn off and lock out all power supplying this device before working on this device!

8 Installation

- The applicant must observe safety rules and standards. Notice safety remarks!
- The device can be mounted on 35 mm rail according EN 60715 or with screws M4 (Option)
- Housing design V4; wide 70 mm (4 TE)
- The devices must be installed in a closed switchgear cabinet or in an enclosure of international protection class IP 5x according EN 60529 or better.
- Terminals with screw mounting M3 maximum tightening torque 0,5 Nm

When installing the device into the switchgear cabinet, please observe the max. admissible temperature. Care for both, sufficient clearance to other devices or sources of heat or enough forced draught. If cooling is made more difficult, e.g. close devices with increased surface temperature or by handicap of airflow cooling, the permissible ambient temperature has to be reduced.

9 Commissioning



Attention!
Before switching on make sure that the operational voltage U_s of the type plate and the mains voltage are the same!



Attention!
Tripping devices with combined supply voltage DC/AC 24 V have no potential separation and are only permitted with power supplies that comply with the requirements of EN 61558 / DIN VDE 0551 (safety transformer or battery power) and when protected wiring is used.



Attention!
Supply voltage AC 24 V must not be grounded to earth (PA).

After the supply voltage is switched on and when the thermistors are correctly connected the green LED must light-up and the relay contacts 11,14 and 21,24 close.

The correct function of the tripping device must be checked by resistance simulation at terminals T1 and T2. This check is also performed after changes to the installation.

10 Operating instructions

MSR220Vi devices have an built-in reset button and can be manually reseted after a fault signal (Red = alarm). Alternately, also an external button (remote reset terminal Y1, Y2) can be used.

11 Trouble shooting and remedies

Relay does not pick up. Please check

- The supply voltage U_s at terminals A1-A2 (green LED lights up).
- The PTCs at terminals T1-T2. In the case of disturbance the red LED lights up.
- The resistance of a PTC circuit must be at $0 \Omega < R < 1500 \Omega$. The terminal voltage T1-T2 is to be measured $< 2.5 \text{ V}$ with connected PTC.
- MSR type: please push the key button "Reset". The relay can pick up at resistance $R < 1.65 \text{ k}\Omega$ and the light changes from red to green. Alternatively reset can be done with closing an external contact at terminals Y1-Y2 or with voltage recovery.

Relay does not release. Please check

- With no PTC sensor connected the PTC Trip Relay must release. The voltage at terminals T1-T2 must be approx. 8 V.

In case of any other malfunctions, replace the device. Please add a description of the occurred malfunction when sending back for repair.

12 Technical Data

Intrinsic safety circuit (T1, T2)

Voltage U_0	8,61 V												
Current I_0	61,7 mA												
Power P_0	0,133 W												
max. permissible values	<table border="1"> <tr> <td>Co/Lo</td> <td></td> <td>IIC</td> <td></td> </tr> <tr> <td>Co...(μF)</td> <td>1,0</td> <td>1,3</td> <td>1,5</td> </tr> <tr> <td>Lo...(mH)</td> <td>2,0</td> <td>1,0</td> <td>0,5</td> </tr> </table>	Co/Lo		IIC		Co...(μF)	1,0	1,3	1,5	Lo...(mH)	2,0	1,0	0,5
Co/Lo		IIC											
Co...(μF)	1,0	1,3	1,5										
Lo...(mH)	2,0	1,0	0,5										
max. ratio L_0 / R_0	198 μH/Ω												
Rated Voltage U_m	250 V												

Power supply (A1, A2)

Rated supply voltage U_s : (see type plate)	AC 110-120 V, AC 220-240 V AC / DC 24 V (without potential separation)
Rated Voltage U_m	250 V
Tolerance Voltage	AC 0,9 U_s ... 1,1 U_s DC 21 ... 30 V
Rated frequency	50 / 60 Hz
Tolerance frequency	45 Hz ... 65 Hz
Rated power consumption	< 2 VA or < 2 W
On-period	100 %
Voltage dip buffer time	max. 20 ms

PTC thermistor input (T1, T2)

	acc. DIN 44081 / DIN 44082
Number	1...6 thermistors in series
Rated response temperature TFS	60 °C ... 180 °C
Response tolerance TFS	±6 °C
Collective resistance cold thermistor	≤ 1,65 kΩ
Terminal voltage	≤ 2,5 V at $R \leq 3,65 \text{ k}\Omega$, ≤ 2 V at $R \leq 1,65 \text{ k}\Omega$ ≤ 8,61 V at $R = \infty$
Terminal current	≤ 1 mA
Power consumption	≤ 2 mW
Line capacity max.	0,2 μF
Temperature monitor cut-out-point	3,3 kΩ ... 3,65 kΩ ... 3,85 kΩ
Temperature monitor reclosing point	1,7 kΩ ... 1,8 kΩ ... 1,95 kΩ
Short circuit monitor cut-out-point	≤ 20 Ω
Short circuit monitor reclosing point	≤ 40 Ω

Reset-Input (Y1, Y2)

	Potential free contact (no)
Current	1 mA
Voltage	< 30 Vdc

Relay output (11,12,14)

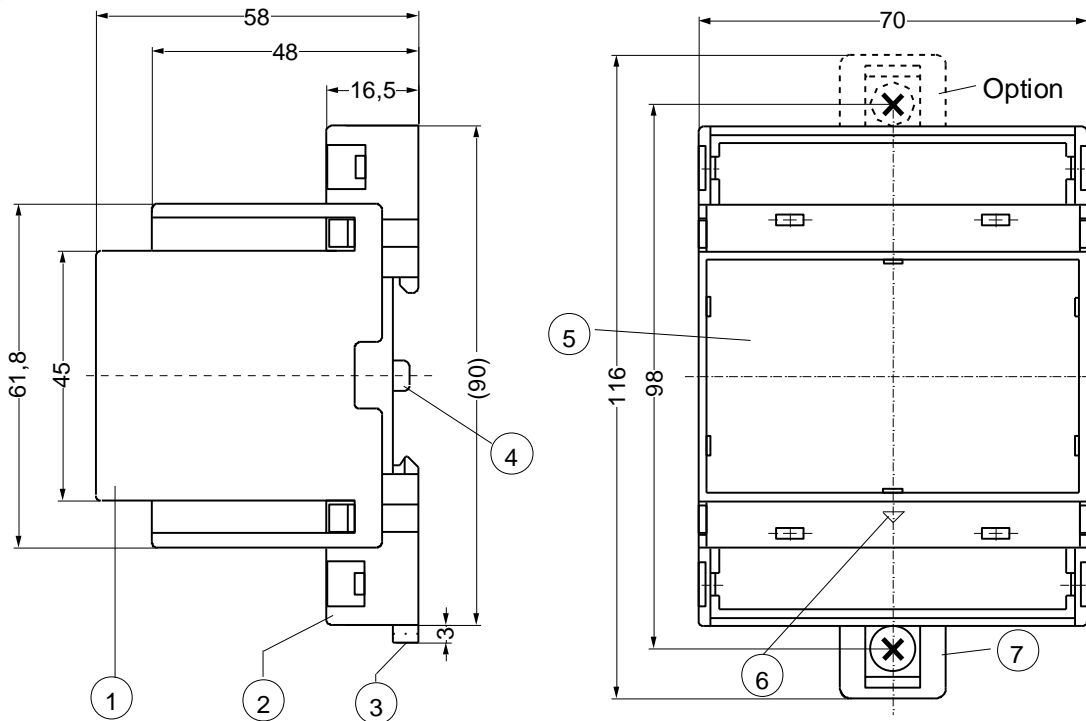
	EN 60947-5-1
Contacts	2 change-over contact (co)
Rated operational voltage U_e	250 V
Switching voltage/ Switching current	Max. AC 250 V / 5A Min. 12 V / 10 mA
Switching power max. (ohm resistive load)	120 W at DC 24 V
Rated operational current (I_e)	AC15 $I_e = 3 \text{ A}$ 1250 VA DC13 $I_e = 2 \text{ A}$ $U_e = 250 \text{ V}$ $U_e = 24 \text{ V}$
Recommended fuse	4 A (gG)
Mechanical contact life	3×10^7 operations
Electrical contact life	1×10^5 operations

Electrical safety – test conditions		IEC/EN 60947-1
Rated insulation voltage Ui		250 V
Rated impulse voltage		4000 V
Overvoltage category		III
Contamination level		2
Transformer		EN 61558-2-6
Proof Test Voltage		2500 Vac 50 Hz
Installation conditions		
Fitting position		any
Rated operational temperature		-20 °C ... +60 °C
Storage/ambient temperature		-40 °C...+70 °C (1K3 EN 60721-3-1)
Altitude		≤ 2000 m above N.N.
Climatic conditions		5-85% rel. F., no condensation (3K3 EN 60721-3-3)
Vibration resistance EN 60068-2-6		2...25 Hz ±1,6 mm 25 ... 150 Hz 5g
EMC - Immunity		EN 61000-6-2
EMC - Emission		EN 61000-6-3
Housing		Design V4 (distribution box)
Dimensions (H x B x T)		90 x 70 x 58 mm
Wide		4 TE
Plastic material		PA66
Fire protection class		UL 94 V-2
Protection class housing EN 60529		IP 30
Mounting EN 60715		Standard rail 35 mm
Optional: Screw mounting		M4, only with additional bar (not included)
Weight		approx. 180 g
Connection terminals		Screw mounting M3
Protection class EN 60529		IP 20
Torque		0.5 Nm (3.6 lb.in)
Line connection solid wire		1 x 0,50 ... 2,5 mm ² (AWG 22 - 12)
Stranded wire with insulated ferrules		1 x 0,34 ... 1,5 mm ² (AWG 24 - 14)
Insulation strip length min.		8 mm
Anschlussklemmen T1, T2		Federklemme (CageClamp)
Protection class EN 60529		IP 20
Line connection solid wire		1 x 0,14 ... 2,5 mm ² (AWG 26 - 12)
Stranded wire with insulated ferrules		1 x 0,25 ... 1,5 mm ² (AWG 24 - 14)
Insulation strip length min.		6 mm
Anschlussklemme PA		Schraubklemme M3,5
Protection class EN 60529		IP 00
Line connection solid wire		1 x 1,5 ... 4,0 mm ² (AWG 14 - 10)
Stranded wire with insulated ferrules		1 x 1,5 ... 4,0 mm ² (AWG 14 - 10)
Insulation strip length min.		6 mm

Subject to technical modifications

13 Dimensions - Design V4

Dimensions in mm



- 1 Oberteil / cover
- 2 Unterteil / base
- 3 Riegel / bar for snap mounting
- 4 Plombenlasche / latch for sealing
- 5 Frontplatteneinsatz / front panel
- 6 Kennzeichen für unten / position downward
- 7 Riegel bei Wandbefestigung mit Schrauben. Riegelbohrung \varnothing 4,2 mm / for fixing to wall with screws, \varnothing 4.2 mm.

14 Safety Instructions and references for putting into operation



please read carefully!

14.1 Special remarks for explosive gas atmospheres areas Zone 0, Zone 1 and Zone 2.

The increased danger within hazardous areas requires the careful attention of the safety instructions and references for putting into operation. Observe the national safety rules and regulations for prevention of accidents as well as the European Standards EN 60079-14. Installation, electrical connection and commissioning to be carried out by trained service personnel only. Inappropriate behavior can cause heavy personal damage and damages to property.

The relay may be installed only outside potentially explosive atmospheres. Within potentially explosive atmospheres the equipment is to be provided with a pressurized enclosure according to EN 60079-2.

14.2 Special remarks for use in the presence of combustible dust Zone 20, Zone 21 and Zone 22.

The increased danger within hazardous areas of combustible dust requires the careful attention of the safety instructions and references for putting into operation. Observe the national safety rules and regulations for prevention of accidents as well as the European Standards EN 60079-14. Installation, electrical connection and commissioning to be carried out by qualified service personnel only. Inappropriate behavior can cause heavy personal damage and damages to property. The relay may be installed only outside potentially explosive atmospheres. Within potentially explosive atmospheres the equipment is to be provided with a dust proofed enclosure according to EN 60529.

14.3 Wiring

The lines of the sensor circuit are to be routed as separate control lines. The use of lines of the supply cable or other mainstream lines is not permissible. If extreme inductive or capacitive stray effects are to be expected by parallel cables of the power installation, shielded control lines should be used. Recommendations for intrinsic safety protection should be observed.

For devices type MSR the terminals Y1, Y2 may be attached parallel to a common resetting mechanism. Sensor lines may not be connected together.

The line resistance within the sensor circuit may not exceed a value of 20 Ω .

Maximum of permissible length for sensor circuit lines:

Wire cross section	Wire length
2,5 mm ²	2 x 500 m
1,5 mm ²	2 x 400 m
1,0 mm ²	2 x 250 m
0,75 mm ²	2 x 150 m
0,5 mm ²	2 x 100 m

With commissioning and after modification of the plant the sensor resistance must be checked with a suitable measuring instrument. With a resistance < 50 Ω the sensor circuit is to be examined for short-circuit.



Attention! Check PTCs only with measuring voltages of < 2.5 V.

14.4 Safe Separation

Mains supply circuits (A1, A2 in devices with transformer), (11, 12, 14 and 21, 22, 24) have safe separation to low-voltage electric circuit (Y1, Y2) as well as to the intrinsically safe circuit (T1, T2).

Tripping devices with combined supply voltage DC/AC 24 V have no potential separation and are only permitted with power supplies that comply with the requirements of EN 61558 / DIN VDE 0551 (safety transformer or battery power) and when protected wiring is used. Caution! Supply voltage AC 24 V must not be grounded to earth (PA).

14.5 Stop function

A stop function released by the protection device must transfer the machine after manipulation of this function as fast as possible into a safe condition. The stop function must have top priority.

In case of failure the relay switches off the contactor/circuit breaker and so prevents an overheating of the isolation system and/or the surface temperature. The protective function of the equipment is guaranteed only if wiring is done directly into the control circuit of the motor/machine in accordance with the connection diagram. The contacts must be protected, in order to prevent welding.



Attention!

The relay contacts must be fused externally to prevent welding of the contacts. Recommended fuses see technical data.

14.6 Start and Restart

A restart may take place automatically only if no dangerous condition can be present. The tripping devices of types MS 220 Vi are equipped with an automatic reset function. For this device design, suitable wiring of the control units must be ensured to prevent automatic restarting of the explosive-protected motor of the type of protection Increased Safety „e“ in case of failure.

14.7 Manual resetting

After introducing a stop instruction by the protection device this must be maintained, until the manual resetting mechanism is operated and safe conditions for a renewed start are given. The manual resetting may be only possible, if all safety functions and protection devices are effective.

Trip device type MSR has an electronic reclosing lock. The stop instruction remains, until pressing the push-

button „Reset“. A start-up is only possible, if no case of failure occurs and the motor is cooled down to a sufficient value of temperature. Trip devices type MSR 220 switch on automatically with return of supply voltage. The user must guarantee by external interlock so the supervised motor/machine does not start again independently.



Attention!

Devices with electronic reclosing lock (Reset) do not fulfill the requirements for safety circuits in accordance with EN 60204/EN 62061. The equipment must not be used alone for functions, when an automatic start must be avoided.

15 Proof testing of the safety functions

The safety function of the safety related parts has to be tested with commissioning and within regular intervals. It is recommended to test once annually or within the maintenance cycle of the plant. For recurring examinations of electrical systems in hazardous areas the inspection period must be kept within 3 years.

Depending on the zone risk tests should be conducted more frequently. One fault is recognized by the safety test. One fault between safety tests can cause the loss of protection.

- The safety function has to be tested by interrupt of the sensor line at terminals T1 or T2.
- The short circuit monitoring function has to be tested by bridging the sensor line at terminals T1 and T2.
- Trip relay MSR the function of the electronic interlock has to be tested additionally.
- If an error is detected no restart must be induced until the error is cleared.

The response of the thermal motor protection must directly switch off the motor, also when used together with converters. This must be realized in the logic section or configuration in the converter.

16 Maintenance and repair

The devices are maintenance-free. Only the manufacturer may accomplish repairs. We recommend testing within the regular maintenance intervals of the plant, where the device is used. EN 60079-17 electrical installations, inspection and maintenance is to be observed.

The guarantee presupposes the observance of these operating instructions (safety and start-up instructions).



Attention!

If the internal fuse has triggered, with high probability a failure occurred inside the equipment. In this case, the device has to be reviewed and / or repaired in the factory! The device must not be repaired from the user and replaced by a similar device.

You'll find this and other user manuals in the internet under www.ziehl.com

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74523 Schwaebisch Hall
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17 EU-Declaration of Conformity

EU-Declaration of Conformity

Erklärung/Declaration No. 11915-1300-02

Hersteller: <i>Manufacturer:</i>	Ziethl industrie-elektronik GmbH + Co KG		
Anschrift: <i>Address:</i>	Daimlerstr. 13 74523 Schwäbisch Hall Germany		
Produktbezeichnung: <i>Product specification:</i>	Kaltleiter-Relais PTC Thermistor relay		
Typ: <i>Type:</i>	MS220Vi	T222181	T222185
	MSR220Vi	T222191	T222195

Wir erklären in alleiniger Verantwortung, dass oben bezeichnetes Produkt den grundlegenden Anforderungen entspricht die in den folgenden Europäischen Richtlinien festgelegt sind:

We declare under our sole responsibility that above designated product meets the basic requirements and complies with the following directives of the European Union:

2014/35/EU	Niederspannungsrichtlinie Low Voltage Directive
2014/30/EU	EMV Richtlinie EMC Directive
2014/34/EU	ATEX Richtlinie ATEX Directive
2011/65/EU	RoHS Richtlinie
2015/863/EU	RoHS Directive

Angewandte harmonisierte Normen und technischen Spezifikationen:
Applied harmonised standards and technical specifications:

EN 60947-8:2003 + A1:2006 + A2:2012
EN 61000-6-2:2005 + AC:2005
EN 61000-6-4:2007 + A1:2011
EN 60079-11:2012
EN 50581:2012

Benannte Stelle und Nummer der EG-Baumusterprüfbescheinigung:
Notified Body and number of the EC-type-examination certificate:

PTB Physikalisch Technische Bundesanstalt 0102
PTB 07 ATEX 2055

Schwäbisch Hall, 30.01.2019
Ort, Datum der Ausstellung
Place, date of issue

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ppa.

Herbert Wahl
Verkaufsleitung

i.V.

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Qualitätsmanagement