

TEMPERATURE PROTECTION

TYPE TMA100Am

INSTRUCTION MANUAL NO. BP/I0/15/09



EXPROTEC



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1. Introduction

The TMA100Am temperature protection is a device with intrinsically safe measuring path designed to protect devices against excessive temperature rise. It uses PTC type temperature sensors built in the devices.



The TMA100Am temperature protection device has been manufactured in compliance with good engineering practice in terms of safety and meets the requirements of the following standards PN-EN 60079-0: 2018, PN-EN 60079-11: 2012.

2. Type designation

TMA100Am – Temperature protection

3. Technical data

Table 1 Technical specifications

Design features:		
Explosion protection designation	I (M1) [Ex ia Ma] I II (1)G [Ex ia Ga] IIC II (1)D [Ex ia Da] IIIC	
EU-type examination certificate	OBAC 10 ATEX 081X	—
Enclosure protection rating	IP20	—
Explosion protection type when installed in hazardous area for I M2 and II 2G	Ex d	
Installation position	mounting bracket: TH 35 / TS 35	—
Connected cable cross-section	0.25..2.5 (2x1.5)	mm ²
Wire stripping length	9	mm
Max. terminal tightening torque	0.3	Nm
TMA100Am relay dimensions (h×w×d)	114 x 23 x 99	mm
TMA100Am relay ground	205	g

Relay type:	Contact type:
TMA100Am	2x NC, 2x NO

Electrical parameters:							
Voltage power supply	Permissible supply voltage range					Current consumption	Input power
	nominal	min	max	min	max		
V AC/DC	V	V DC	V DC	V AC	V AC	mA	VA
TMA100Am	24-42	19.2	50.4	19.2	50.4	<70	3

Operating conditions:		
Altitude above sea level	up to 1000	m
Ambient temperature	-20..+70	°C
Relative humidity at 20°C	up to 95	%
Transport temperature	-20..+40	°C
Relative humidity for transport	up to 95	%
Mechanical exposures – frequency	10..500	Hz
Impact resistance	10	g
Vibration resistance (10...500 Hz)	5	g
Type of operation	continuous	—

Table 2 Intrinsically safe and technical parameters

Permissible parameters of circuits on TMA100Am terminals:			
14, 15, 16 (measuring circuit)	—	U _o = 8.61	V
	—	I _o = 0.85mA	mA

Safety level "ia"	—		Po = 1.9mW			mW	
	—		Co = (*)			uF	
	—		Lo = (*)			mH	
	Group	I	IIA	IIB	IIC	IIIC	—
	Co =	1000	1000	50	5.9	50	uF
Lo =	640	390	195	49	195	H	
~3~4 (power supply)	Um = 250					V	
	Un = 24					V AC/DC	
	Un = 42					V AC/DC	
1, 2, 5, 6, 7, 8 (relay outputs)	Um = 250					V	
	Imax = 1					A	
	Un = 250 (1A)					V AC	
	Un = 30 (1A)					V DC	
Operation of the device							
Description	Terminals 14,15		Terminals 15,16				
Tripping resistance at low resistance value	170÷180		20÷30			Ω	
Return resistance from low resistance value	180÷190		30÷40			Ω	
Tripping resistance at high resistance value	3800÷4050		3650÷3900			Ω	
Return resistance from high resistance value	1800÷1980		1650÷1830			Ω	

4. Identification of the hazards caused by the equipment during its operation.

4.1 Introduction

CAUTION!

Safe operation of the equipment requires special training, knowledge and experience. Do not attempt to operate this equipment unless qualified to do so. Improper or careless operation can lead to serious accidents or death for the operator or others.

The equipment is designed to meet specific technical conditions and customer requirements.

CAUTION!

Modification of equipment for which authorisation has not been granted or use of repaired parts or other replacement parts not meeting the manufacturer's technical specifications may result in serious risk or loss of warranty, certification or approvals.

If modifications to the equipment are required, they must be made only after written authorisation has been obtained from the manufacturer.

4.2 Hazards during operation of equipment

Before starting up the equipment, ensure that it does not endanger the life and health of others.

CAUTION!

Before starting the unit, make sure that the power cables are undamaged and properly screwed to the screw terminals.

The installation of temporary connections is prohibited. For safe operation, follow all procedures outlined in the safe use manual.

4.3 Special conditions for safe use

CAUTION!

Special conditions for safe use:

- Install the device outside the hazardous area. If placed in a hazardous area, the device should be protected with appropriate explosion protection.
- Ambient temperature range: $-20^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$
- Installation shall be carried out with the required separation distances to the external terminals of the device in accordance with section 6.2.1 PN-EN 60079-11.

CAUTION!

The device can be operated in mining plants, in workings classified as class "a", "b" or "c" methane explosion hazard and class "A" or "B" coal dust explosion hazard, only when installed in a flameproof enclosure of Ex d design.

The device can be operated in explosive gas atmospheres of zone 1 or 2 (G) and operated in a location where dust explosive atmospheres of zone 21 or 22 (D) occur, only when installed in a shield with appropriate explosion protection.

5. Construction and principle of operations

5.1 Mechanical part

The relay control module type TMA100Am (Fig. 1) consists of a printed circuit board and a ME 22.5 or ME 35 plastic enclosure by Phoenix Contact with IP20 protection. The wires are connected to the screw terminals located on the sides of the enclosure. The relay is equipped with non-replaceable sockets and plugs. To make replacement impossible, the plugs and terminal blocks have coding inserts. Additionally, colour coding was applied (intrinsically safe circuit has a blue plug-socket, non-intrinsically safe circuit has a grey plug-socket), which facilitates proper connection. The relay enclosure is adapted for mounting on a TH 35 / TS 35 bus bar.

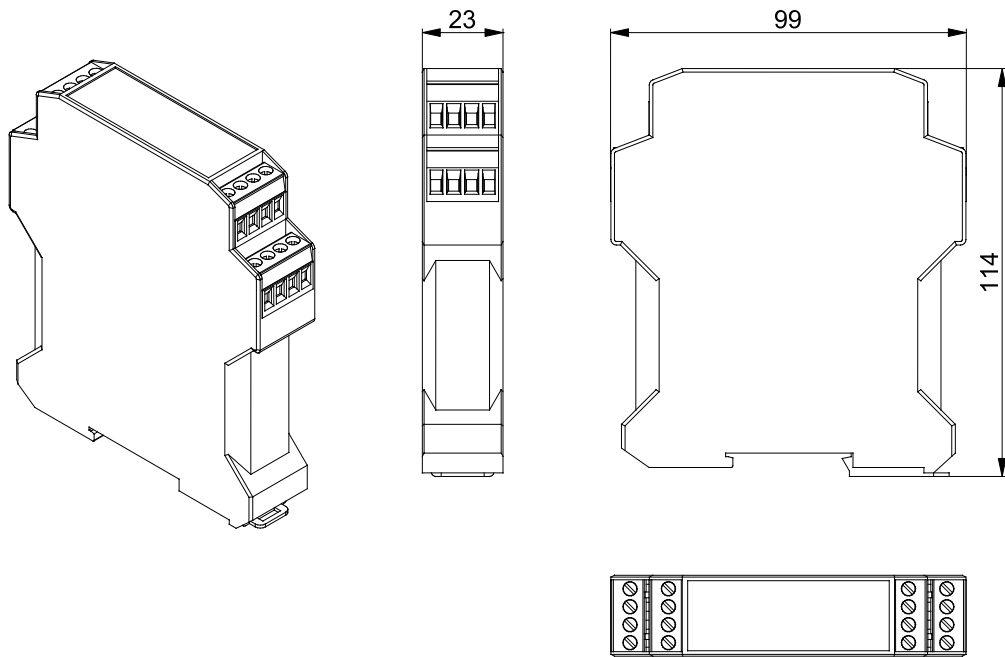


Fig. 1. General view of the TMA100Am relay



Fig. 2. View of the front and description of the TMA100Am relay

5.2 Electrical part

5.2.1 TMA100Am

The temperature protection device type TMA100Am is an intrinsically safe device with protection level "ia", it ensures galvanic isolation between the intrinsically safe measurement path and the non-intrinsically safe supply and control part.

Short-circuit of the PTC temperature sensor(s) triggers the actuating relay of the protection device. The relay will switch back on when the resistance rises above the low resistance return value. A break in the connections between the temperature sensor and the protection causes the resistance to rise above the tripping threshold, which in turn leads to the tripping of the actuating relay of the protection. The relay will turn back on when the resistance drops below the high resistance return value. This controls the transmission line for breaks and short circuits between the temperature sensor and the TMA 100Am protection. Between 1 and 6 PTC sensors can be connected to the TMA100Am protection device to control its temperature.

On the front of the relay there is a switch to enable additional filtering of the measurement signal, extending the run time.

5.2.2 LED

A view of the front and description of the TMA100Am relay is shown in Fig. 2.

LED of the TMA100Am relay:

- **ON – Resistance detection according to the operating principle,**

Table 3 Designations and description of contacts – TMA100Am

Power circuit					
Sym.	Description	Function			
~3	(+) DC, (-) AC	Power supply circuit, any polarity			
~4	(-) DC, (-) AC				
Channel 1 (CH1)					
Sym.	Description	Function	Sym.	Description	Function
14	14	Measurement system input			
15	15				
16	16				
1	COM	Actuating contact (common)			
2	NC	Normally-closed contact			
8	NO	Normally open contact			
5	COM	Actuating contact (common)			
6	NO	Normally open contact			
7	NC	Normally-closed contact			

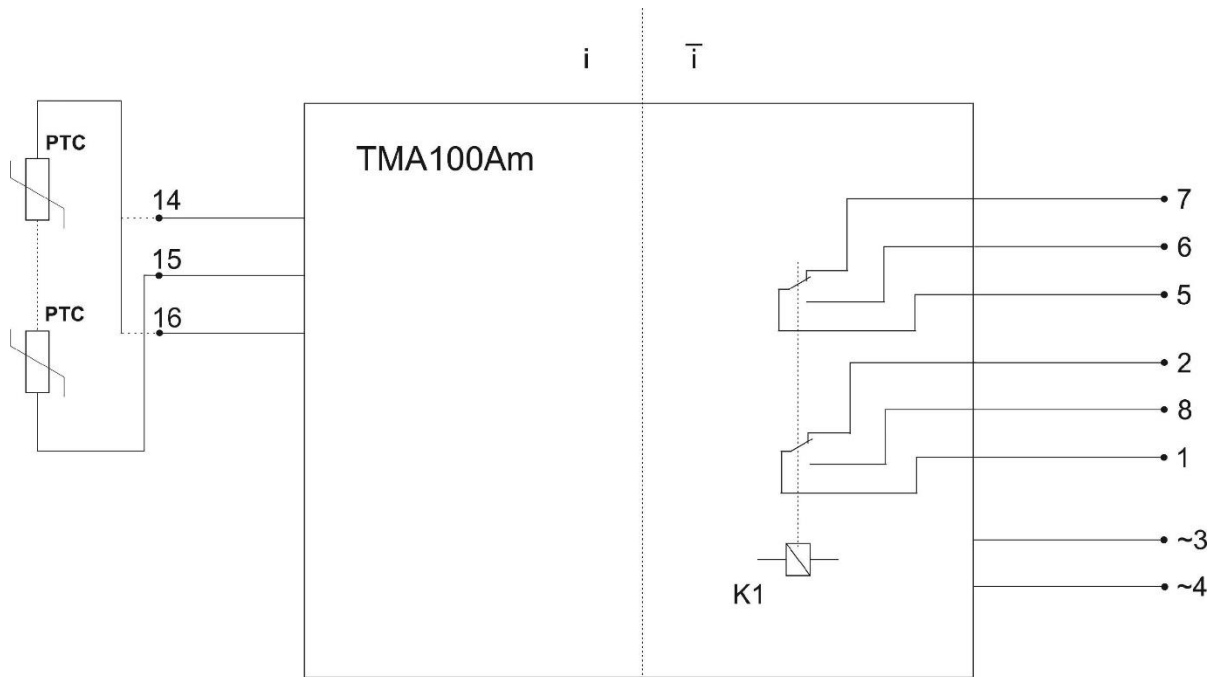


Fig. 3. Electrical diagram of the TMA100Am relay

6. Marking

Each intrinsically safe device has a rating plate, made of a self-adhesive paper label, attached to the enclosure cover (from the outside) containing the following data: supervising unit number, manufacturer's name, device name, type, Ex symbol in a hexagon, explosion-proof design marking, intrinsically safe parameters, protection degree, factory number / year of manufacture.

7. Operation setup

7.1 Installation

The device should be mounted inside control cabinets and boxes. The permissible deviation from vertical should not exceed the value given in the technical data. Connect the power and control circuits according to the electrical documentation.

7.2 Anti-electrocution protection

CAUTION!

The enclosure does not provide protection for live parts against direct contact

8. Storage and transport conditions

The unit should be stored in closed storage rooms in the temperature and relative humidity specified in the technical data, in an environment free from harmful vapours and corrosive gases. Transport horizontally or vertically, secured against movement.

9. Inspection and maintenance rules

During operation, ad hoc and periodic inspections should be carried out to ensure trouble-free operation of the unit.

- **Ongoing inspections:**
Ongoing inspections are to be carried out in case of changing the installation location and in case of need to replace damaged elements or components.
- **Periodical inspections:**
Periodical inspections – depending on the operating conditions, inspections should be carried out at intervals of 6 to 12 months.

CAUTION!

Observe the safety regulations before and during any inspections or maintenance. Maintenance and repair work may be carried out by qualified personnel. This work must be carried out with the supply voltage disconnected and secured.

9.1 Inspections and maintenance

The enclosure of the device together with plugs and connectors should be checked for mechanical damage. If damage is found, send the device to the manufacturer to eliminate the defect.

Inspect the electrical connections to detect any mechanical damage to the insulation of the wires connected to the terminals. If the insulation is damaged, replace cable with a new one.

Check that the functionality of the device has not been damaged during operation. If a malfunction is found, send to the manufacturer for repair.

10. List of spare parts

The manufacturer does not provide spare parts. Any repairs or overhauls are performed solely by the manufacturer's service department.

11. List of standards and regulations

This equipment complies with the following standards and regulations:

Table 4 Standards and regulations

Directive/Standard	Description
Directive 2014/34/EU	Equipment and protective systems intended for use in a potentially explosive atmosphere (ATEX)
PN-EN 60079-0:2018-09	Explosive atmospheres - Part 0: Equipment. Essential requirements.
PN-EN 60079-11:2012 (EN 60079-11:2012)	Explosive atmospheres - Part 11: Equipment protection with "i" intrinsic safety.
PN-EN 50303:2004 (EN 50303:2000)	Group I category M1 equipment intended to remain functional in atmospheres endangered by methane and/or coal dust
Additional	
PN-G-50003:2003	Work protection in the mining industry – Electrical devices for mining operations – Requirements and tests.

12. Disposal

After the end of its service life, the unit must be disposed of in accordance with the applicable environmental regulations.

In case of a lack of knowledge in the matter, local town or municipal office will provide all necessary information.

13. Orders and Service

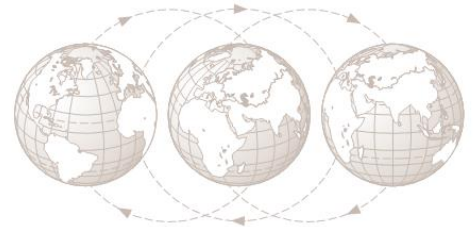
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Components should be replaced by the manufacturer or a company authorised by the manufacturer.

The manufacturer is not responsible for the quality of the equipment after the customer provides repairs or replacement of components on their own.

EXPROTEC

EXPROTEC
protects the people
and the environment
by the
safety of
its components,
systems
and equipment



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