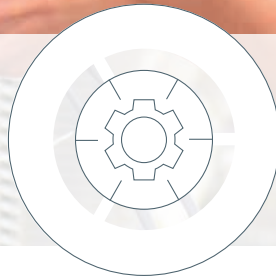




**RAIL MODULES.**  
INDUSTRIAL ELECTRONICS.



# GHM rail systems.

**Special edition 2019.**

## **Editorial.** Specialists by Competence.

*'Our new GHM-Rail series with the latest generation of mounting rails is the foundation of a fault-free process sequence. They are designed to be consistently future-proof and as efficient as possible.'*



***Sebastian Schäfer***

Product management Martens

Phone: +49 561 94871050

Email: s.schaefer@ghm-messtechnik.de

A handwritten signature in black ink, appearing to be 'S. Schäfer', written in a cursive style.

*Additional information is provided on our website at:*

*<https://www.ghm-group.de/en/business-units/industrial-electronics/>*

## Industrial electronics

Modern industry places increasingly higher requirements on all systems and components involved in the production process. With modern systems there is an expectation that downtimes are reduced to a minimum and that maximum process efficiency is achieved. Furthermore, the cost savings and associated competitive ability of a new acquisition are important requirements and a major emphasis for every machine modernisation. We meet these requirements with our modern product platform which is produced using state-of-the-art development methods and production processes in our factory.

Industry is facing the upcoming Industry 4.0 future project in the coming years. After the first industrial revolution in the area of mechanisation and mass production, we now have the intelligent factory in the digital revolution. Work should take place in a resource-saving manner with better integration of customer requirements in the value-added chain. In order to achieve this goal, increasingly more process values from the widest variety of production processes will have to be combined without losing the information that is relevant for the users on site.

GHM Messtechnik is also taking on this challenge and, in collaboration with its customers, developing highly efficient devices and systems for the next industrial revolution.

## Our customers



**All products  
available ex  
stock!**

Our customers come from a wide variety of areas in machinery and plant construction.

The following areas are emphasised:

- Food and beverage
- Plant and machinery construction
- Industrial and laboratory furnace construction
- Gas and oil industry
- Ship construction
- Plastics industry
- Chemical and pharmaceutical industry

This broad spectrum is the basis for an outstanding product assortment which satisfies the widest variety of requirements of numerous sectors. And if we do not have the right product in our portfolio, we are capable of quickly developing and producing the right product for the task on short notice, thanks to our application-based development and in-house production depth.

## Our products

Our product spectrum in the area of industrial electronics extends from process value detection to signal processing, display, control and regulation, to actuators for intervening in the process. In this connection, our products always pursue the goal of being as efficient as possible in all areas of the product life cycle, and that applies particularly for:

- space-saving assembly
- quick and uncomplicated integration  
short wiring times
- simple commissioning without software,  
whenever possible
- use of intuitively operated configuration software,  
wherever it is necessary
- clear process information for operators in order  
to minimise downtimes
- fulfilment of necessary regulations, such as EN 14597  
or SIL
- long service life

The true cost efficiency is evident over the entire period of use, beginning with the integration, followed by commissioning, and then long service times during the operation life. Our products satisfy this demand with solutions ranging from the simple sensor via standard isolating amplifier to the modular automation unit.

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No guarantee is taken for statements or indications referring to prices, product texts and/or product pictures; errors and technical changes excepted.



# Temperature Measuring Transducer MU125



- Universal input for Pt100, Pt1000, thermocouple, NTC and resistance measurement value
- Configuration via front DIP switches
- Analog actual value output 4 .. 20mA
- Zero point and limit value can be adjusted via trim potentiometers on the front
- With Pt100 and Pt1000 sensors, monitoring of sensor break and short-circuit
- Wide-range mains adapter or 24 V DC
- Optional supply via carrier rail bus
- Removable coded screw terminals or optional push-in terminals
- Housing width 12.5 mm
- Carrier rail mounting TS35 EN60715

## Characteristics

Devices of the MU125 series convert a temperature measurement value or resistance measurement value from various sensors to a current signal of 4..20mA. The universal configurability of the measuring inputs reduces the stock requirement for various applications. The housing width of only 12.5 mm enables space-saving installation in the switch cabinet.

## Measurement inputs

Switchable via DIP switch:

	Measuring range	Basic precision	Temperature deviation *)
<b>Pt100</b>	-50.. 50°C	0.4%	0.01%/K
	0.. 50°C	0.6%	0.02%/K
	0..100°C	0.4%	0.02%/K
	0..150°C	0.4%	0.01%/K
	0..200°C	0.3%	0.01%/K
	0..250°C	0.3%	0.01%/K
	0..300°C	0.2%	0.005%/K
	0..500°C	0.2%	0.005%/K
<b>Pt1000</b>	-50.. 50°C	0.4%	0.01%/K
	-30.. 70°C	0.4%	0.01%/K
	-20.. 40°C	0.4%	0.01%/K
	0.. 50°C	0.6%	0.02%/K
	0..100°C	0.4%	0.02%/K
	0..150°C	0.4%	0.01%/K
	0..200°C	0.3%	0.01%/K
	0..250°C	0.3%	0.005%/K
<b>FeCuNi</b>	0..250°C	1.0%	0.04%/K
	0..500°C	0.5%	0.03%/K
<b>NiCrNi</b>	-50..250°C	0.7%	0.05%/K
	0..500°C	0.5%	0.04%/K
	0..750°C	0.4%	0.03%/K
	0..1000°C	0.3%	0.02%/K
	0..1250°C	0.3%	0.02%/K
<b>PtRhPt</b>	0..1500°C	1.0%	0.04%/K
	0..100°C	1.0%	0.01%/K
<b>NTC</b> R <sub>25</sub> =10kΩ B <sub>25/85</sub> =3977K	0..100°C	1.0%	0.01%/K
	-20.. 50°C	1.5%	0.01%/K
<b>NTC</b> R <sub>25</sub> =10kΩ B <sub>25/85</sub> =3977K	0.. 100°C	1.0%	0.01%/K
	0.. 100°C	1.0%	0.01%/K
<b>Resistance</b> linear**)	0.. 2kΩ	0.3%	0.005%/K
	0.. 5kΩ	0.5%	0.01%/K
	0..10kΩ	0.3%	0.005%/K

\*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10..+60°C)

\*\*) Adjusting zero point and limit value via the integrated trim potentiometers makes it possible to also connect KTY sensors for these measuring ranges. The linearisation must then be accomplished with the help of a parallel resistor.

(Special measurement ranges available on request)

## Product information Transmitter / Signal Conditioning

### Technical data

#### Wide-range power supply

Supply voltage : 20..125VDC and  
20..250VAC (47..63Hz), max.1.5W

#### 24V power supply

Supply voltage : 24V DC +/-15%, max. 1.5W

#### Combined data

Rated voltage : 253V AC  
Test voltage : 3kV AC between  
supply // input = output  
Working temperature : -10..60°C  
Storage temperature : -20..80°C  
Humidity : 10..90% (no condensation)

#### Measurement inputs

Pt100 : linearised,  
measuring current approx. 1.6mA  
Pt1000 : linearised,  
measuring current approx. 130µA  
In the event of a sensor break or short  
circuit, the analog output drops to 0mA.  
The operation LED blinks red  
Thermocouple : linearised with comparison position  
compensation  
(optionally without internal  
compensation)  
NTC : linearised for  $B_{25/85}=3977K$  or  $3528K$   
Max. load  $200\mu W$  (averaged)  
Linear resistance : Mb. 0..2kΩ: approx. 1.4mA  
Mbs. 0..5kΩ, 0..10kΩ: approx. 300µA  
Zero point setting : +/-40% of the factory measuring range  
(= end value – start value)  
via 12-turn trim potentiometer  
End value  
reduction : -50% based on the factory end value  
via 12-turn trim potentiometer  
Note: The measuring accuracy drops  
proportionally with the narrowing of the  
measuring range  
Potentiometer setting  
limits : Limitation of the aforementioned  
adjustment ranges  
Pt100 -50..500°C (..600°C)  
Pt1000 -50..250°C (..300°C)  
FeCuNi -100..500°C (..800°C)  
NiCrNi -150..1250°C  
PtRhPt 0..1500°C (..1600°C)  
NTC (10kΩ) -20..100°C (..150°C)  
NTC ( 2kΩ) -40..100°C (-50°C..150°C)  
R linear 0..10kΩ  
(values in parentheses apply for optional,  
customer-specific special measuring  
ranges that are configured at the factory)

**Analog output** : 4..20mA, max. burden 400Ω,  
no galvanic isolation  
from the input signal  
(max. burden error of 0.2% at 400Ohm)

Dimensions (WxDxH): 12.5 x 114 x 108mm

Material : PA6.6, light grey,  
Flammability class V0 (UL94)

Weight : 120g

Protection rating : IP20

Screw terminals : 0.2..2.5 mm<sup>2</sup>, AWG 24..14,  
removable, coded

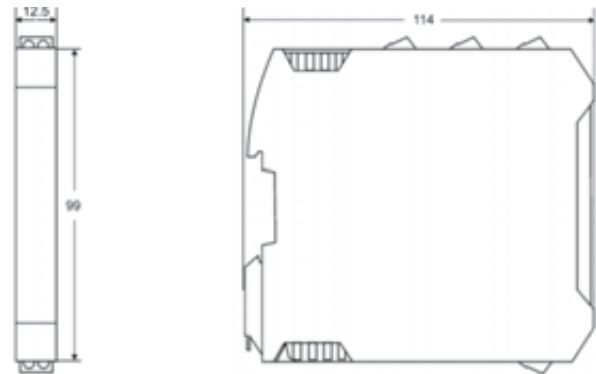
Push-in terminals : 0.5..1.5 mm<sup>2</sup>, AWG 25..16,  
(spring-type  
terminals)  
Double connection (12A between  
the connections), removable, coded

Power Rail : 8A over the entire bus system  
(power supply via removable terminals  
0.2..2.5 mm<sup>2</sup>, AWG 24..14)

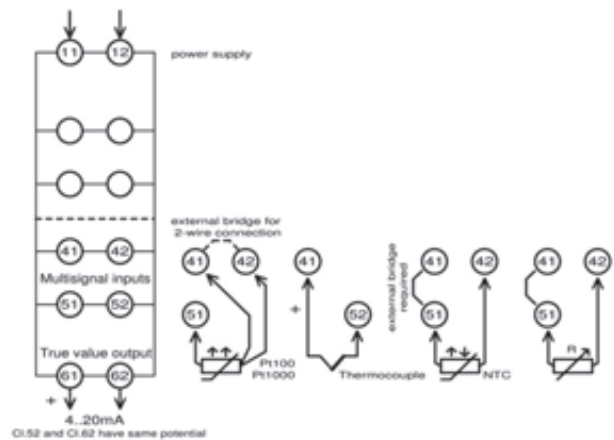
### A service mode for the trim potentiometers on the front offers the following possibilities:

- 1) A check of whether potentiometers are positioned at the calibrated factory settings
- 2) The pre-adjustment of a new output characteristic curve only with connection of a current measuring device. (a temperature calibrator is not necessary)
- 3) Specification of a constant value at the current output, e.g. in order to test the reaction of connected devices. (Limited range from 5.6..20mA)

### Dimensions



### Connection diagram



### Ordering code

MU  1. -  2.

1.	Device version	
125L	Supply voltage 24V DC +/- 15%	
125LP	Supply voltage:24V DC +/-15% with carrier rail bus connection *)	
125M	Wide-range mains adapter 20..125VDC / 20..253V AC	
4.	Options	
00	No options	
01	Push-in terminals (plug-in)	

\*) see separate Power-Rail information sheet

# Universal Transmitter UT125



- Transmitter for electrical signals
- Universal input for standard signals, Pt100, thermocouple, potentiometer
- Configuration via front-side DIP switch
- Analog output 4..20 mA
- With Pt100 sensors, monitoring of sensor break and short-circuit
- Wide-range power supply or 24 V DC
- Housing width 12.5 mm
- Removal coded screw terminals
- Carrier rail mounting TS35 EN60715

## Characteristics

The UT125 series of universal transmitters are designed for the affordable transformation of standard signals, temperatures and potentiometer statuses into a current signal of 4..20 mA. The universal configurability of the measuring inputs reduces the stock requirement for various applications. The measuring inputs and actual value output are not galvanically isolated. The housing width of only 12.5 mm enables space-saving installation in the switch cabinet.

## Measurement inputs

### Configuration via DIP switch

Standard signals	: 0/2..10 V and 0/4..20 mA
Potentiometer	: Rated value 500 Ω..20 kΩ
Pt100	: -50..50 °C 0..100 °C 0..150 °C 0..200 °C 0..300 °C 0..500 °C
Thermocouple FeCuNi, Type J	: 0..250 °C 0..500 °C
NiCrNi, Type K	: 0..500 °C 0..750 °C 0..1000 °C
PtRhPt, Type S	: 0..1500 °C

(Special measurement ranges available on request)

## Technical data

### Wide-range power supply

Supply voltage : 20..125 VDC and  
20..250 VAC (47..63 Hz), max. 1.5 W

### 24V power supply

Supply voltage : 24 V DC +/-15 %, max. 1.5 W

### Combined data

Rated voltage : 253 V AC  
Test voltage : 3 kV AC between  
power supply // input = output

Working temperature : -10..60 °C  
Storage temperature : -20..80 °C  
Air humidity : 10..90% (no condensation)

### Measurement inputs

Voltage : 0/2..10 V, Ri approx. 20 kΩ  
Current : 0/4..20 mA, Ri approx. 60 kΩ  
Pt100 : linearised,  
measurement current 1.6 mA  
Recognition of sensor break or  
short circuit: Actual value drops to  
approx. 0mA

Thermocouple : linearised  
with comparison point compensation  
Resistance : Potentiometer (3-wire)  
Rated value 500 Ω..20 kΩ  
Intern. reference voltage approx. 1.5 V  
Analog output : 4..20 mA, max. burden 400 Ω,  
No galvanic isolation from the  
input signal

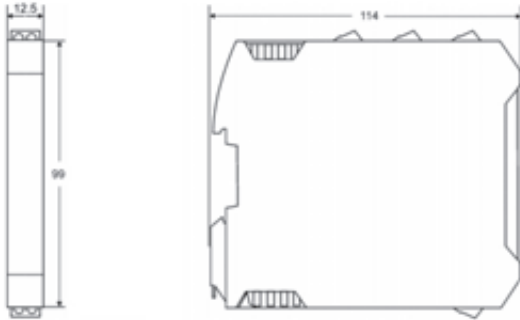
Input signal	Basic precision-actual value output	Temperature deviation *)
0/2..10 V	0.2 %	0.004 %/K
0/4..20 mA	0.2 %	0.004 %/K
Potentiometer	1 %	0.007 %/K
Pt100 -50.. 50 °C	0.5 %	0.03 %/K
Pt100 0.. 50 °C	0.9 %	0.04 %/K
Pt100 0..100 °C	0.5 %	0.03 %/K
Pt100 0..150 °C	0.2 %	0.02 %/K
Pt100 0..200 °C	0.4 %	0.02 %/K
Pt100 0..300 °C	0.3 %	0.01 %/K
Pt100 0..500 °C	0.2 %	0.007 %/K
FeCuNi 0..250 °C	1.0 %	0.04 %/K
FeCuNi 0..500 °C	0.5 %	0.03 %/K
NiCrNi 0..500 °C	0.5 %	0.04 %/K
NiCrNi 0..750 °C	0.4 %	0.03 %/K
NiCrNi 0..1000 °C	0.3 %	0.02 %/K
PtRhPt 0..1500 °C	1.0 %	0.04 %/K

\*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10..+60°C)

### Housing

Dimensions (W x D x H) : 12.5 x 114 x 108 mm  
Material : PA6.6, light grey,  
Flammability class V0 (UL94)  
Weight : 120 g  
Protection rating : IP20  
Screw terminals : 0.2..2.5 mm<sup>2</sup>, AWG 24..14,  
removable, coded  
Push-in terminals : 0.5..1.5 mm<sup>2</sup>, AWG 25..16,  
(spring-type terminal) Double connection (12A between the  
connections), removable, coded  
Power Rail : 8A over the entire bus system  
(Supply via removable terminals  
0.2..2.5 mm<sup>2</sup>, AWG 24..14)

**Dimensions**



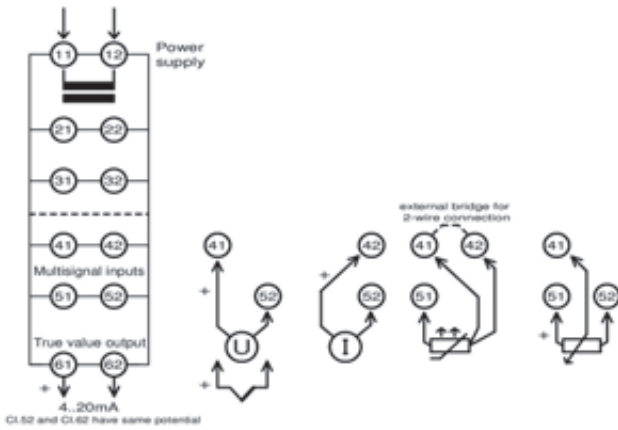
**Ordering code**

UT  1. -  2.

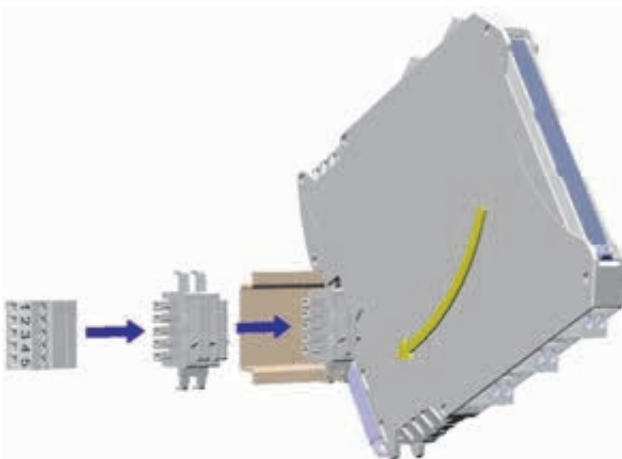
1. Device version	
125L	Supply voltage 24 V DC +/- 15 %
125LP	Supply voltage 24 V DC +/- 15 % with carrier rail bus connection *)
125M	Wide-range power supply 20..125 V DC / 20..253 V AC
2. Options	
00	No options
01	Push-in terminals (plug-in)

\*) Supply including matching bus adapter piece; see also separate Power Rail information sheet

**Connection diagram**



**Power Rail**



The power supply of multiple devices can be concentrated in the mounting carrier rail (TS35) of a bus system.

An equivalent version is available for the entire series of GHM power rail devices in 12.5 mm wide housing.

# Standard Signal Transmitter PMT50-1



**PROFIBUS**

- Signal conditioning – Linearisation – Characteristic adjustment
- Input for standard signals 0/2..10 V and 0/4..20 mA
- Measuring range programmable
- Linearisation and characteristic adjustment programmable via 32 bases
- Automatic input fault detection

## Characteristics

The programmable universal transmitter PMT50 operates with analog input signals. The device convert input signals to analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire transmitter. 4 alarm outputs for monitoring and controlling are available.

## Technical data

### Power supply

Supply voltage : 230 V AC ±10 %  
115 V AC ±10 %  
24 V DC ±15 %

Power consumption : < 5 VA

Operating temperature : -10..+55 °C

CE – conformity : EN 61326-1:2013; EN 60664-1:2007

**Input** : 0/2..10 V, 0/4..20 mA

Ri : current 10 Ω

voltage 10 kΩ

Accuracy : < 0.1 %, ±1 Digit

Transmitter supply : 24 V DC max. 30 mA

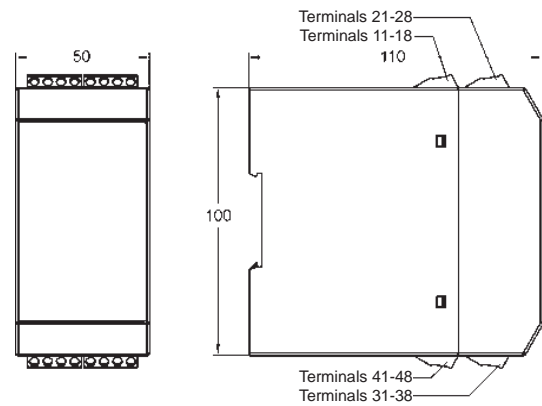
Fault detection : break of wire (only 4 mA / 2 V)

### Outputs

Alarm outputs : relay SPDT  
< 250 V AC < 250 VA < 2 A cos φ ≥ 0,3  
< 300 V DC < 40 W < 2 A

Analog output	: 0/4..20 mA burden ≤ 500 Ω, 0/2..10 V burden > 500 Ω, isolated output burden depending
Fault indication	: break of wire in the measuring circuit → analog output programmable 0 mA, < 3.6 mA or >21.5 mA → alarm relay(s) min. or max. programmable
<b>Bus system</b>	
Modbus	: RS485, RTU or ASCII max. 38400 Baud
Profibus	: Profibus DP
Connection	: 9pol. D-SUB connector in the front
<b>Display</b>	: graphic-LCD-Display, 128 x 64 Pixel, with white LCD backlight
<b>Case</b>	: Polyamide (PA) 6.6 , UL94V-0 acc. to DIN EN 60715, DIN rail TS35
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm <sup>2</sup> AWG 26..AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

## Dimensions

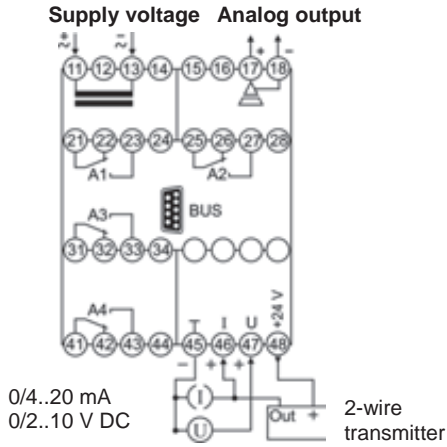


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**Connection diagram**

Model PMT50-1  
Standard signals 0/4..20 mA, 0/2..10 V



**Ordering code**

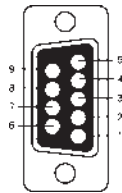
PMT50 -  1. -  2. -  3. -  4. -  5. -  6.

<b>1. Model/input</b>	
1	standard signals 0/4..20 mA, 0/2..10 V DC
<b>2. Analog output</b>	
AO	0/4..20 mA, 0/2..10 V DC, isolated
<b>3. Alarm outputs</b>	
00	not installed
2R	2 relay outputs, A1, A2 SPDT
<b>4. Alarm outputs/BUS configuration</b>	
00	not installed
2R	2 relay outputs, A3, A4 SPDT
MB	Modbus RTU/ASCII, RS485
PB	Profibus DP
<b>5. Supply voltage</b>	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
<b>6. Options</b>	
00	without option

**Bus connection**

Modbus		
PIN	Signal	EIA/TIA-485 name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9 pole D-Sub connector in the front



Transmitters / Signal conditioning

# Temperature Transmitter PMT50-2 /-3



- Signal conditioning – linearisation – output characteristic transformation
- Input for resistance and Potentiometer or RTD Pt100/Pt1000 and thermocouples
- Measuring range programmable
- Linearisation or transformation of output characteristic via 32 base-points programmable
- Automatic fault detection in the measuring circuit

## Characteristics

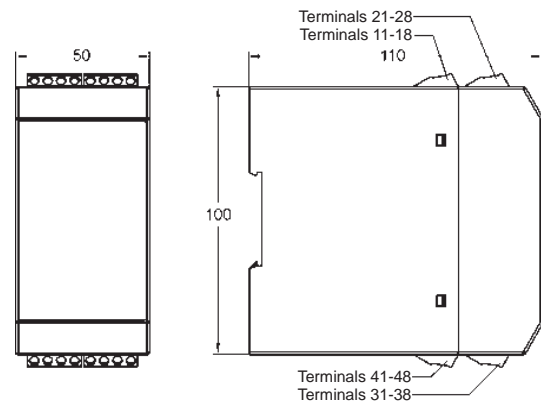
The programmable universal transmitter PMT50 operates with analog input signals. The device convert input signals to analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire sensors. 4 alarm outputs for monitoring and controlling are available.

## Technical data

<b>Power supply</b>	
Supply voltage	: 230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 %
Power consumption	: < 5 VA
Operating temperature	: -10..+55 °C
CE – conformity	: EN 61326-1:2013, EN 60664-1:2007
<b>Inputs</b>	
Fault detection	: type -2: (only resistance measurement) broken line; type -3: broken line (Pt100 / Pt1000,TC) and short circuit (only Pt100 / Pt1000)
<b>Device type 2</b>	
Input	: resistance 0..100 kΩ, potentiometer min.1 kΩ.. max. 100 kΩ
Accuracy	: < 0.2 %, ±1 Digit

<b>Device type 3</b>	
Input	: Pt100 (3-wire) -100.0..+600.0 °C Pt1000 (3-wire) -100.0..+300.0 °C : Thermocouple (TC) type J -100.0..+800.0 °C type K -150..+1200 °C type N -150..+1200 °C type S -50..+1600 °C
Accuracy	: < 0.1 %, ±1 Digit
<b>Outputs</b>	
Alarm outputs	: relay SPDT < 250 V AC < 250 VA < 2 A cos Phi ≥ 0.3 < 300 V DC < 40 W < 2 A
Analog output	: 0/4..20 mA burden ≤ 500 Ω, 0/2..10 V burden > 500 Ω isolated output changes automatically (burden depending)
Fault indication	: for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → Alarm relays min. or max. programmable
<b>Bus system</b>	
Modbus	: RS485, RTU or ASCII max. 38400 Baud
Profibus	: Profibus DP
Connection	: 9 pole D-SUB plug in the front
<b>Display</b>	
	: Graphic-LCD-Display 128 x 64 Pixel, with white LCD backlight
<b>Case</b>	: Polyamide (PA) 6.6 , UL94V-0 TS35 acc. to DIN EN 60715
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm <sup>2</sup> AWG 26..AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

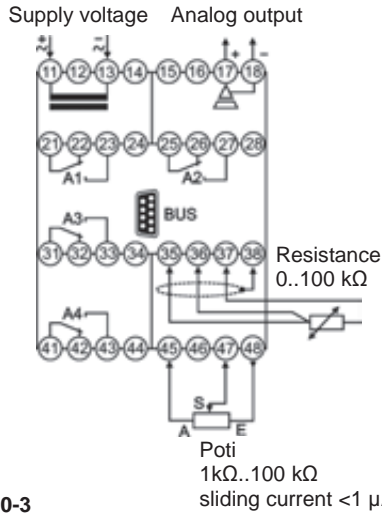
## Dimensions



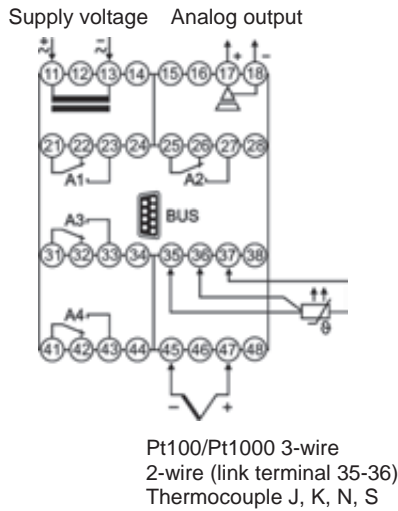
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**Connection diagrams**

**Device type PMT50-2**  
Resistance, Potentiometer



**Device type PMT50-3**  
Pt100, Pt1000, thermocouple



**Ordering code**

1. 2. 3. 4. 5. 6.  
PMT50 -  -  -  -  -  -

<b>1. Device type/input</b>	
2	Resistance in the range 0..100 kΩ Poti 1 kΩ..100 kΩ
3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C
<b>2. Analog output</b>	
AO	0/4..20 mA, 0/2..10 V DC isolated
<b>3. Alarm outputs</b>	
00	not installed
2R	2 relay outputs, A1, A2 SPDT
<b>4. Alarm output/BUS configuration</b>	
00	not installed
2R	2 relay outputs, A3, A4 SPDT
MB	Modbus RTU/ASCII, RS485
PB	Profibus DP
<b>5. Supply voltage</b>	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
<b>6. Options</b>	
00	without option

Transmitters / Signal conditioning

**Bus connection**

Modbus		
PIN	Signal	EIA/TIA-485 Name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9-pol. D-Sub plug  
in the front

## Standard Signal Transmitter PMT50Ex-1



- Signal conditioning – Linearisation – Characteristic adjustment
- Input for standard signals 0/2..10 V and 0/4..20 mA
- Measuring range programmable
- Linearisation and characteristic adjustment programmable via 32 bases
- Automatic input fault detection

### Characteristics

The programmable universal transmitter PMT50Ex operates with analog input signals. The device convert input signals to an analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 16 V DC max. 20 mA allows the feeding of 2- and 3-wire transmitter. 2 alarm outputs for monitoring and controlling are available.

### Technical data

#### Power supply

Supply voltage : 230 V AC  $\pm 10\%$   
 : 115 V AC  $\pm 10\%$   
 : 24 V DC  $\pm 15\%$   
 Um = 253 V AC and 125 V DC  
 (terminals 11, 13)

Power consumption : < 5 VA  
 Operating temperature : -10..+55 °C  
 CE-conformity : ATEX-directive 2014/34/EU  
 Standards : EN 60079-0:2006 EN 60079-11:2007  
 EN 61241-0:2006 EN 61241-11:2006

EMC-directive / standard : 2014/30/EU / EN 61326-1:2013

#### Explosion protection

Marking : II (1) G [Ex ia] IIC/IIB or II (1) D  
 [Ex iaD]  
 Approval : TÜV 08 ATEX 554329

Input : 0/2..10 V DC, 0/4..20 mA  
 Fault detection : broken line in the measuring circuit  
 Ri : current 10  $\Omega$   
 voltage 10 k $\Omega$   
 (terminals 45, 46, 47)  
 Accuracy : < 0.1 %,  $\pm 1$  Digit  
 Max. U<sub>0</sub> no load : 18.9 V  
 Max. I<sub>0</sub> short circuit : 92.5 mA  
 Max. output power P<sub>0</sub> : 580 mW  
 Resistance : 272  $\Omega$   
 Characteristic curve : trapezoidal  
 Internal inductivity : 4  $\mu$ H  
 Internal capacity : 1.2 nF  
 Transmitter supply : 16 V DC, max. 20 mA  
 (terminals 48)

<b>Explosion protection</b>	<b>Ex ia/IIC</b>	<b>or</b>	<b>ia/IIC</b>	<b>ia/IIB</b>
Max. external inductivity	: 2,3 mH		: 0,1 mH	: 5 mH
Max. external capacity	: 0,12 $\mu$ F		: 0,22 $\mu$ F	: 0,76 $\mu$ F
Max. values	U <sub>i</sub>			
	I <sub>i</sub>			
	P <sub>i</sub>			
	: 30 V			
	: 52 mA			
	: 980 mW			

#### Outputs

Alarm outputs : relay SPDT  
 < 250 V AC < 250 VA < 2 A cos  $\varphi \geq 0,3$   
 < 300 V DC < 40 W < 2 A  
 (terminals 21, 22, 23; 25, 26, 27)  
 Analog output : 0/4..20 mA burden  $\leq 500 \Omega$   
 0/2..10 V burden > 500  $\Omega$  isolated  
 output changes burden depending  
 Accuracy : 0.2 %; TK 0.01 %/K  
 (terminals 17, 18)  
 Fault indicating : break of wire in the measuring circuit  
 → analog output programmable  
 0 mA, < 3.6 mA or > 21.5 mA  
 → alarm relay(s)  
 min. or max. programmable

#### Bus system

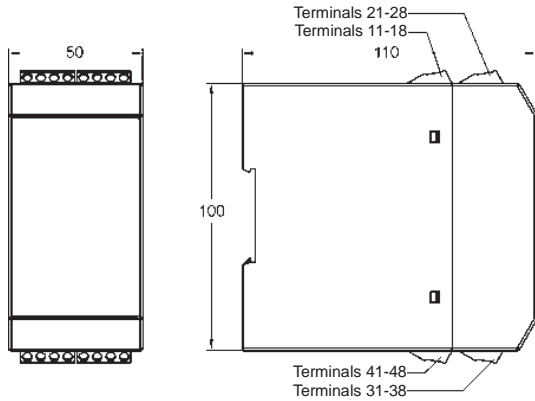
Modbus : RS485, RTU or ASCII  
 max. 38400 Baud  
 Profibus : Profibus DP  
 Connection : 9pol. D-SUB connector in the front  
**Display** : graphic-LCD-Display, 128 x 64 Pixel  
 with white back-light  
**Case** : Polyamide (PA) 6.6, UL94V-0

Weight : approx. 450 g  
 Connection : screw clamps 0.14..2.5 mm<sup>2</sup>  
 AWG 26..AWG14  
 Protection class : case IP30, terminals IP20 acc. to  
 BGV A3

Continue next page



**Dimensions**



**Ordering code**

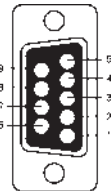
PMT50Ex -  1. -  2. -  3. -  4. -  5. -  6.

<b>1. Model/input</b>	
1	Standard signals 0/4..20 mA, 0/2..10 V DC
	Intrinsically safe EX II (1) G [Ex ia] IIC/IIB EX II (1) D [Ex iaD]
<b>2. Analog output</b>	
AO	0/4..20 mA, 0/2..10 V DC, isolated
<b>3. Alarm outputs</b>	
00	not installed
2R	2 relay outputs, A1, A2 SPDT
<b>4. BUS configuration</b>	
00	not installed
MB	Modbus RTU/ASCII, RS485
PB	Profibus DP
<b>5. Supply voltage</b>	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
<b>6. Options</b>	
00	without option

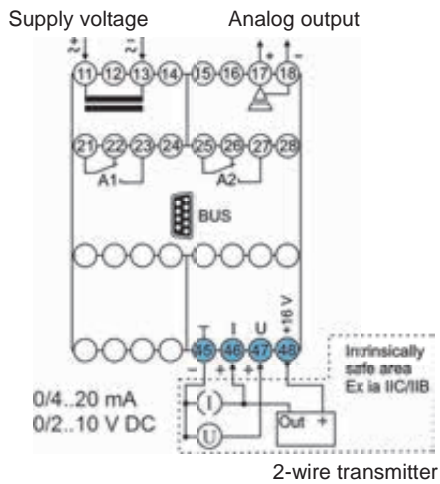
**Bus connection**

Modbus		
PIN	Signal	EIA / TIA-485 name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max 10 mA	
8	RxD / TxD-N	

9 pol. D-Sub connector in the front



**Connection diagram**



Transmitters / Signal conditioning

# Temperature Transmitter PMT50Ex-2 /-3



- Signal conditioning – linearisation – output characteristic transformation
- Input for resistance and Potentiometer or RTD Pt100/Pt1000 and thermocouples
- Measuring range programmable
- Linearisation or transformation of output characteristic via 32 base-points programmable
- Automatic input fault detection

## Characteristics

The programmable Temperature Transmitter PMT50 operates with RTD and thermocouple input signals. The device convert the signal to analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire sensors. 4 alarm outputs for monitoring and controlling are available.

## Technical data

### Power supply

Supply voltage : 230 V AC ±10 %  
 115 V AC ±10 %  
 24 V DC ±15 %  
 Um = 253 V AC or 125 V DC (terminals 11 and 13)

Power consumption : < 5 VA  
 Operating temperature : -10..+55 °C  
 CE-conformity : ATEX-directive 2014/34/EU  
 Standards : EN 60079-0:2006 EN60079-11:2007  
 EN 61241-0:2006 EN61241-11:2006  
 EMC-directive / standard : 2014/30/EU / EN 61326-1:2013

### Explosion protection

Marking : II (1) G [Ex ia] IIC/IIB bzw. II (1) D [Ex iaD]  
 Approval : TÜV 08 ATEX 554329

### Device type 2

**Input** : resistance 0..20 kΩ (terminals 35, 36, 37, 38)

Fault detection : broken line  
 Accuracy : < 0.2 %, ±1 Digit  
 Max. U<sub>o</sub> no load : 1.4 V  
 Max. I<sub>o</sub> short circuit : 2,5 mA  
 Max. output power P<sub>o</sub> : 3 mW  
 Resistance : 5600 Ω

Characteristic curve : trapezoidal  
 Internal inductivity : 4 µH  
 Internal capacity : 135 nF

**Explosion protection Ex ia/IIC ia/IIB**  
 Max. external inductivity : 100 mH 100 mH  
 Max. external capacity : 25 µF 120 µF

**Input** : Potentiometer min. 1 kΩ..max. 100 kΩ (terminals 45, 47, 48)

Accuracy : <0.2 %, ±1 Digit  
 Max. values U<sub>o</sub> : 9.6 V  
 Max. I<sub>o</sub> : 56 mA  
 Max. P<sub>o</sub> : 200 mW  
 Resistance R : 259 Ω  
 Characteristic curve : trapezoidal  
 Internal inductivity : 4 µH  
 Internal capacity : negligible

**Explosion protection Ex ia/IIC ia/IIB**  
 Max. external inductivity : 5 mH 20 mH  
 Max. external capacity : 0.48 µF 2 µF

### Device type 3

**Input** : Pt100 (3-wire) -100.0..+600.0 °C  
 Pt1000 (3-wire) -100.0..+300.0 °C  
 thermocouple (TC)  
 type J -100.0..+800.0 °C  
 type K -150..+1200 °C  
 type N -150..+1200 °C  
 type S -50..+1600 °C (terminals 35, 36, 37; 45, 47)

Fault detection : broken line (Pt100 / Pt1000,TC) or short circuit (only Pt100 / Pt1000)

Accuracy : < 0.1 %, ±1 Digit  
 Max. voltage no load U<sub>o</sub> : 1,4 V  
 Max. short circuit curr. I<sub>o</sub> : 2.5 mA  
 Max. output power P<sub>o</sub> : 3 mW  
 Resistance R : 5600 Ω  
 Characteristic curve : trapezoidal  
 Internal inductivity : 4 µH  
 Internal capacity : 135 nF

**Explosion protection Ex ia/IIC ia/IIB**  
 Max. external inductivity : 100 mH 100 mH  
 Max. external capacity : 25 µF 120 µF

### Outputs

**Alarm outputs** : relay SPDT  
 < 250 V AC < 250 VA < 2 A  
 cos Phi ≥ 0,3  
 < 300 V DC < 40 W <2 A (terminals 21, 22, 23; 25, 26, 27)

**Analog output** : 0/4..20 mA burden ≤ 500 Ω  
 0/2..10 V burden > 500 Ω, isolated output changes automatically (burden depending)

- Accuracy : 0.2 %; TK 0.01 % / K (terminals 17, 18)

**Fault function** : for broken line or short circuit detection  
 → analog output (programmable)  
 0 mA, < 3.6 mA or >21.5 mA  
 → alarm relays  
 min. or max. programmable

### Bus system

**Modbus** : RS485, RTU or ASCII  
 max. 38400 Baud

**Profibus** : Profibus DP

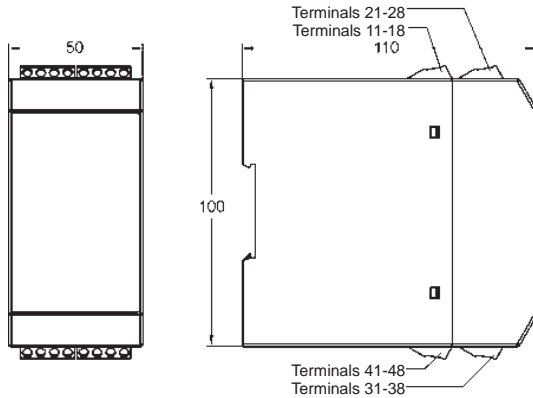
**Connection** : 9 pole D-SUB plug in the front

**Display** : graphic-LCD-display, 128 x 64 Pixel with white LCD backlight

## Product information Transmitter / Signal Conditioning

**Case** : Polyamide (PA) 6.6, UL94V-0  
TS35 acc. to DIN EN 60715  
**Weight** : approx. 450 g  
**Connection** : screw terminals 0.14..2.5 mm<sup>2</sup>  
AWG 26..AWG14  
**Protection class** : case IP30, terminals IP20 acc. to  
BGV A3

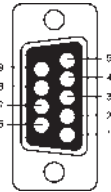
### Dimensions



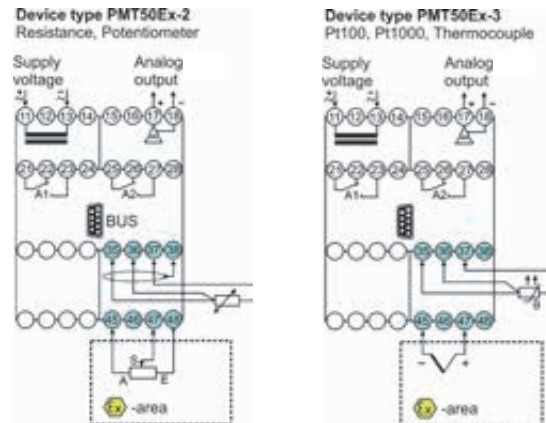
### Bus connection

Modbus		
PIN	Signal	EIA / TIA-485 Name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9 pol. D-Sub plug  
in the front



### Connection diagram



### Ordering code

PMT50Ex - 1. - 2. - 3. - 4. - 5. - 6.

<b>1. Device type/input</b>	
2	Resistance in the range 0..20 kΩ Poti 1 kΩ..100 kΩ
3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C
	Inputs intrinsically safe      EX II (1) G [Ex ia] IIC/IIB EX II (1) D [Ex iaD]
<b>2. Analog output</b>	
AO	0/4..20 mA, 0/2..10 V DC isolated
<b>3. Alarm outputs</b>	
00	not installed
2R	2 relay outputs, A1, A2 SPDT
<b>4. BUS configuration</b>	
00	not installed
MB	Modbus RTU/ASCII, RS485
PB	Profibus DP
<b>5. Supply voltage</b>	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
<b>6. Options</b>	
00	without option

## Transmitter DMS50



- Weight – Force – Pressure – Torque with DMS-strain gauges
- Bridge sensitivity 0.100..5.000 mV/V
- Teach-in function
- Tare function
- Min- and Max peak storage (not voltage safe)
- Integrated bridge supply 2.5 V, 5 V, 10 V max. 120 mA
- Bus-interface Modbus / Profibus

### Characteristics

The DMS50 converts the output signal of standard strain gauges (DMS measuring bridges) into a standard signal 0/4..20 mA or 0/2..10 DC. The bridge supply and an external control input for the tare function are integrated.

If several strain gauges are required in an application, these must be connected parallel. The bridge current must not exceed 120 mA in this case. Where appropriate, a SBB1616 measuring amplifier is to be interposed for a feed current up to 200 mA.

### Technical data

#### Power supply

Supply voltage : 230 V AC  $\pm 10\%$ ; 115 V AC  $\pm 10\%$   
or 24 V DC  $\pm 15\%$

Power consumption : max. 7 VA

Operating temperature : -10..+55 °C

CE-conformity : EN 61326-1:2013; EN 60664-1:2007

#### Input

##### DMS

Bridge-supply : 2.5 V/ 5 V/ 10 V DC ;  
programmable; max. 120 mA

Bridge sensitivity : 0.100..5.000 mV/V

Sense line : compensated line resistance  
of max. 10  $\Omega$

Accuracy : < 0.025 %  $\pm 2$  digit

Tare external : ext. contact or 24 V DC signal

Display : graphic LCD-Display 128x64 pixel,  
backlight white

Indicating range :  $\pm 9999$  Digit

#### Outputs

Relay SPDT, A1-A4 : < 250 V AC < 250 VA < 2 A  
cos  $\phi \geq 0.3$

< 300 V DC < 40 W < 2 A

Analog output : 0/4..20 mA burden  $\leq 500 \Omega$ ;  
0/2..10 V burden > 500  $\Omega$ , isolated  
output changes automatically

Accuracy : 0.2 %; TK 0.01 %/K

Fault indication at error in the DMS measuring circuit

→ Analog output 0 mA, < 3.6 mA or >21.5 mA, programmable

→ Alarm contact(s) min. or max. programmable

#### Bus system

Modbus : RS485, RTU or ASCII max. 38400 Bd

Profibus : Profibus DP

Connection : 9 pole D-SUB plug in the front

#### Case

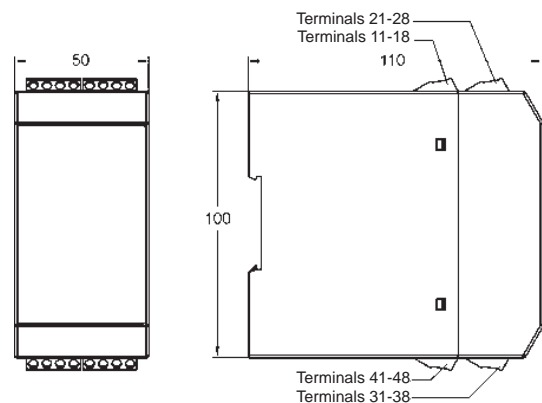
: Polyamide (PA) 6.6, UL94V-0,  
acc. to DIN EN 60715

Weight : approx. 450 g

Connection : screw terminals 0.14..2.5 mm<sup>2</sup>  
AWG 26..AWG14

Protection class : case IP30,  
terminals IP20 acc. to BGV A3

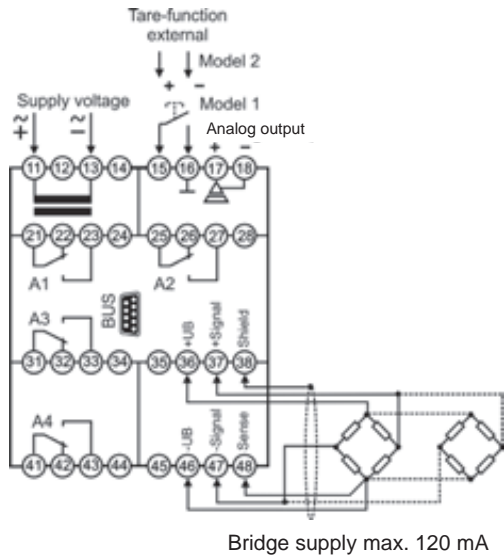
### Dimensions



Continue next page



Connection diagram



Ordering code

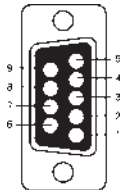
DMS50 -  1. -  2. -  3. -  4. -  5. -  6.

<b>1. Model</b>	
1	input DMS strain gauge, input ext. tare-function via contact
2	as 1, but isolated input for external tare function via 24 V DC electronic signal
<b>2. Alarm outputs</b>	
00	not installed
2R	2 relay outputs, A1, A2 SPDT
<b>3. Alarm outputs/BUS configuration</b>	
00	not installed
2R	2 relay outputs, A3, A4 SPDT
MB	Modbus RTU/ASCII, RS485
PB	Profibus DP
<b>4. Analog output</b>	
AO	0/4..20 mA; 0/2..10 V DC
<b>5. Supply voltage</b>	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
<b>6. Options</b>	
00	without option

Bus connection

Modbus		
PIN	Signal	EIA / TIA-485 name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max 10 mA	
8	RxD / TxD-N	

9 pole D-Sub connector in the front



Transmitters / Signal conditioning

# Transmitter DMS50Ex



- Weight – Force – Pressure – Torque with DMS strain gauges
- Bridge sensitivity 0.500..5.000 mV/V
- Teach-in function
- Tare function
- Min- and Max peak storage (not voltage safe)
- Integrated bridge supply 2.5 V, 5 V max. 40 mA
- Bus-interface Modbus / Profibus

## Characteristics

The DMS50Ex converts the output signal of standard strain gauges (DMS measuring bridges) into a standard signal 0/4..20 mA or 0/2..10 DC. The bridge supply and an external control input for the tare function are integrated.

If several strain gauges are required in an application, these must be connected parallel. The bridge current must not exceed 40 mA in this case.

## Technical data

### Power supply

Supply voltage : 230 V AC  $\pm 10\%$ ; 115 V AC  $\pm 10\%$   
24 V DC  $\pm 15\%$   
Um = 253 V AC or 125 V DC

Power consumption : max. 5 VA  
Operating temperature : -10..+55 °C

CE-conformity : ATEX-directive 2014/34/EU  
Standards : EN 60079-0:2006; EN60079-11:2007  
EN 61241-0:2006; EN61241-11:2006

EMC-directive / standard : 2014/30/EU / EN 61326-1:2013

### Explosion protection

Certification : Ex II (1) G [Ex ia] IIC/IIB or  
Ex II (1) D [Ex iaD]

Approval : TÜV 08 ATEX 554171

### Input

#### DMS

Bridge supply : 2.5 V / 5 V DC programmable,  
max. 40 mA

Bridge sensitivity : 0.500..5.000 mV/V

Sense line : compensated line resistance  
of max. 10  $\Omega$

Accuracy : < 0.025 %  $\pm 2$  digit

Max. no load voltage U<sub>0</sub> : 14.5 V

Max. short circuit curr. I<sub>0</sub> : 163 mA

Max. power consump. P<sub>0</sub> : 590 mW

**Explosion protection Ex ia / IIC ia / IIB**

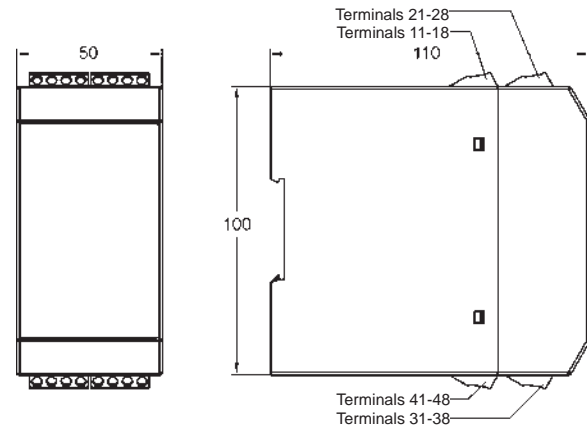
Max. external inductivity : 100mH 100mH

Max. external capacity : 25  $\mu$ F 120  $\mu$ F

Internal capacity : negligible

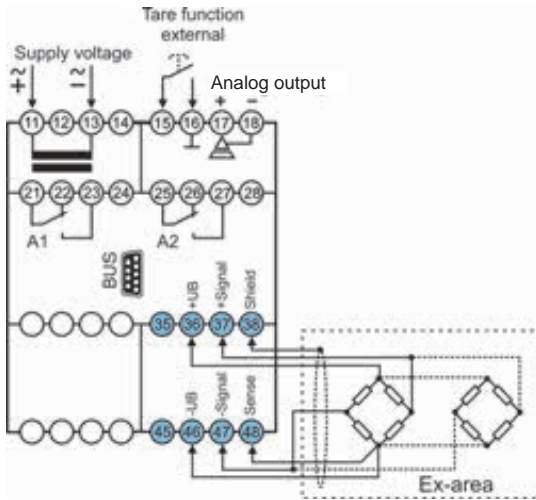
Internal inductivity	: negligible
Tare-function	: external contact
<b>Display</b>	: graphic LCD-Display 128x64 pixel, with back-light white
Indicating range	: $\pm 9999$ Digit
<b>Outputs</b>	
Relay SPDT A1-A2	: < 250 V AC < 250 VA < 2 A cos $\phi \geq 0.3$ < 300 V DC < 40 W < 2 A
Analog output	: 0/4..20 mA burden $\leq 500 \Omega$ ; 0/2..10 V burden > 500 $\Omega$ , isolated output changes burden depending
Accuracy	: 0.2 %; TK 0.01 %/K
<i>Fault indication at error in the DMS measuring circuit</i>	
→ Analog output 0 mA, < 3.6 mA or > 21.5 mA, programmable	
→ Alarm contact(s) min. or max. programmable	
<b>Bus system</b>	
Modbus	: RS485, RTU or ASCII max. 38400 Bd
Profibus	: Profibus DP
Connection	: 9 pole D-SUB connector in the front
<b>Case</b>	: Polyamide (PA) 6.6, UL94V-0, acc. to DIN EN 60715
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm <sup>2</sup> AWG 26..AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

## Dimensions



Continue next page

**Connection diagram**



Bridge supply max. 40 mA

**Ordering code**

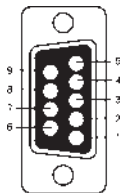
DMS50Ex -  1. -  2. -  3. -  4. -  5. -  6.

<b>1. Model</b>	
1	input DMS strain gauge, input external tare-function via contact, voltage free, intrinsically safe ATEX II (1) G [Ex ia] IIC/IIB ATEX II (1) D [Ex iaD]
<b>2. Alarm outputs</b>	
00	not installed
2R	2 relay SPDT A1, A2
<b>3. BUS configuration</b>	
00	not installed
MB	Modbus RS485 RTU, ASCII
PB	Profibus DP
<b>4. Analog output</b>	
AO	0/4..20 mA; 0/2..10 V DC
<b>5. Supply voltage</b>	
0	230 V AC ±10 % 50-60 Hz
1	115 V AC ±10 % 50-60 Hz
5	24 V DC ±15 %
<b>6. Options</b>	
00	without option

**Bus connection**

Modbus		
PIN	Signal	EIA / TIA-485 name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max 10 mA	
8	RxD / TxD-N	

9 pole D-Sub connector in the front



Transmitters / Signal conditioning

## Universal Isolating Amplifier TV125M / ST125M



- Standard inputs and outputs with adjustment function
- Safe electrical isolation between input / output / power supply by reinforced insulation in accordance to DIN EN 61010-1
- Functional safety to EN61508 SIL2
- Input intrinsically safe for the connection of sensors in the Ex-zone 0 and 20 possible
- Equipment installation in ex-zone 2
- Wide range power supply for AC and DC supply
- Power rail supply
- Output accuracy < 0.2% of full scale
- Operating display and status messages bi-color LED
- Configuration via front panel dip switches
- Coded Plug-in terminal blocks
- Small design, width 12.5 mm
- Mounting rail TS 35 and EN60715

### Characteristics

Isolation amplifiers of series TV/ST125M are suitable for potential separation or to convert the standard signals. The universal design of inputs and outputs, and the internal power supply with wide-range power supply enable a wide spectrum of applications with only one type of device.

Alternatively the power supply can be carried out via a mounting rail bus connector. The pluggable terminal strips allow a simple and time-saving wiring.

The configuration of input and output signals is done by front panel dip switches in a very easy and fast way.

Because of the microprocessor design it's possible to interpret undershooting or exceedance of the measurement range and reported about by a bi-color status LED on the front panel. In case of an error the output is then set to a defined initial value or ending value.

The initial value and the end value of the measuring range can be adjusted by means of two front-mounted trimmers. The device version of ST125 additionally provides a transmitter power supply for external 2-, 3- and 4-conductor sensors.

### Technical data

#### Explosion protection

Gas	:  II (1) G [Ex ia Ga] IIC/IIB
Dust	:  II (1) D [Ex ia Da] IIIC
Intrinsically safe + Zone 2:	II 3 G nA nC [ic] IIB T4 Gc *)
Ignition protection type „n“:	II 3 G nA nC IIB T4 Gc X *)

\*) Installation in a clean environment in a conductive, earthed housing (switch cabinet) with a minimum protection rating of IP54.

#### Characteristics intrinsically safe circuits

	All types (Terminals 41, 42)	ST125M(MP)-Ex (Terminals 51, 52)
<b>U<sub>0</sub></b>	27,6 V	25,9 V
<b>I<sub>0</sub></b>	1,3 mA	92,6 mA
<b>P<sub>0</sub></b>	9,6 mW	598 mW
<b>U<sub>i</sub></b>	26 V	-
<b>I<sub>i</sub></b>	113 mA	-
<b>P<sub>i</sub></b>	660 mW	-
	max. inductivity capacity	
<b>C<sub>i</sub></b>	1 nF	1 nF
<b>L<sub>i</sub></b>	240 nH	240 nH
	IIB / IIIC	
<b>C<sub>0</sub></b>	667 nF	769 nF
<b>L<sub>0</sub></b>	200 mH	8 mH
	IIC	
<b>C<sub>0</sub></b>	85 nF	99 nF
<b>L<sub>0</sub></b>	100 mH	2 mH

#### External Power

##### Auxiliary voltage

Wide-range power supply	: 20..125 V DC / 85..253 V AC (47..63Hz)
Power-Rail-supply	: 24 V DC +/- 15 %

Wide-range power supply	: < 4 VA
Power-Rail-supply	: < 2 W
Conformity	: Directive 2014/35/EU
EMC	: Directive 2014/30/EU
Standards	: EN 61010-1: 2010, EN 61326-1: 2013, EN 61326-3-1: 2008,
Rated voltage	: 253 V AC, 125 V DC according to EN 60079-11 300 V AC/DC according to DIN EN 61010-1 with overvoltage Category 2 and Degree of Contamination 2 between all circuits. Safe separation with amplified isolation
Test voltage	: 3kV AC Input/Output/Power supply

##### Ambient conditions

Working temperature	: -10..60°C
Storage temperature	: -20..80°C
Relative air humidity	: 10..90% (no condensation)

##### Input

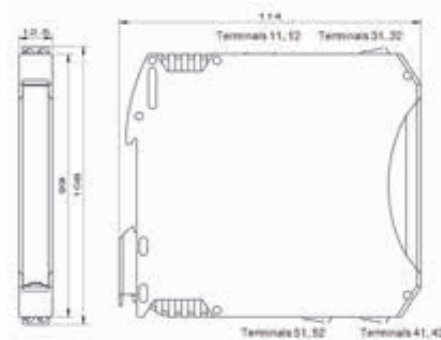
Voltage input	: 0..10V oder 2..10 V switchable, R <sub>i</sub> = 30 kΩ, overload max. 26 V DC
Current input	: 0..20 mA or 4..20 mA switchable; R <sub>i</sub> = 51 Ω, 113mA
Measuring span	: adjustable ± 2 %
Zero point	: adjustable ± 2 %



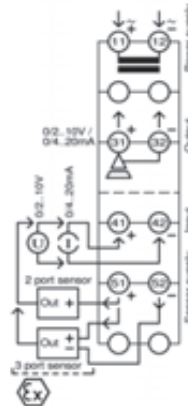
## Product information Isolating converter

<b>Output</b>	
Voltage output	: 0...10 V or 2...10 V switchable, Load > 500 Ω.
Current output	: 0..20 mA or 4..20 mA switchable, Load < 600 Ω.
Step response T90	: 40 ms
Standard error	: < 0,2 % of the end value
Temperature coefficient	: < 0,01 % / K
<b>Transmitter feed</b>	
Rated voltage at 20 mA output current	: > 15 V DC; terminals 51, 52 > 14 V DC; terminals 51, 41, Ri = 300 Ω
<b>Housing</b>	
Material	: Polyamid (PA) 6.6, UL94V-0
Weight	: 91g
Protection class	: Housing IP30, terminals IP20 BGV A3
Colour	: light grey
Installation width	: 12,5 mm
Dimension (HxT)	: 108 x 114 mm
Assembly	: Mounting rail assembly TS35 DIN EN 60715
<b>Safety Integrity</b>	
Level	: Sil 2 (parameters in accordance with EN 61508 and SN 29500) for input types 4..20 mA or 2..10 V and output types 4..20 mA or 2..10 V
Device type	: B
HFT	: 0
Error signalling	: Output 0 V respective 0 mA
Reaction time	: Normal function → error: 40 ms, error → normal function: 1s (self resetting)

### Mechanical design / dimensions



### Connection diagram



Power supply:  
85...253 VAC / 20 ... 125 VDC  
or 24 VDC +/- 15 %

Output:  
0/2 ... 10V or 0/4...20 mA

Input:  
0/2 ... 10 V or 0/4...20 mA

### Controls, functional description

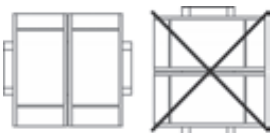


Status-LED	Message
Green LED illuminates	Operating voltage connected
Red and green LED illuminates	See manual tab. 7: Status messages
Red LED illuminates	Electronic defect

Configuration:

DIP	On	Off
S1	Voltage input	Current input
S2	Voltage output	Current output
S3	Input: S1 = On: 0 ... 10 V, S1 = Off: 0 ... 20 mA	Input: S1 = On: 2 ... 10 V, S1 = Off: 4 ... 20 mA
S4	Output: S2 = On: 0 ... 10 V, S2 = Off: 0 ... 20 mA	Output: S2 = On: 2 ... 10 V, S2 = Off: 4 ... 20 mA

### Mounting



Carrier rail mounting TS35,  
DIN EN 60715  
Mounting of multiple units without  
distance is only permitted in hori-  
zontal orientation.

### Order code

1. 2. 3. 4.  
□ - □ - □ - □

<b>1. Device version</b>	
TV125M	Wide-range mains adapter
TV125MP	Mounting rail bus connection *), Auxiliary voltage 24 V DC +/- 15 %
ST125M	Transmitter feed, Wide-range mains adapter
ST125MP	Transmitter feed, mounting rail bus connection *), Auxiliary voltage 24 V DC +/- 15 %
<b>2. Explosion protection</b>	
00	No intrinsically safe input and no intrinsically safe trans- mitter feed. The devices TV125MP and ST125MP may be installed in zone 2 according to ATEX-ignition protec- tion type "n"
Ex	<b>In case of installing the devices out of the ex-zone:</b> Input and transmitter feed are intrinsically safe in accor- dance to ignition protection type "ia" for zones 0 and 20. <b>The devices TV125MP and ST125MP may be installed</b> in zone 2 according to ATEX-ignition protection type „ic“
<b>3. Input</b>	
10	0/2...10 V / 0/4...20 mA
<b>4. Options</b>	
00	without option
01	Push-In terminals (plug-in)

\*) see separate information sheet power rail

## Universal Isolating Amplifier TV125L



- Safe galvanic isolation between input / output / auxiliary voltage with reinforced isolation in accordance with DIN EN 61010-1
- Step response  $T_{90}$  40ms
- Output deviation < 0.2% of the limit value
- Overload protection of the current input with automatically resetting fuse
- Operating display and status messages via two-colour LED
- Configuration via front DIP switches
- Plug-in terminal strips
- Narrow installation width of 12.5 mm for carrier rail mounting TS 35

### Characteristics

Isolating amplifiers of the series TV125L are suitable for potential isolation or for conversion of unit signals. The universal layout of the inputs and the output enables a broad range of applications with only one type of device. The plug-in terminal strips enable simple and time-saving wiring. The configuration is also quick and easy with the front DIP switches.

### Brief information

The input measuring ranges can be switched between 0..20 mA and 4..20 mA or 0..10 V and 2..10 V with a DIP switch on the front. The input measuring ranges can be switched between 0..20 mA and 4..20 mA or 0..10 V and 2..10 V with a DIP switch on the front.

With the microprocessor-controlled measurement logging, undercutting and exceeding of the measurement range are detected and indicated via a two-colour status LED on the front side. Then the current output is set to a defined starting or final value.

The current input is protected with an automatically resetting fuse (PTC) against static overvoltages up to 32 V AC/DC.

The required auxiliary energy is less than 0.5 VA.

The three circuits: Inputs, outputs, and auxiliary voltage, are galvanically separated with amplified isolation.

### Technical data

#### Auxiliary power

Auxiliary voltage :	18 - 30V DC
Power consumption :	< 0.5 VA
Conformity :	CE; Directive 2004/108/EC

EMC :	DIN EN 61326-1: 2013-07
Standards :	DIN EN 61010-1: 2011-07, DIN EN 61010-2: 2011-07

Rated voltage:	300 V AC/DC in accordance with DIN EN 61010-1 with Overvoltage category 2 and Degree of contamination 2 between all circuits. Safe separation with amplified isolation
----------------	--

Test voltage :	3 kV AC, 50 Hz, 1 min
----------------	-----------------------

Input / Output /  
Auxiliary power

#### Environmental conditions

Working temperature :	-10..60°C
Storage temperature :	-20..60°C
Air humidity :	< 95% (no condensation)

#### Inputs

Voltage input :	Switchable, 0..10V or 2..10 V. Ri = 47 kΩ. Max. overload 32 V AC
Current input :	Switchable, 0..20 mA or 4..20 mA. Ri = 48 Ω + 15 Ω (RiPTC). Max. overload 32 V AC/DC in accordance with DIN EN 61010-2-30

#### Output

Current output	Switchable, 0..20 mA or 4..20 mA. Load < 150 Ω.
Step response :	40 ms
Standard error :	< 0.2 % of final value
Temperature coefficient :	< 0.01 % / K

#### Casing

Material :	Polyamide (PA) 6.6 , UL94V-0,
Weight :	91g
Protection rating :	Housing IP30, terminals IP20 BGV A3
Colour :	light grey
Installation width :	12.5 mm
Dimensions (HxD) :	108 x 114 mm
Installation :	Carrier rail mounting TS35 DIN EN 60715

**Operation**

TV 125L

Status LED	Message
Green LED illuminates	Operating voltage applied
Red and green LED blink alternately with 2 Hz	measuring range undercutting or measuring range exceeding
Red LED illuminates	Failure of the unit, please return to manufacturer!

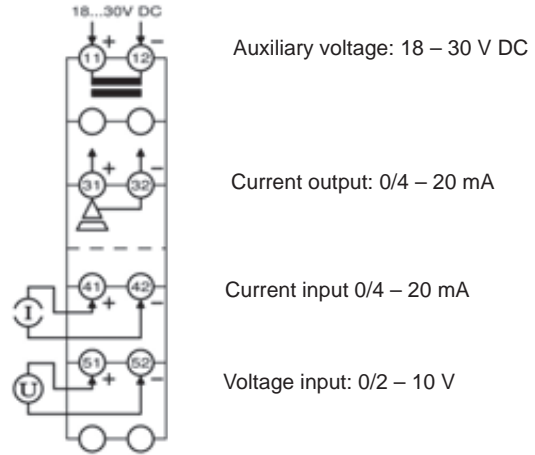
  

GHM

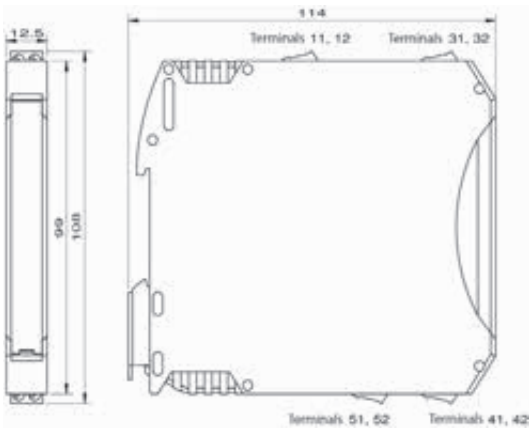
**Configuration**

S1	S2	Input	Output
Off	Off	4..20 mA, 2..10 V	4..20 mA
Off	On	4..20 mA, 2..10 V	0..20 mA
On	Off	0..20 mA, 0..10 V	4..20 mA
On	On	0..20 mA, 0..10 V	0..20 mA

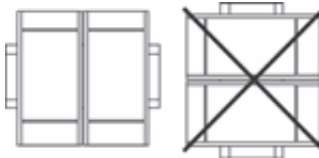
**Connection diagram**



**Dimensions**



**Installation**



Carrier rail mounting TS35, DIN EN 60715  
The gapless installation of multiple devices is now permissible with horizontally installed carrier rails.

**Ordering code**

TV -  1. -  2. -  3. -  4.

1. Device version	
125L	Auxiliary voltage 18..30 V DC
125LP	Auxiliary voltage 18..30 V DC Tragschienenbusanschluss *)
2. Metering range	
10	Inputs 0/4..20 mA and 0/2..10 V Outputs 0/4..20 mA
3. Auxiliary voltage	
5	18..30 V DC
4. Options	
00	without option
01	Push-in-clamp (plug-in)

\*) siehe gesondertes Informationsblatt Power-Rail

## Switch amplifier TS125 and TS225



- 1 or 2 channel version
- Safe galvanic isolation between input / output / auxiliary voltage
- Functional safety up to SIL2 EN61508
- Inputs for switching contacts, Namur initiators, or optocouplers
- Intrinsically safe inputs for connection of sensors in Ex Zones 0 and 20
- Device installation in Ex Zone 2 possible
- Galvanic isolation in accordance with the requirements for amplified isolation (EN60664)
- Switchable monitoring of the input circuit for wire breaks and short-circuit
- Relay outputs as normally open contacts or changeovers (invertible effect)
- Wide-range mains adapter or 24 V DC
- Configuration via front DIP switches
- Plug-in coded terminal strips
- Housing width of 12.5 or 22.5mm
- Carrier rail mounting TS35 EN60715
- Operating display, switching status and error message display via LEDs

### Characteristics

Switch amplifiers of the series TS125 and TW255 are used in switch cabinets for the conversion and isolation of digital switching signals, as well as in explosion-prone areas.

The devices are available in one- or two-channel versions.

Passive sensors, such as switching contacts, Namur initiators, or passive electronic outputs of third-party devices, can be connected to the intrinsically safe inputs.

The TS125 series in 12.5 mm wide carrier rail housing offers relay outputs with output make circuit. The TW225 series in 22.5 mm wide carrier rail housing offers relay outputs with changeover function. The plug-in terminal strips enable simple and time-saving wiring. The configuration is also quick and easy with the front DIP switches.

### Technical data

#### Explosion protection

Gas:	II (1) G [Ex ia Ga] IIC/IIB
Dust:	II (1) D [Ex ia Da] IIIC
Intrinsically safe + Zone	II 3 G nA nC [ic] IIB T4 Gc *)
Protection rating 'n':	II 3 G nA nC IIB T4 Gc X *)

\*) Manufacturer's certificate, requires installation in an earthed, conductive housing (minimum protection rating IP54)

#### Wide-range mains

Auxiliary voltage:	20..125VDC and 20..250VAC, (47..63Hz), max. 1.5W
ATEX thresholds:	$U_o = 8.7V$ ; $I_o = 19mA$ ; $P_o = 42mW$ $L_i = 20\mu H$ ; $C_i = 10nF$ IIB/IIIC: $L_o$ 100 $\mu H$ 1mH 100mH $C_o$ 12.9 $\mu F$ 7.3 $\mu F$ 2.8 $\mu F$ IIC : $L_o$ 100 $\mu H$ 1mH 100mH $C_o$ 2.2 $\mu F$ 1.2 $\mu F$ 0.4 $\mu F$

#### 24V mains adapter

Auxiliary voltage:	24V DC +/-15%, max. 1.5W
ATEX thresholds:	$U_o = 8.7V$ ; $I_o = 17mA$ ; $P_o = 37mW$ $L_i = 20\mu H$ ; $C_i = 10nF$ IIB/IIIB: $L_o$ 100 $\mu H$ 1mH 100mH $C_o$ 13.9 $\mu F$ 7.3 $\mu F$ 2.9 $\mu F$ IIC/IIIC: $L_o$ 100 $\mu H$ 1mH 100mH $C_o$ 2.2 $\mu F$ 1.3 $\mu F$ 0.4 $\mu F$

#### Combined data

$U_m$ (according to ATEX):	253V AC / 125V DC
Test voltage :	3kV AC between input/output/auxiliary voltage
Working temperature :	-10..60°C
Storage temperature :	-20..80°C
Air humidity :	10..90% (no condensation)
<b>Measuring inputs (in accordance with EN60947-5-6 Namur)</b>	
Open circuit voltage :	approx. 8V
Short circuit voltage :	approx. 8mA
Switching points :	inactive $\leq 1.2mA$ , active $\geq 2.1mA$ , hyst. $< > 0.5mA$

#### Error recognition

-Wire break :	<0.2mA
-Short circuit :	>7mA

#### Relay outputs

Switching voltage :	<250V AC <2A <500VA <125V DC <0.2A <25W < 30V DC <2A <60W
Switching frequency :	max. 5Hz
-delay :	max. 30ms

#### Casing

Dimensions (WxDxH)	TS125: 12.5 x 114 x 108mm TS225: 22.5 x 114 x 108mm
Material :	PA6.6, light grey, Flammability class V0 (UL94)
Weight :	TS125: 120g; TS225: 140g
Protection rating :	IP20
Terminals :	0.2 - 2.5mm <sup>2</sup> , AWG 24 - 14 Removable coded terminals

#### Functional safety :

SIL2 in accordance with EN61508  
(specific data on request)

## Product information Isolating converter

### Operation

- Green Power ON operating display

#### TS125...-1, TS125...-2, TS225...-1 TS225...-2

Operating elements per channel Ch.1 / Ch.2

- LEDs A1 / A2 :                   yellow ● with active relay  
  blinks ● red with error status  
  (wire break or short circuit)
- Switch INV :                    off: active input switches on the  
  assigned relay  
  off: active input switches off the  
  assigned relay

(condition as delivered underlined)

Applications with functional safety (SIL2) require switch **INV = off** and **ERR = on** !

#### TS125...-F, TS225...-F

Single-channel isolating amplifier with additional error relay or parallel relay. Operating elements :

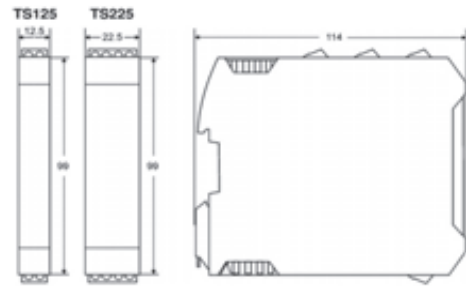
- LED A1 :                         yellow ● with active Relay A1  
  blinks ● red with error status  
  (wire break or short circuit)
- LED A2 :                         yellow ● with active Relay A2  
  (if switch ERR-Ch.2 = off)  
  blinks ● red/yellow with active  
  Relay A2 with error status  
  blinks ● red with inactive  
  Relay A2 with error status  
  (if switch ERR-Ch.2 = on)
- Switch INV-Ch.1 :            off: active input Ch.1  
  switches on Relay A1  
  on: active input Ch.1  
  switches off Relay A1
- Switch ERR-Ch.1 :            off: Error recognition via  
  Relay A1 inactive  
  on: Error recognition active  
  With error status, switches  
  off Relay A1
- Switch INV-Ch.2 :            off: active input Ch.1 or  
  alternatively an error status\*)  
  switch on Relay A2  
  on: active input Ch.1 or  
  alternatively an error status\*)  
  switch off Relay A2
- Switch ERR-Ch.2            off: Error recognition via relay  
  A2 inactive  
  (A2 switches parallel to A1)  
  \*) on: Error recognition active  
  (see Switch INV-Ch.2)

(condition as delivered underlined)

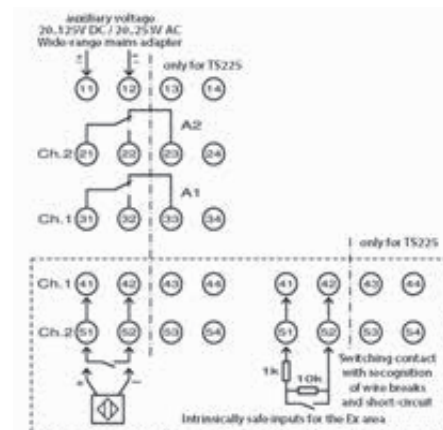
Applications with functional safety (SIL2) require switch **INV-Ch.2 = on**, **ERR-Ch.2 = on** !

INV-Ch.1 = off, INV-Ch.2 = on, ERR-Ch.2 = off simulates a changeover contact with Relay A1 / A2

### Dimensions



### Connection diagram



### Ordering code

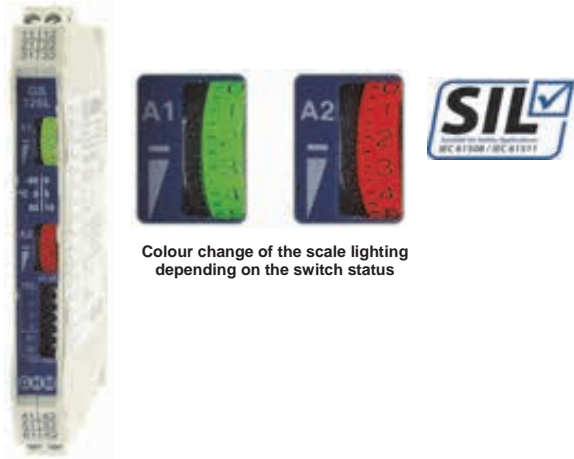
1.    2.    3.    4.  
TS -  -  -  -

1. Device version	
125L	Housing width 12.5mm, Relay NO contacts, Auxiliary voltage 24V DC +/-15%
125LP	Housing width 12.5mm, Relay NO contacts, Auxiliary voltage 24V DC +/-15% with DIN-rail bus connector / Power Rail *)
125M	Housing width 12.5mm, Relay NO contacts, Wide-range mains adapter 20..125 VDC, 20..250 VAC
225M	Housing width 22.5mm, Relay changeover contacts, Wide-range mains adapter 20..125 VDC, 20..250 VAC
2. Explosion protection	
00	Installation of the device TV125L in Zone 2 permitted, in accordance with ATEX ignition protection rating 'n'
Ex	<b>With installation of the devices outside the Ex area:</b> Inputs intrinsically safe in accordance with ATEX ignition protection rating 'ia' for Zones 0 and 20 <b>The device TS125L</b> may be installed in Zone 2 in accordance with ATEX ignition protection rating 'ic'.
3. Number of channels	
1	Single channel
2	Dual channel
F	Single channel with additional error relay or parallel relay
4. Options	
00	without option

\*)see separate information sheet Power Rail



# Limit value switch GS125



- Universal input for unit signals,
- Pt100, thermocouple, potentiometer, switchable via front-side DIP switch
- 1 or 2 relay outputs
- Universal relay connection
- Adjustable min/max contact function
- Actual value output 4 .. 20mA
- 2-colour illuminated scales for limit value adjustment, colour depends on switch status
- With Pt100 sensors, monitoring of sensor break and short-circuit
- Wide-range mains adapter or 24 V DC
- Functional safety up to SIL2
- Housing width 12.5 mm
- Removal coded terminals
- Carrier rail mounting TS35 EN60715
- Safe galvanic isolation between input / output / auxiliary voltage

## Technical data

Limit value switches of the series GS125 are used in switch cabinets for process monitoring or for simple process regulation.

Both temperatures and derived variables such as voltage, current and resistance are used as control signals. In the process, 1 or 2 limit values can be monitored.

The universal configurability of the measuring inputs reduces the stock requirement for various applications.

The housing width of only 12.5mm enables space-saving installation in the switch cabinet. The scales for the limit value setting, illuminated red or green depending on the switch status, also enable operating in dark environments.

For assignment of the measuring unit to the scale labelling, 24 transparent adhesive labels are supplied. They can be glued between the adjusting wheels on the front panel.

## Measurement inputs

Switchable via DIP switch	
Unit signals	: 0/2..10 V 0/4..20 mA
Potentiometer	: 500 Ω..20 kΩ
Pt100	: -50..50°C 0..50°C 0..100°C 0..150°C 0..200°C 0..300°C 0..500°C
Thermocouple	
FeCuNi, Type J	: 0..250°C 0..500°C
NiCrNi, Type K	: 0..500°C 0..750°C 0..1000°C
PtRhPt, Type S	: 0..1500°C

(Special measurement ranges available on request)

## Technical data

### Wide-range power supply

Voltage	: 20..125 V DC and 20..250 V AC, (47 - 63Hz), max. 1.5W
---------	--

### 24 V power supply

Voltage	: 24 V DC +/-15%, max. 1.5W
---------	-----------------------------

### Combined data

Rated voltage	: 253 V AC
Test voltage	: 3kV AC between input/relay output/auxiliary voltage
Operating temperature	: -10..60 °C
Storage temperature	: -20..80 °C
Air humidity	: 10..90 % (non-condensing)

### Measurement inputs

Voltage	: 0/2..10 V, Ri approx. 20 kΩ
Current	: 0/4..20 mA, Ri approx. 60 Ω
Pt100	: linearised, measurement current approx. 1.6 mA Relays become inactive if there is a sensor break or short-circuit

Thermocouple	: linearised with comparison position compensation
Resistance	: (3-wire), nominal value 500 Ω..20 kΩ Internal reference voltage approx. 1.5 V

### Relay outputs

Switching voltage	: < 250 V AC <2 A <500 VA < 125 V DC <0.2 A <25 W < 30 V DC <2 A <60 W
Switching frequency	: max. 5 Hz
Switching hysteresis	: approx. 1%

### Functional safety

: SIL2 in accordance with EN61508 (specific data available on request)
---

### Setpoint setting

: Scale precision: 2 %
------------------------

### Actual value output

: 4..20 mA, resistance max. 120 Ω, No galvanic isolation from the input signal
--

## Product information Safety and Monitoring

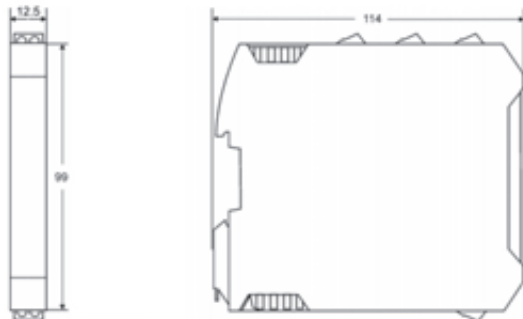
Input signal	Basic precision-actual value output	Temperature deviation *)
0/2..10V	0.2%	0.004%/K
0/4..20mA	0.2%	0.004%/K
Potentiometer	1%	0.007%/K
Pt100 -50.. 50°C	0.5%	0.03%/K
Pt100 0.. 50°C	0.9%	0.04%/K
Pt100 0..100°C	0.5%	0.03%/K
Pt100 0..150°C	0.2%	0.02%/K
Pt100 0..200°C	0.4%	0.02%/K
Pt100 0..300°C	0.3%	0.01%/K
Pt100 0..500°C	0.2%	0.007%/K
FeCuNi 0..250°C	1.0%	0.04%/K
FeCuNi 0..500°C	0.5%	0.03%/K
NiCrNi 0..500°C	0.5%	0.04%/K
NiCrNi 0..750°C	0.4%	0.03%/K
NiCrNi 0..1000°C	0.3%	0.02%/K
PtRhPt 0..1500°C	1.0%	0.04%/K

\*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10..+60°C)

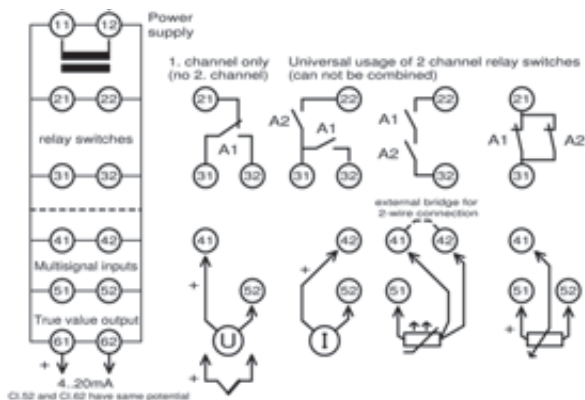
### Housing

Dimensions (WxDxH)	: 12.5 x 115 x 108 mm
Material	: PA6.6, light grey, Flammability class V0 (UL94)
Weight	: 120 g
Protection class	: IP20
Screw terminals	: 0,2..2,5 mm <sup>2</sup> , AWG 24..14,
Push-In-Terminals	: 0,5..1,5 mm <sup>2</sup> , AWG 25..16, coded terminals

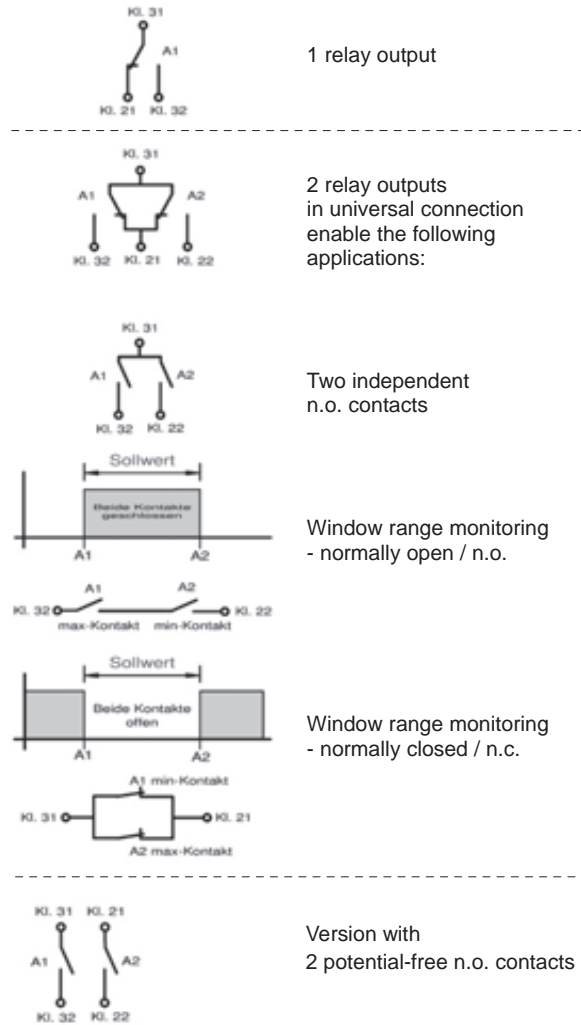
### Dimensions



### Connection diagram



### Limit value contacts



### Ordering code

GS  1.  2.  3.  4.

1. Device version	
125L	Power supply 24V DC +/-15%
125LP	Power supply:24V DC +/-15% with carrier rail bus connection *)
125M	Wide-range power supply 20..125 V DC / 20..253V AC
2. Limit value contacts	
1	1 relay (changeover contact)
2	2 relays (universal connection)
3	2 relays (potential-free n.o. contacts)
3. Actual value output	
0	not provided
1	Output 4..20 mA
4. Options	
00	No options
01	Push-in terminals (plug-in)

\*) Delivery incl. bus adapter see also separate information sheet Power-Rail

# Thermal Limiter TB225

(in accordance with DIN EN 14597)



- Can be used as a temperature limiter and monitor
- Certified in accordance with DIN EN 14597
- adapted for all sensors according to DIN EN14597
- Pt100 inputs, dual thermocouple, input signals
- 2 changeover relays
- Configuration via backlit graphic display
- 'White / Red' display colour change in the case of an alarm
- Safe galvanic isolation between input / output / auxiliary voltage
- Automatic recognition of the output signal
- Wide-range mains adapter
- Carrier rail mounting TS 35

## Characteristics

The temperature limiter TB225 is used for applications where thermal processes must be monitored and the system must be switched to a safe operating state in the case of a fault. The device has universal inputs for the connection of dual thermocouples, Pt100 sensors, and input signals (0/4..20mA or 0/2..10V). The safety function is provided by means of the main relay with configurable threshold. An additional relay with an independently adjustable threshold is provided for additional signalling. The TB225 also offers an analog output which can be freely defined within the measuring range of the temperature input. The resetting of the device in the operating mode as a temperature limiter can take place via the buttons on the front, the integrated graphic display, or using an external switch or external voltage. The TB225 has safe 3-way electrical isolation between input, output, and auxiliary voltage.

## Brief information

The connected temperature signal is evaluated and monitored. If the permissible threshold is reached or an error occurs within the permissible temperature range, the TB225 switches off immediately. The additional relay output of the TB225 enables the function of a preliminary alarm with an independent threshold. TB225 is adapted for the use with all sensors according to EN14597.

The following operating modes are possible through configuration:

### Temperature limiter:

Maximum or minimum monitoring with catch, manual resetting after fault elimination via the front keys or an external switch / voltage signal.

Operating methods in accordance with EN14597: 02/2015: Type 2B, 2H, 2V

### Temperature monitor:

Maximum or minimum monitoring without catch, automatic resetting on return to the permissible range.

Operating methods in accordance with EN 14597: 02/2015: Type 2B

## Technical data

### Auxiliary power

Auxiliary voltage : 18 – 230 V AC/DC  
 Power consumption : < 5 VA  
 Rated voltage : 250V AC in accordance with EN 60730-1: 10/2012, between input / relay output / auxiliary voltage, Degree of contamination 2, Overvoltage category III  
 Rated surge voltage 4kV

CE Conformity : EN 14597 02/2015  
 EN 61326: 07/2013

### Environmental conditions

Operating temperature : -10..+55 °C  
 storage temperature : -20..+60 °C  
 Relative air humidity : < 95 %  
 Condensation : not permitted

### Approvals

DIN EN 14597: 02/2015 : Temperature control devices and temperature limiters for heat generating systems

### Input

Pt100 : -100.0..600.0°C  
 Accuracy : 0,2%, ±1 Digit  
 Temperature coefficient : 0,01%/K  
 Thermocouple : Type J:Fe-CuNi-100..800°C  
 Type K: NiCr-Ni -150..1200°C  
 Type N: NiCrSi-NiSi -150..1200°C  
 Type S:Pt10RH-PT 0..1600°C  
 Reference junction compensation integrated

Accuracy: : <0.3 %, ±1 digit  
 Temperature coefficient : 0.01 %/K  
 Analog input : 0/2..10 V DC, 0/4..20 mA  
 0..10 V und 0..20 mA not allowed for temperature limiter

Accuracy : 0,2%, ±1 Digit  
 Temperature coefficient : 0,01%/K

### Display

graphic LC display with 32 x 90 pixel, with white/red background lighting

### Outputs

Switching outputs : 2 x relay  
 Changeover relay : < 250 V AC < 500 VA < 2 A ohmic load  
 < 30 V DC < 60W < 2 A ohmic load  
 Internal main relay secured with 2A fuse!  
 Fuse is not interchangeable!

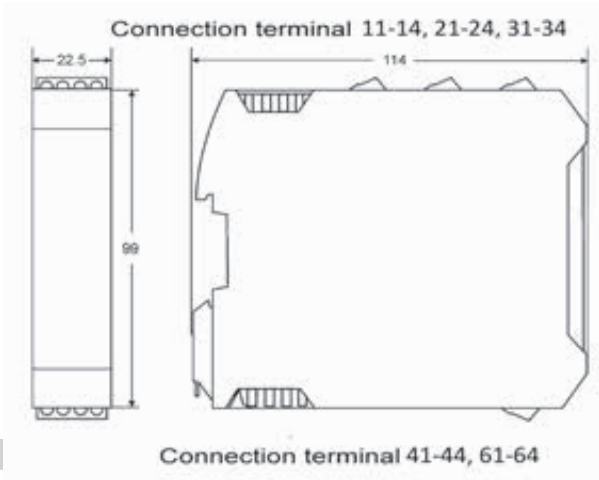
Analog output : 0/4..20 mA load ≤ 500 Ω  
 0/2..10 V DC load > 500 Ω electrically isolated.

Output switches automatically (load-dependent)  
 Housing : polyamide (PA) 6.6 , UL94V-0, TS35 in accordance with DIN EN 60715

Weight : approximately 180 g  
 Connection : screw terminals 0.14..2.5 mm<sup>2</sup> with wire protection 0.14 - 2.5 mm<sup>2</sup> (AWG 26 - 14)

Protection rating : IP20, BGV A3

**Dimensions**

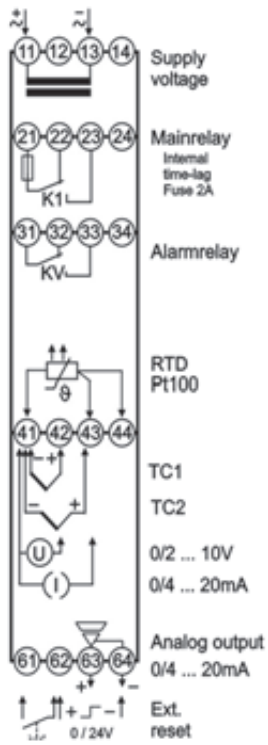


**Ordering code**

1. 2. 3. 4.  
TB225 -  -  -  -

<b>1. Version/input</b>	0	Universal input
<b>2. Output</b>	0	2 relay / 1 analog output 0/4..20 mA
<b>3. Auxiliary voltage</b>	0	18 – 230 V AC/DC
<b>4. Options</b>	00	without option
	01	Push-in terminal block

**Connection diagram**



# Safety Temperature Limiter STL50

(acc. to DIN EN 14597, SIL 2)



- Useable as Temperature Limiter/-Guard and Exhaust gas Temperature Limiter
- Certified according to DIN EN 14597 SIL2
- Inputs RTD Pt100 or double-thermocouple
- Limit value and switching hysteresis programmable
- Basic accuracy < 0.5%, ± 2 digit
- Reaction time ≤ 0.5 s
- 1 Relay for safety-relevant temperature limit, forcibly guided
- 1 Relay for pre-alarm
- Analogue output 0/4... 20mA; 0/2... 10 VDC
- Memory function for error message
- Operator lock (password protection)
- Contact input for external reset
- 24 V DC signal for external alarm message

## Characteristics

The STL50 safety temperature limiter is used where ever thermal processes must be monitored and the system must be transferred into a safe operational state in case of fault. If the permissible temperature limit value is reached, or if a fault occurs within the permissible temperature range on the monitoring equipment (sensor open, sensor short-circuit, failure of a component part in the device, fault in the software, failure or inadmissible value of the supply voltage etc.), the STL50 switches off without delay.

The alarm contact is activated, the LED ALARM on the front panel and the back-lighting of the display light up, and the error cause is indicated as plain text on the display. In addition, there is a 24 V DC signal present on the terminals 16-17 for an external alarm signal. Alternatively, the device can be reset using an external contact. In addition, the STL50 optionally has an programmable analog output with up or downscaling function, as well as a precontact.

## Description

### Programming

The device is programmable via front side buttons in connection with the graphic display.

### Operating modes

The device can be used as:

STB → Maximum- or minimum-monitoring with hold. Reset possible after omission of the fault with the external or internal button.

ASTB → as before, but monitoring the exhaust gas temperature

STW → Maximum- or minimum-monitoring without hold.

Automatic reset after leaving the dangerous range

Switching hysteresis always acts in the direction of safe range.

The last fault is stored as plain text and can be called up in the working level and deleted.

### Temperature sensor

When using the device according to DIN EN 14597, temperature sensors which are approved according to DIN EN 14597 must be used!

## Technical data

### Power supply

Supply voltage : 230 V AC ±10 %  
115 V AC ±10 %  
24 V DC ±15 %

Power consumption : < 4 VA

CE-conformity : EN 61326-1: 2013  
EN 61326-2-2: 2013

### Ambient conditions

Operating temperature : -10..+55 °C  
Storage temperature : -30..+60 °C  
Relative humidity : < 95 %  
Condensation : not permitted  
Vibrations : operation only in vibration less ambient

### Approvals

EN 14597:2012 : Temperature control devices and temperature limiters for heatgenerating systems  
EN 61508:2011 SIL2 : Functional security safety-related electrical/electronic/programmable electronic systems

### Input

Pt100 : in the range -100,0..+600,0 °C  
3-wire,  
max. line resistance 4 Ω  
each line  
sensor current <1 mA  
(non self heating)

### Thermocouple

Typ J : Fe-CuNi, -100,0..+800,0 °C  
Typ K : NiCr-Ni,-150..+1200 °C  
Typ N : NiCrSi-NiSi, -150..+1200 °C  
Typ S : Pt10Rh-Pt, 0..+1600 °C  
cold junction compensation integrated  
Accuracy : <0,5 %, ±2 Digit  
Temperature coefficient : 0,01 %/K  
Display : graphic-LCD-display 28 x 64 Pixel,  
with white LCD-backlight

### Outputs

Main relays : SPDT  
<250 V AC <200 VA <2 A cosφ ≥0,7;  
<250 VDC <80 W <2 A, forcibly guided,  
internal fuse 2 A (slow-blow)  
Pre-alarm relays : SPDT <250 V AC <500 VA <  
2 A ohmic load;  
<30 VDC <60 W <2 A,  
Analogue output : 0/4 ... 20mA burden ≤500Ω; 0/2 ... 10V  
burden > 500Ω, galvanically isolated  
Output automatically changing  
(burdendependend)

### Accuracy

(analogue output) : 0,4 %; TK: 0,01% /K  
Case : Polyamide (PA) 6.6, UL94V-0,  
TS35 according to DIN EN 60715

### Weight

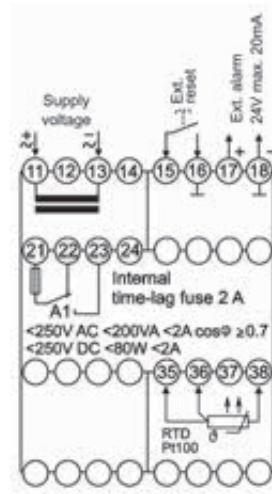
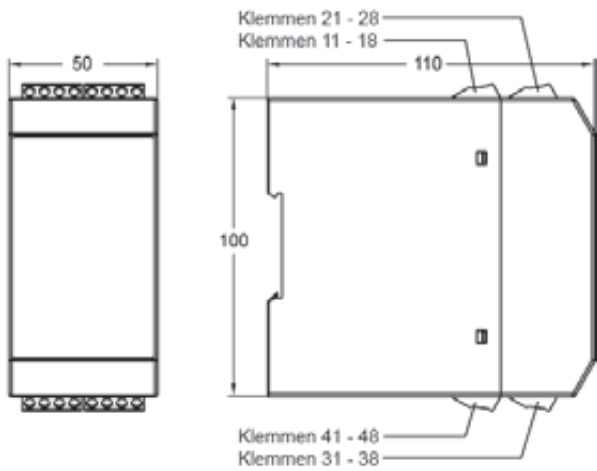
Connection : approx. 450 g  
: screw terminals 0,14..2,5 mm<sup>2</sup>  
(AWG 26 .. 14)

### Protection class

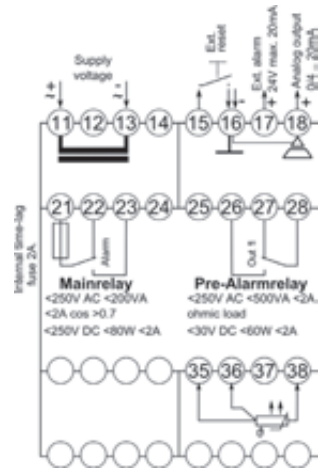
: IP20, DIN EN 60529, BGV A3



**Dimensions**

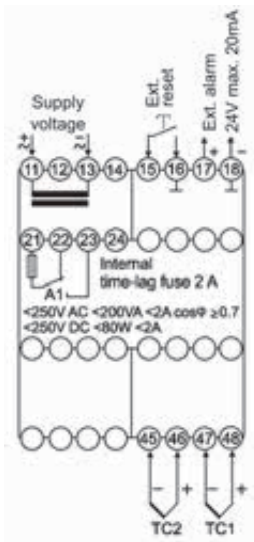


Pt100-1R

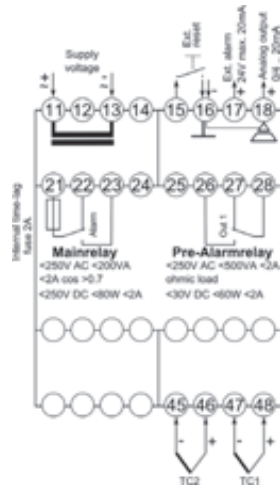


Pt100-2RAO

**Connection diagrams**



Thermocouple 1R



Thermocouple 2RAO

**Accessories:**

**Temperature sensor**

- When using STL50 as safety limiter -or guard- according to EN14597, safety temperature sensors acc. To 14597 have to be used: See our products TR296/293, TC296/293
- Temperature sensor for SIL applications: Temperature sensors without transducers are passive elements and not SIL-classified. All sensors of our portfolio can be used. PFD characteristics for resistance elements or thermocouples are to be found in the standard tables. Alternatively manufacturer declarations of evaluation electronics and sensors to the SIL level can be created on request.

**Ordering code**

STL50 -  1. -  2. -  3. -  4.

1.	Device type/input
1	Pt100, 3-wire, -100,0..+600,0 °C
5	Thermocouple J (Fe-CuNi), -100,0..+800,0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), 0..1600 °C
2.	Output
1R	1 alarm output, relay SPDT
2RAO	2 relay SPDT + analogue output
3.	Supply voltage
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
4	24 V AC, ± 15 % 50-60 Hz
5	24 V DC, ± 15 %
4.	Options
00	Without option

# Safety Temperature Limiter STL50Ex

(acc. to DIN EN 14597, SIL 2)



- Useable as Temperature Limiter/-Guard and Exhaust gas Temperature Limiter
- Certified according to DIN EN 14597 SIL2
- Intrinsically safe input for use with temperature sensors in 0/20; 1/21; 2/22
- Inputs RTD Pt100 or double-thermocouple
- Limit value and switching hysteresis programmable
- Basic accuracy < 0.5%, ± 2 digit
- Reaction time ≤ 0.5 s
- 1 Relay for safety-relevant temperature limit, forcibly guided
- 1 Relay for pre-alarm
- Analogue output 0,4..20mA; 0/2..10 VDC
- Memory function for error message
- Operator lock (password protection)
- Contact input for external reset
- 24 V DC signal for external alarm message

## Characteristics

The STL50Ex safety temperature limiter is used where ever thermal processes must be monitored and the system must be transferred into a safe operational state in case of fault. If the permissible temperature limit value is reached, or if a fault occurs within the permissible temperature range on the monitoring equipment (sensor open, sensor short-circuit, failure of a component part in the device, fault in the software, failure or inadmissible value of the supply voltage etc.), the STL50Ex switches off without delay. The alarm contact is activated, the LED ALARM on the front panel and the back-lighting of the display light up, and the error cause is indicated as plain text on the display. In addition, there is a 24 V DC signal present on the terminals 16-17 for an external alarm signal. Alternatively, the device can be reset using an external contact. In addition, the STL50Ex optionally has an programmable analog output with up or downscaling function, as well as a precontact.

## Description

### Programming

The device is programmable via front side buttons in connection with the graphic display.

### Operating modes

The device can be used as:

- STB → Maximum- or minimum-monitoring with hold. Reset possible after omission of the fault with the external or internal button.
- ASTB → as before, but monitoring the exhaust gas temperature
- STW → Maximum- or minimum-monitoring without hold. Automatic reset after leaving the dangerous range.

Switching hysteresis always acts in the direction of safe range. The last fault is stored as plain text and can be called up in the working level and deleted.

### Temperature sensor

When using the device according to DIN EN 14597, temperature sensors which are approved according to DIN EN 14597 must be used!

## Technical data

### Power supply

Supply voltage	: 230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 %
Power consumption	: < 4 VA
CE-conformity	: EN 61326-1: 2013 EN 61326-2-2: 2013

### Ambient conditions

Operating temperature	: -10..+55 °C
Storage temperature	: -30..+60 °C
Relative humidity	: < 95 %
Condensation	: not permitted, operation only in vibration less ambient

### Approvals

EN 14597:2005	: temperature control devices and temperature limiters for heat-generating systems
EN 61508:2001 SIL2	: Functional security safety-related electrical/electronic/programmable electronic systems

### Input

Explosion protection	: II (1) G [Ex ia] IIC/IIB or II (1) D [Ex ia Da] IIIC
Approval	: TÜV 07 ATEX 554295
Pt100	: -100.0..+600.0 °C, 3-wire, 3-wire, max. line resistance 4 Ω each line, sensor current < 1 mA (non self heating)

### Data in case of an error

Max. voltage no load U <sub>0</sub>	: 1.4 V
Max. short circuit current I <sub>0</sub>	: 6 mA
Max. power loss P <sub>0</sub>	: 7 mW
Min. internal resistor R	: 1.6 kΩ (curve trapezoidal)

### Explosion protection

Max. external inductivity	: 100mH	20mH
Max. external capacity	: 110µF	28 µF
Internal capacity	: negligible	
Internal inductivity	: negligible	

### Thermocouple

Type J	: Fe-CuNi, -100.0..+800.0°C
Type K	: NiCr-Ni, -150..+1200 °C
Type N	: NiCrSi-NiSi, -150..+1200°C
Type S	: Pt10Rh-Pt, 0..1600 °C cold junction compensation integrated

### Data in case of an error

Max. voltage no load U <sub>0</sub>	: 0.7 V
Max. short circuit current I <sub>0</sub>	: 2 mA
Max. power loss P <sub>0</sub>	: 1.5 mW
Min. internal resistor R	: 5 kΩ (curve trapezoidal)

### Explosion protection

Max. external inductivity	: 100mH	50mH
Max. external capacity	: 240µF	54 µF
Internal capacity	: negligible	
Internal inductivity	: negligible	

Accuracy	: < 0.5 %, ± 2 Digit
Temperature coefficient	: 0.01 %/K
Display	: graphic LCD-display 28 x 64 Pixel, with white LCD-backlight

Continue next page >

- Output**  
Relay : SPDT  
<250 V AC <200 VA <2 A  
cos Phi ≥0.7  
<250 VDC <80 W <2 A,  
internal fused 2 A (slow-blow)
- Pre-alarm relays : SPDT <250 V AC <500 VA <2 A  
ohmic load;<30 VDC <60 W <2 A,
- Analogue output : 0/4 ... 20mA burden ≤500Ω; 0/2..10V  
burden > 500Ω, galvanically isolated  
Output automatically changing  
(burdendependend)
- Accuracy (analogue output) : 0,04 %; TK: 0,01% /K
- Case** : Polyamide (PA) 6.6 , UL94V-0,  
TS35 acc. to DIN EN 60715
- Weight : approx. 450 g
- Connection : screw terminals 0.14..2.5 mm<sup>2</sup>  
(AWG 26 .. 14)
- Protection class : IP20, DIN EN 60529, BGV A3

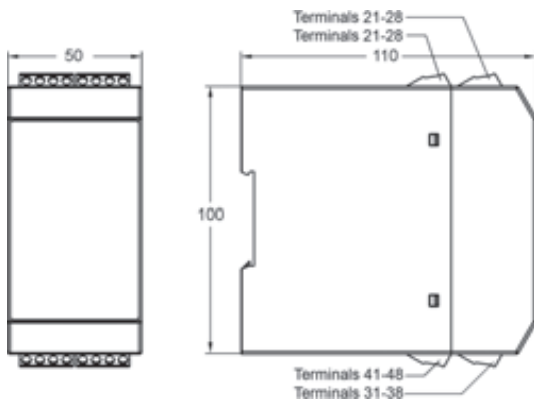
**Ordering code**

STL50Ex -  -  -  -

1. 2. 3. 4.

<b>1. Device type/input</b>	
1	Pt100, 3-wire, -100.0..+600.0 °C
5	Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), 0..1600 °C
<b>2. Output</b>	
1R	1 alarm output relay
2RAO	2 relay outputs + analog output
<b>3. Supply voltage</b>	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
<b>4. Options</b>	
00	without option

**Dimensions**

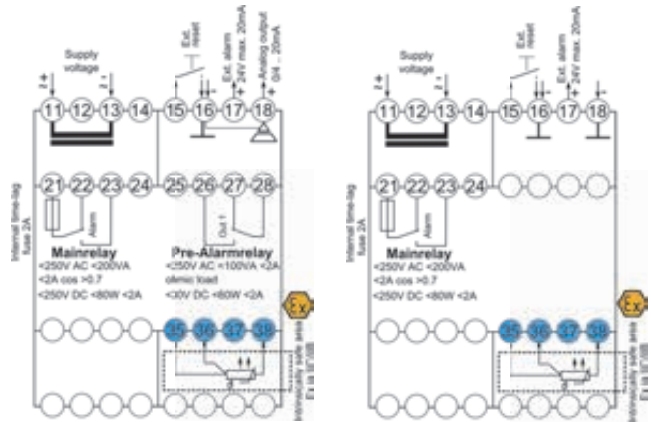


**Connection diagrams**

**Pt100**

with pre-alarm / analog

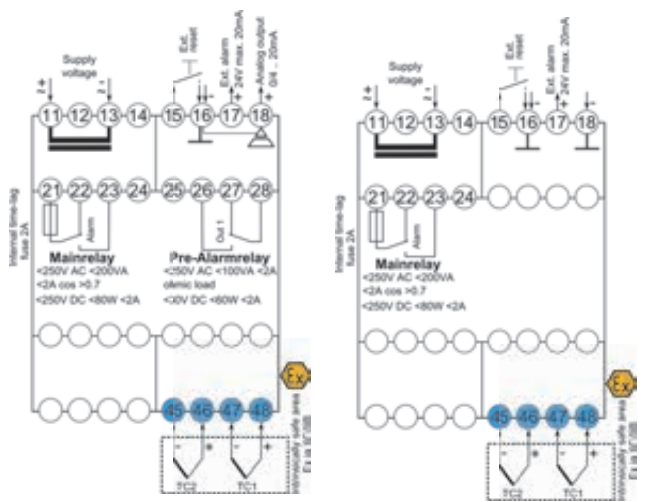
without pre-alarm / analog



**Thermo**

with pre-alarm / analog

without pre-alarm / analog



**Accessories**

**Temperature sensor**

- When using STL50Ex as safety limiter -or guard according to EN14597, safety temperature sensors acc. To 14597 have to be used: See our products TR296/293, TC296/293

- Temperature sensor for SIL applications: Temperature sensors without transducers are passive elements and not SIL-classified. All sensors of our portfolio can be used. PFD characteristics for resistance elements or thermocouples are to be found in the standard tables. Alternatively manufacturer declarations of evaluation electronics and sensors to the SIL level can be created on request.

# Monitoring Relay MR50



- Input standard signals 0/4..20 mA, 0/2..10 V DC
- Measuring range programmable
- Max. 4 alarm outputs
- Isolated analog output 0/4..20 mA, 0/2..10 V DC

## Characteristics

The Monitoring Relay MR50 has inputs for industry standard signals 0/4..20 mA and 0/2..10 V DC. Measuring value and programmed unit are shown in the display. The integrated transmitter supply offers direct connection of loop powered sensors. Simple programming, up to 4 alarm outputs (SPDT) and optional available fully isolated free programmable analog output 0/4..20 mA; 0/2..10 V DC meets the demand for different applications.

## Technical data

### Power supply

Supply voltage : 230 V AC ±10 %, 115 V AC ±10 %, or 24 V DC ±15 %

Power consumption : max. 5 VA

### Operating

temperature : -10..+55 °C

CE-conformity : EN 61326-1:2013

EN 60664-1:2007

Input : 0/4..20 mA; 0/2..10 V DC

Ri : current 10 Ω, voltage 10 kΩ

Fault detection : break of wire

Accuracy : <0,1 %, ±1 Digit

Transmitter supply : 24 V DC max. 30mA

### Outputs

Relay SPDT : < 250 V AC < 250 VA < 2 A  
cosφ ≥ 0.3, < 300 V DC < 40 W < 2 A

Analog output : 0/4..20 mA, burden ≤500 Ω;  
0/2..10 V burden >500 Ω, isolated,  
output changes automatically  
(burden dependent)

Accuracy : 0.2 %;TK 0.01 %/K

### Fault function at break of wire:

→ Analog output : 0 mA, < 3.6 mA or >21.5 mA

→ Alarm contact(s) : min. or max. programmable

### Display

: graphic LCD-display with 128 x 64 Pixel,  
and white back-light

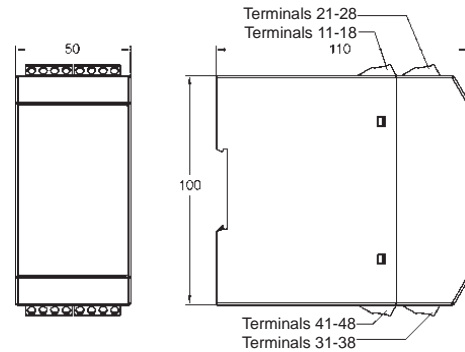
Case : Polyamide (PA) 6.6 , UL94V-0  
acc. to DIN EN 60715

Weight : approx. 450 g

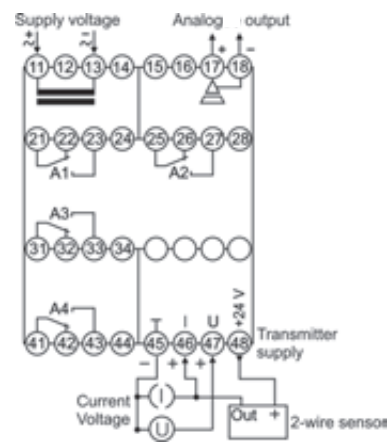
Connection : screw terminals 0.14..2.5 mm<sup>2</sup>  
(AWG 26..14)

Protection class : case IP30, terminals IP20, BGV A3

## Dimensions



## Connection diagram



## Ordering code

MR50 - 1. - 2. - 3. - 4. - 5. - 6.

1. Input	
1	standard signals 0/4..20 mA, 0/2..10 V DC, transmitter supply 24 V DC, max. 30 mA
2. Alarm output A1, A2	
2R	2 relays SPDT
3. Alarm output A3, A4	
00	not installed
2R	2 relays SPDT
4. Analog output	
00	not installed
AO	0/4..20 mA, 0/2..10 V DC
5. Supply voltage	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
6. Options	
00	without option

# Monitoring Relay MR50Ex



- Input standard signals 0/4..20 mA, 0/2..10 V DC
- Measuring range programmable
- Max. 2 alarm outputs
- Isolated analog output 0/4..20 mA, 0/2..10 V DC

## Characteristics

The Monitoring Relay MR50Ex has inputs for industry standard signals 0/4..20 mA and 0/2..10 V DC. Measuring value and the programmed unit are shown in the display. The integrated transmitter supply offers direct connection of loop powered sensors. Simple programming, up to 2 alarm outputs (SPDT) and an optional available fully isolated free programmable analog output 0/4..20mA; 0/2..10 V DC meets the demand for different applications.

## Technical data

### Power supply

Supply voltage : 230 V AC ±10 %,  
115 V AC ±10 %,  
24 V DC ±15 %  
 $U_m=253$  V AC or 125 V DC  
(terminals 11 and 13)

Power consumption : max. 5 VA

Operating temperature : -10..+55 °C

CE-conformity : ATEX-directive 2014/34/EU

Standards : EN 60079-0:2006 EN 60079-11:2007  
EN 61241-0:2006 EN 61241-11:2006,

EMC-directive / standard : 2014/30/EU / EN 61326-1:2013

### Inputs

Explosion protection : Ex II (1) G [Ex ia] IIC/IIB or  
II (1) D [Ex iaD]

Approval : TÜV 08 ATEX 554329

Input : 0/4..20 mA; 0/2..10 V DC

Ri : current 10 Ω,  
voltage 10 kΩ

Fault detection : break of wire in the measuring circuit  
(terminals 45, 46 and 47)

Accuracy : < 0.1 %, ±1 Digit

Temperature coefficient : 0.01 %/K

### Safety data

Max. no load voltage  $U_0$  : 18.9 V

Max. short circuit curr.  $I_0$  : 92.5 mA

Max. output power  $P_0$  : 580 mW

Resistance R : 272 Ω

Characteristics : trapezoidal

Internal inductivity : 4 μH

Internal capacity : 1.2 nF

Transmitter supply : approx. 16 V DC max. 20 mA  
(terminal 48)

### Explosion protection

Max. ext. inductivity : 2.3 mH 0.1 mH 5 mH

Max. ext. capacity : 0.12 μF 0.22 μF 0.76 μF

At connecting of externally supplied active intrinsically safe circuits the rules for the interconnection of intrinsically safe circuits have to be observed.

Max. values  $U_i$  : 30 V

$I_i$  : 52 mA

$P_i$  : 980 mW

### Outputs

Relay SPDT : < 250 V AC < 250 VA < 2 A

$\cos \varphi \geq 0.3$ ,

< 300 V DC < 40 W < 2 A

(terminals 21, 22, 23; 25, 26, 27)

Analog output : 0/4..20 mA, burden  $\leq 500 \Omega$ ;

0/2..10 V burden  $> 500 \Omega$ , isolated,

output changes automatically

(burden dependent)

Accuracy : 0.2 %; TK 0.01 %/K

for connection at electrical equipments with supply voltage of max. 230V (terminals 17 and 18)

Fault function : break of wire in the measuring circuit:

→ analog output 0 mA,

< 3.6 mA or > 21.5 mA

→ alarm contact(s)

min. or max. programmable

Display : Graphic-LCD-Display, 128 x 64 Pixel,  
with white back-light

Case : Polyamide (PA) 6.6, UL94V-0  
acc. to DIN EN 60715

Weight : approx. 450 g

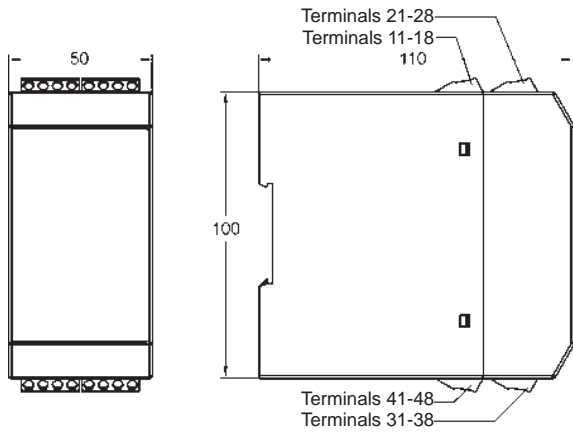
Connection : screw terminals 0.14..2.5 mm<sup>2</sup>  
(AWG 26..14)

Protection class : case IP30, terminals IP20, BGV A3

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**Dimensions**

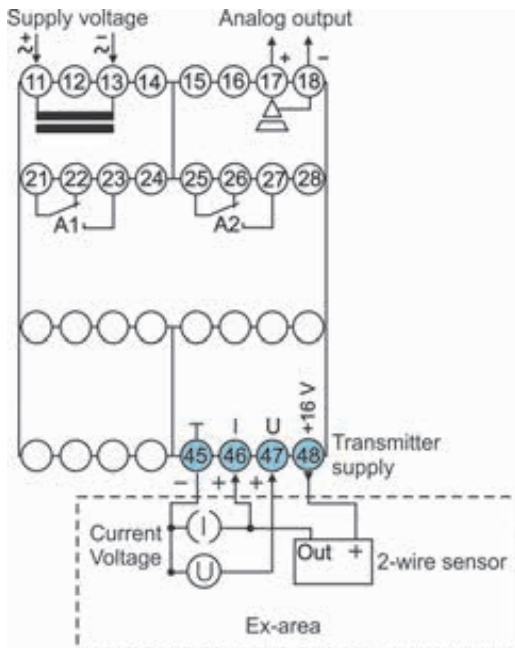


**Ordering code**

MR50Ex -  1. -  2. -  3. -  4. -  5. -  6.

1. Input	
1	standard signals 0/4..20 mA, 0/2..10 V DC, transmitter supply approx. 16 V DC, max. 20 mA, inputs intrinsically safe
2. Alarm output A1, A2	
2R	2 relay SPDT
3. Alarm output A3, A4	
00	not available
4. Analog output	
00	not installed
AO	0/4..20 mA, 0/2..10 V DC
5. Supply voltage	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
6. Options	
00	without option

**Connection diagram**



# Temperature Guard TG50



<b>Output</b>	
Alarm A1-A4	: relay SPDT < 250 V AC < 250 VA < 2 A cos Phi ≥ 0.3 < 300 V DC < 40 W < 2 A
Analog	: 0/4..20 mA burden ≤500 Ω 0/2..10 V burden >500 Ω isolated, automatic output changing (burden dependent)
- Accuracy	: 0.2 %;TK 0.01 %/K
Fault indication	: for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → Alarm relays min. or max. function programmable
<b>Case</b>	: Polyamide (PA) 6.6 , UL94V-0 TS35 acc. to DIN EN 60715:2001-09
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm <sup>2</sup> AWG 26..AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

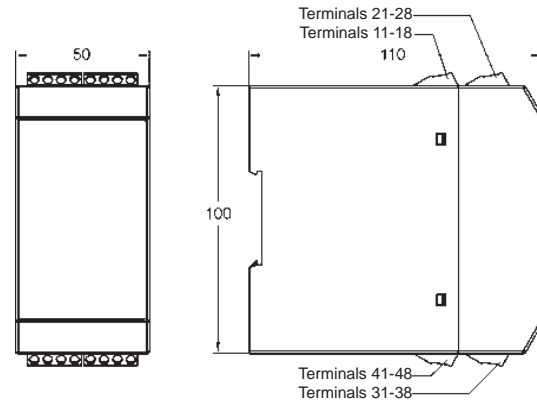
## Characteristics

The Temperature-Guard TG50 has inputs for temperature probes RTD (Pt100/Pt1000) and thermocouple J, K, N and S. Simple programming, up to 4 alarm outputs (SPDT) and an available fully isolated free programmable analog output 0/4..20 mA; 0/2..10 V DC offers a lot of solutions for temperature monitoring. Peak value indication for minimum and maximum measured temperature are stored in the background and can be read out from the display at any time.

## Technical data

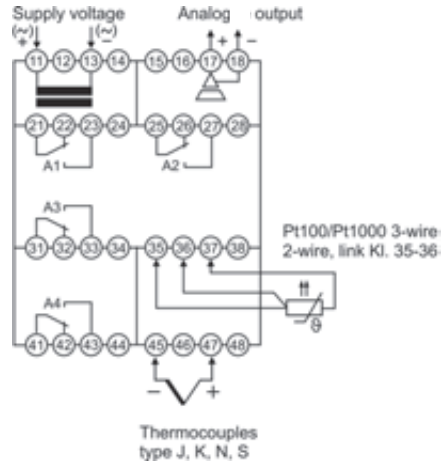
<b>Power supply</b>	
Supply voltage	: 230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 % : < 5 VA
Operating temperature	: -10..+55 °C
CE-conformity	: EN 61326-1:2013 EN 60664-1:2007
<b>Input</b>	
Fault function	: break of wire (RTD Pt100/1000, Thermocouple) and short-circuit (only Pt100/1000)
RTD	: Pt100 (3-wire) -100.0..+600.0 °C Pt1000 (3-wire) -100.0..+300.0 °C : Thermocouple (TC) type J -100.0..+800.0 °C type K -150..+1200 °C type N -150..+1200 °C type S -50..+1600 °C cold junction compensation integrated
Accuracy	: <0.1 %, ±1 Digit
Display	: Graphic LCD-Display, 128 x 64 Pixel, with white back-lite

## Dimensions



Continue next page.

**Connection diagram**



**Ordering code**

1. 2. 3. 4. 5. 6.  
 TG50 -  -  -  -  -  -

- 1. Device type/input**
  - 3 RTD Pt100, 3-wire, -100.0..+600.0 °C
  - RTD Pt1000, 3-wire, -100.0..+300.0 °C
  - Thermocouple
  - J (Fe-CuNi), -100.0..+800.0 °C
  - K (NiCr-Ni), -150..+1200 °C
  - N (NiCrSi-NiSi), -150..+1200 °C
  - S (Pt10Rh-Pt), -50..+1600 °C
- 2. Alarm output A1, A2**
  - 2R 2 relay SPDT
- 3. Alarm output A3, A4**
  - 00 not installed
  - 2R 2 relay SPDT
- 4. Analog output**
  - 00 not installed
  - AO 0/4..20 mA, 0/2..10 V DC, isolated
- 5. Supply voltage**
  - 0 230 V AC, ± 10 % 50-60 Hz
  - 1 115 V AC, ± 10 % 50-60 Hz
  - 5 24 V DC, ± 15 %
- 6. Options**
  - 00 without option

# Temperature Guard TG50Ex



## Characteristics

The Temperature Guard TG50Ex offers intrinsically safe inputs for direct connection of temperature probes RTD (Pt100, Pt1000) and thermocouples type J, K, N or S, which are installed in the explosion endangered area.

Simple programming, 2 alarm outputs (SPDT) and an optional available fully free programmable isolated analog output 0/4..20 mA; 0/2..10 V DC offers a lot of solutions for temperature monitoring. The peak value indication for minimum and maximum measured temperature are stored in the background and can be read out from the display at any time.

## Technical data

### Power supply

Supply voltage	: 230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 % Um = 253 V AC or 125 V DC (terminals 11 and 13)
Power consumption	: max. 5 VA
Operating temperature	: -10..+55 °C
CE-conformity	: ATEX-directive 2014/34/EU EN 60079-0:2006 EN 60079-11:2007 EN 61241-0:2006 EN 61241-11-0:2006
EMC-directive / standard	: 2014/30/EU / EN 61326-1:2013

### Inputs

Explosions protection	: II (1) G [Ex ia] IIC/IIB or II (1) D [Ex iaD]
Approval	: TÜV 08 ATEX 554329
Fault detection	: broken line (Pt100/1000 and thermocouple) and short circuit (only Pt100/1000)
Input RTD	: Pt100 (3-wire) -100.0..+600.0 °C Pt1000 (3-wire) -100.0..+300.0 °C (terminals 35, 36, 37)
Input TC	: Thermocouple type J -100.0..+800.0 °C type K -150..+1200 °C type N -150..+1200 °C type S -50..+1600 °C cold junction compensation integrated (terminals 45 and 47)
Accuracy	: <0.1 %, ±1 Digit
Temperature coefficient	: 0.01 %/K

### Safety data

Max. voltage no load U <sub>0</sub>	: 1,4 V
Max. short circuit curr. I <sub>0</sub>	: 2.5 mA
Max. output power P <sub>0</sub>	: 3 mW
Resistance R	: 5600 Ω
Characteristic curve	: trapezoidal
Internal inductivity	: 4 μH
Internal capacity	: 135 nF

### Explosion protection

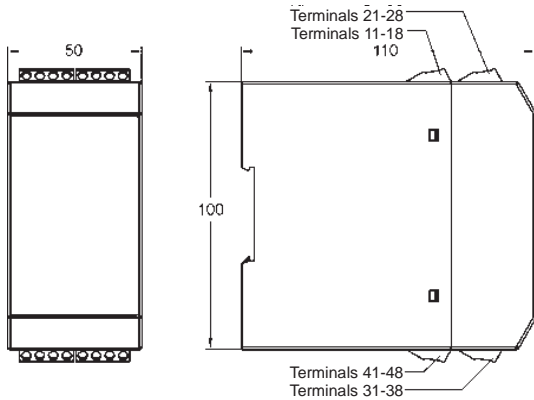
	<b>Ex ia/IIC</b>	<b>ia/IIB</b>
Max. external inductivity	: 100 mH	100 mH
Max. external capacity	: 25 μF	120 μF

### Outputs

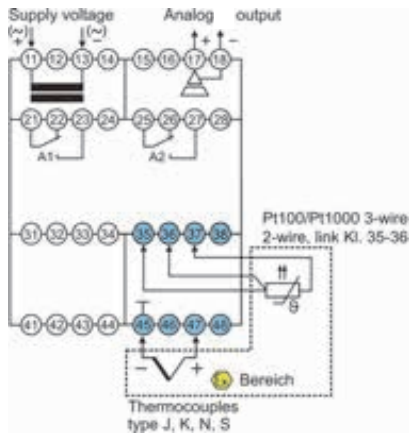
Alarm outputs	: relay SPDT < 250 V AC < 250 VA < 2 A cos Phi ≥ 0.3 < 300 V DC < 40 W < 2 A (terminals 21, 22, 23; 25, 26, 27)
Analog output	: 0/4..20 mA burden ≤ 500 Ω 0/2..10 V burden > 500 Ω, isolated output changes automatically (burden depending)
- Accuracy	: 0.2 %; TK 0.01 % / K (terminals 17 and 18)
Fault function	: for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → alarm relays min. or max. function programmable
Display	: graphic-LCD-display, 128 x 64 Pixel with white LCD backlight
Case	: Polyamide (PA) 6.6, UL94V-0 TS35 acc. to DIN EN 60715
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm <sup>2</sup> AWG 26..AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

Continue next page

**Dimensions**



**Connection diagram**



**Ordering code**

TG50Ex - 1. - 2. - 3. - 4. - 5. - 6.

<b>1. Device type/input</b>	3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C
Inputs intrinsically safe	EX II (1) G [Ex ia] IIC/IIB EX II (1) D [Ex iaD]	
<b>2. Alarm outputs A1, A2</b>	2R 2 relay SPDT	
<b>3. Alarm outputs A3, A4</b>	00 not available	
<b>4. Analog output</b>	00 not installed AO 0/4..20 mA, 0/2..10 V DC, isolated	
<b>5. Supply voltage</b>	0 230 V AC, ± 10 % 50-60 Hz 1 115 V AC, ± 10 % 50-60 Hz 5 24 V DC, ± 15 %	
<b>6. Options</b>	00 without option	



# GHM Messtechnik GmbH – General Terms and Conditions of Business

## § 1 Scope of Application and Definitions

- These General Terms and Conditions of Business ("GTC") shall apply exclusively to legal relations between GHM Messtechnik GmbH ("GHM"), consisting of GHM Greisinger, GHM Honsberg, GHM Martens and GHM IMTRON, and customers. The GTC also apply to the sale of DELTA Ohm products as a member of the GHM Group via GHM Messtechnik GmbH. Any provisions which deviate from, contradict or supplement these GTC shall, even upon knowledge thereof, not be recognised and are hereby expressly objected to, unless there is express and written agreement between the customer's contracting terms and conditions of business.
- A customer within the meaning of these GTC is an entrepreneur (§ 14 BGB), legal person under public law or special fund under public law which submits an order to GHM or concludes a contract with GHM. GHM does not supply to consumers (§ 13 BGB).
- GHM reserves the right to change the GTCs for future orders. In this regard, please check the GHM website.

## § 2 Conclusion of Contract

- The product catalogues issued by GHM as well as other brochures and technical documentation do not constitute an offer to conclude a contract but rather merely an invitation to the customer to submit a written offer to GHM to conclude a contract.
- Offers by GHM are subject to confirmation and are non-binding, unless expressly designated as binding by GHM. Contracts are only concluded by way of written order confirmation by GHM or by way of delivery. Orally issued orders shall only become effective once confirmed in writing by GHM. Amendments to a concluded contract must be confirmed in writing by GHM in order to be effective.
- A customer order which qualifies as an offer to conclude a contract may be accepted by GHM within 2 weeks. Acceptance and dispatch of the ordered products shall have the same effect.

## § 3 Scope of performance obligation

- The scope of the performance obligation of GHM shall be determined in accordance with the relevant contract. GHM reserves the right to make changes to technical data as well as changes to form, colour and/or weight within reasonable bounds.
- GHM is entitled to render partial performance where this is reasonable according to the individual circumstances of the customer. The invoices issued in this regard are payable independently of the total delivery.
- Product details and usage criteria in product catalogues, brochures and technical documentation as well as other information material provided by GHM to the customer and product descriptions are not to be understood as either guarantees of a particular quality of the products or as a simple agreement as to quality; such quality guarantees and quality agreements must be expressly agreed in writing.

## § 4 Prices / Payments / Interest on Late Payments / Set-off

- All prices specified in the product catalogues, brochures and technical documentation as well as other information material issued by GHM are exclusive of the relevant applicable VAT, unless they are stated to include VAT. Packaging, freight, postage, requested export certificates as well as any other shipping costs and insurance are additionally to be paid by the customer unless otherwise agreed.
- Unless fixed prices are expressly agreed, the specified prices are based on GHM's production costs at the time of order confirmation. In the event of unforeseeable increases in production costs that are beyond GHM's control, GHM reserves the right to increase prices accordingly where the delivery or service is not required to be rendered within 4 months of conclusion of the contract.
- Unless otherwise agreed in writing, all payments must be made within 30 days of the date of invoice without deduction in full to the specified payment agent.
- If payments are deferred or the customer is in default of payment, the statutory interest for late payment between businesses shall be due (currently 9 percentage points over the relevant base interest rate in accordance with § 288 para 2 BGB). According to § 286 para 3 BGB, default of payment – even without a notice – occurs where the customer does not make payment within 30 days of the due date for payment and receipt of an invoice or an equivalent payment schedule.
- The customer only has rights of set-off or retention to the extent that its claim is legally established or undisputed. In the event of defective delivery, the counter-claims of the customer in particular in accordance with § 8.2 of these GTC shall remain unaffected.

## § 5 Force Majeure

Unforeseen breakdowns, delayed deliveries or non-delivery by suppliers of GHM (including intra-group suppliers of GHM), shortage of labour, power or raw materials, strikes, lockouts, difficulties in providing means of transport, traffic disruptions, government orders, embargoes, boycotts and other events of force majeure shall relieve the party affected thereby of its obligation to supply or accept the items, as the case may be, for the duration of and to the extent of such hindrance. If, in consequence, delivery or acceptance is delayed by more than one month, either party may, to the exclusion of all further claims, withdraw from the contract in respect of the quantities affected by such delivery or acceptance hindrance.

## § 6 Delivery and Transfer of Risk

- The place of performance and fulfilment is the place from which delivery is effected.
- In the event that the customer requests that the contractual item is sent to another location, the risk of accidental loss passes to the customer upon handover of the item to the first freight carrier. This shall also apply if the customer refuses to accept the delivery. Unless agreed otherwise, GHM is free to select the manner of shipping. The packaging material is to be recycled or properly disposed of by the customer at its own cost. § 11 shall apply mutatis mutandis.
- Delivery dates and deadlines are only binding if the contracting parties have made an express agreement to this effect. In case of doubt, delivery deadlines begin on the date of order confirmation. If there is a temporary hindrance to performance which is beyond GHM's control, the delivery dates and deadlines shall be extended correspondingly. This applies in particular in cases of force majeure within the meaning of § 5. Occurrence of delivery delay by GHM shall be determined in accordance with legal regulations. In any case a notice by the customer shall however be necessary.

## § 7 Retention of Ownership

- Until full payment of all of our present and future claims arising out of the ongoing business relationship with the customer ("secured claims") we retain ownership of the contractual items. The customer shall handle the contractual items with care and shall store them safely at no cost.
- Prior to full payment of the secured claims, the contractual items subject to retention of ownership may not be pledged to third parties or used as security. The customer shall notify GHM promptly in writing if an application is filed for the initiation of insolvency proceedings or where third parties have access (e.g. by way of pledges) to the contractual items belonging to GHM.
- Where the customer is in breach of the contract, in particular in the case of non-payment of the due amount under the contract, GHM may in accordance with legal regulations withdraw from the contract and/or demand that contractual items be returned on the basis of the retention of ownership. The demand for return does not simultaneously constitute the withdrawal; GHM is moreover entitled to make the demand for return and reserve the right to withdraw. If the customer does not pay the due amount under the contract, GHM may only assert these rights if GHM has given the customer a reasonable deadline to make payment without success or where such a setting of a deadline is not required in accordance with legal regulations.
- Until the time of withdrawal in accordance with (c) below, the customer is authorised to continue to sell on and/or to process the contractual items which are subject to retention of ownership within the ordinary course of business. In such a case the following supplemental provisions shall apply:
  - The retention of ownership shall extend to the full value of products resulting from the processing or combining of the contractual items, whereby GHM shall remain the manufacturer. In the event that processing or combining uses third party items which are subject to ownership rights, the customer hereby transfers to GHM co-ownership in the proportion of the invoice value of the processed or combined contractual items. GHM hereby accepts the transfer. Otherwise, the same shall apply to the resulting product as to the contractual items delivered under retention of ownership.
  - The customer hereby assigns to GHM as security any claims arising out of the onward sale of the contractual items in their entirety or in the amount of any proportion co-owned by GHM in accordance with the previous paragraph. GHM hereby accepts the assignment. The obligations of the customer set out in paragraph 2 shall also apply in regard to assigned claims.
  - The customer shall remain authorised to redeem the claim in addition to GHM. GHM is obliged not to redeem the claim as long as the customer meets its payment obligations to GHM, there is no defect in its ability to perform and GHM does not assert ownership by exercising a right in accordance with paragraph 3. If this is however the case, GHM may demand that the customer discloses the claims assigned to GHM and their creditors, provides all necessary information for redemption, hands over the associated documentation and informs the (third party) creditor of the assignment. Furthermore, in such a case GHM shall be entitled to revoke the authorisation of the customer for the onward sale and processing of the items subject to retention of ownership.
  - If the realisable value of the security exceeds the claims of GHM by more than 10%, GHM shall at the request of the customer select and release security.

## § 8 Guarantee

- The customer shall check whether the delivered contractual item is in accordance with the contract and is suitable for the intended purpose. The obligation to inspect and issue a complaint in accordance with §§ 377, 381 HGB shall also apply to customers who are not fully vested commercial agents within the meaning of the law. Apparent defects shall be notified to GHM within two weeks and non-apparent defects promptly after discovery. Damage to packaging is to be noted in the freight paperwork or notified in writing to the delivery shipping service and to GHM by the 6th day after delivery at the latest.
- In the case of duly notified defects, at its own choice and taking into consideration the interests of the customer, GHM shall either rectify the defect or deliver defect-free replacement items. If these measures are not successful after two attempts to rectify, the customer may exercise its statutory rights. The right of GHM to refuse to rectify in accordance with the statutory requirements shall remain unaffected.
- All guarantee claims lapse 12 months after the statutory start date of the prescription period. This deadline does not apply if the law according to § 438 para 1 number 2 BGB (buildings and items for buildings) and § 634a para 1 no 2 BGB (building faults) prescribes longer deadlines, or in case of deliberate action, fraudulent concealment of the fault, or if a guarantee of quality has not been fulfilled.

## § 9 Exchanges and Repairs outside of the Guarantee

- GHM is not obliged to give an exchange and in the event of custom orders, exchange shall be excluded.
- Where GHM however voluntarily declares that it will take back a standard item, without any obligation in accordance with guarantee regulations or any guarantee given, 20% of the purchase price shall be retained where the item is undamaged. In the case of damaged goods, any additional necessary repair costs shall also be deducted.
- Where GHM is to perform repairs for the customer which do not follow within the framework of the guarantee or any given guarantee, the repair item shall be sent back at the cost of the customer. Where a cost estimate is requested by the customer for the repair, GHM is entitled to additionally invoice this work in the amount actually incurred.

## § 10 Limitation of Liability

- The liability of GHM for damages, regardless of the legal basis, in particular due to impossibility, delay, defective or incorrect delivery, breach of contract, breach of obligations in contractual negotiations and unlawful acts (unerlaubte Handlungen) is, to the extent that this involves culpability (Verschulden), limited in accordance with this § 10.
- GHM is not liable in the case of simple negligence of its management bodies, legal representatives, employees or other vicarious agents (Erfüllungsgehilfen), to the extent that this does not relate to a breach of material contractual obligations (vertragsgewesentliche Pflichten). Material contractual obligations are obligations compliance with which facilitates proper performance of the contract, so in particular the obligation to deliver in a timely manner, the conformity of the delivered items with the agreed quality characteristics, as well as advisory, protective and due care obligations, and the protection of life or health of the customer's personnel or the protection of its property from material damage.
- Where GHM is liable in accordance with and on the grounds of § 10.2, such liability shall be limited to damages which GHM foresaw upon conclusion of the contract as a possible consequence of a breach of contract or which GHM should have foreseen when exercising due care and attention (verkehrsbübliche Sorgfalt). Indirect damages and consequential damages, which are the consequence of defects in the delivered item, shall only be compensated to the extent they are typically to be expected in the course of a proper use of the delivered item.
- In the event of a delivery delay caused by our simple negligence, the amount of default damages which the customer may claim shall be limited to a maximum of 5 % of the agreed net contract price for each complete week of delivery delay and in total to a maximum of 20 % of the agreed net contract price.
- Where we provide technical information or act in a consulting capacity and such information or consulting is not included in the contractually agreed scope of performance owed by us, this shall take place free of charge and under exclusion of any liability.
- The aforementioned exclusions and limitations on liability shall apply to the same extent for the benefit of management bodies, legal representatives, employees or other vicarious agents (Erfüllungsgehilfen) of GHM.
- The limitations set out in this § 10 shall not apply to liability of GHM for willful misconduct, for guaranteed quality characteristics, for damage to life, body or health or in accordance with the German Product Liability Act (ProdHaftG).
- If the customer sells the delivered item unchanged or after processing, transforming or combining with other items, the customer shall release us internally from all product liability claims by third parties, to the extent that the customer is responsible for the circumstances giving rise to the liability.

## § 11 Disposal of Electronic Devices

- To the extent that electronic devices are the contractual items, the disposal of old devices (§ 3 no 3 ElektroG) used outside private households (§ 3 no 5 ElektroG) shall be subject to the following paragraphs. For any technical questions, please contact info@greisinger.de.
- The customer shall dispose of the delivered electronic devices at the end of their useful lives at its own cost and in accordance with the relevant legal regulations. The customer shall release GHM from manufacturer obligations under § 19 ElektroG and in that context from any associated claims by third parties.
- In the event that delivered devices are transferred to commercial third parties, the customer is obliged to also subject such third parties in writing to the obligation to properly dispose of the devices at the end of their useful lives, to bear the costs thereof and in the event of a further transfer, to effect a transfer of the obligation in accordance with this provision.
- In the event that the customer fails to contractually oblige third parties to undertake proper disposal and to oblige third parties to pass on the obligation in accordance with § 11.2, the customer shall be obliged to take back the delivered goods at the end of their useful lives at its cost and to dispose of them properly in accordance with legal regulations. This shall also apply where the obligation of the third party was not made in writing and the third party disputes contractual assumption of the duty to dispose.
- GHM's right to have the customer hold harmless and release GHM will not expire before two years have passed after the final use of the device. This two-year expiry restriction begins no earlier than the date of GHM receiving a written notification from the customer of the end of the device's use. However, the claim to hold harmless and release will expire no later than 30 years after it comes into existence.

## § 12 Miscellaneous

- Unless otherwise agreed, the law of the Federal Republic of Germany shall exclusively apply, under the exclusion of the rules concerning the conflict of laws applicable under that law. The United Nations Convention on Contracts for the International Sale of Goods of 11.04.1980 is not applicable.
- The place of jurisdiction shall be Wuppertal or at the election of GHM, the competent court at the seat of the customer.
- In the event that a provision of these GTC or of the contract is or becomes wholly or partly void, ineffective or unenforceable, the effectiveness and enforceability of all other remaining provisions shall not be affected thereby. The void, ineffective or unenforceable provision shall be deemed replaced by such effective and enforceable provision which comes as close as possible to the commercial meaning and purpose of the void, ineffective or unenforceable provision with regard to its object, scope, time, place and scope of application. This shall apply mutatis mutandis to any gaps in these GTC or the contract.
- The contractual language shall be German. In the event that interpretation is necessary, only the German version of this text shall be relevant. Translations into other languages are exclusively for information purposes.

Status: 11 / 2018

# Your contact to us.



## Sales Center Export

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### Asia and India

- Subsidiary in Mumbai
- Numerous certified partners



### Europe

- 12 locations, including sales centers
- 5 production locations and specialized sales locations



### Americas

- Subsidiary in São Paulo
- Qualified partners



### Africa

- Subsidiary in Johannesburg
- Reliable partners



# Your ideas and requests are our inspiration.

Challenge us.

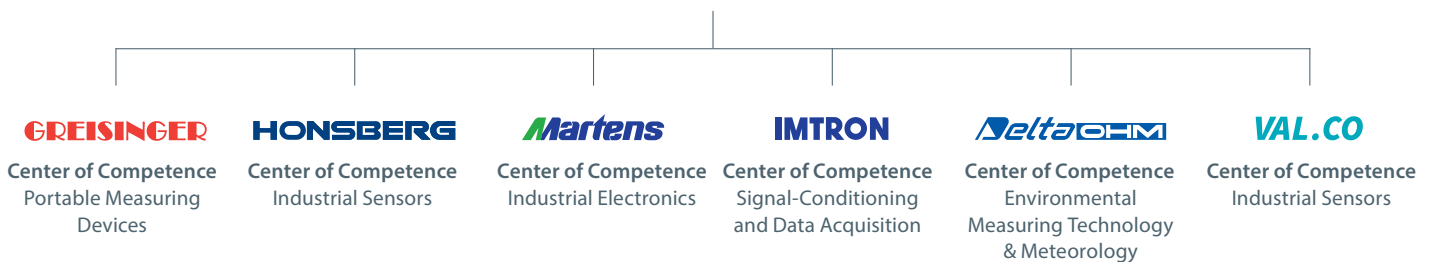
The GHM Messtechnik GmbH Group was founded in 2009. However, the history of the traditional brands that are bundled under the umbrella brand goes back much further. In its current formation as the GHM GROUP, the enterprise is still obligated to the shared philosophy of the founders: Absolute customer orientation, speed, and first-class product quality!

**Innovation with method:** An increasing number of tasks in terms of the global economy and in technology reach the limits of feasibility and beyond. We meet this challenge with a broad-based enterprise structure

The Centers of Competence under the umbrella of the GHM GROUP cover a wide range of market-specific solutions for all important areas of application with their respective areas of expertise.

With the GHM GROUP our customers benefit from over 200 years of combined experience. With this expertise, our engineers at the various "Centers of Competence" are quickly and flexibly in a position to develop solutions that meet the specific requirements of our customers and are in-line with market demand.

**It is an advantage of our enterprise, which is unrivalled.**



## INDUSTRIAL

- Sensors for a variety of process variables such as temperature, flow, level and pressure
- Transmitters and isolators for various input/ output variables
- Indicators and controllers in various formats and performance classes



## ENVIRONMENTAL

- Measuring stations for climate and environmental data with the connection to cloud-systems
- Mobile measurement technology for climate, water and gas analysis



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- Stationary and mobile systems for universal use
- Modular systems for individual adaption to the process needs



Your direct contact to us



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