Technical manual BA 0620

Signal converter

Transcont KTM

Head transmitter – passive

for conversion and adjustment of a
Pt100 temperature signal

Input signal Pt100 in 2- or 3-wire-technology
- Zero value –100°C...+100°C
- Measuring range 30K...700K
- 12 standard measuring ranges or adjustment by specification

Output signals
- Direct current 4…20mA
- Direct voltage 0…10V
- PNP switching output

High accuracy

ATEX II 1 G Ex ia IIC T4
Certification for the use in explosion hazardous areas

Installation in connection head style B acc. to DIN 43729

ACS-CONTROL-SYSTEM
know how mit system

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Application

The passive head transmitter **Transcont KTM** is used, to linearize Pt100 temperature signals in the range from –100°C to +600°C with a measuring span between 20 Kelvin and 700 Kelvin and to convert it into an electrical standard signals 4...20mA resp. 0...10V, also in explosive hazardous areas.

The voltage signal of the Pt100 is monitored continuously. At wire break resp. wire short circuit a fail information is generated at the 4...20 mA resp. 0...10V output signal.
At wire break the output signal rises up to 21,7 mA resp. 10,85 V, at wire short circuit the output signal falls to 3,55mA resp. 0V.
At a short circuit between terminals 4 and 5 the device will operate in 2-wire-connection.

In the version type AS, with 2-wire-technology with signal 4...20 mA, an optional, per potentiometer freely adjustable, overload and short circuit protected PNP switching output in working current principle is integrated.

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Safety notes

Each person that is engaged with inauguration and operation of this device, must have read and understood this technical manual and especially the safety notes.

Installation, electrical connection, inauguration and operation of the device must be made by a qualified employee according to the informations in this technical manual and the relevant standards and rules.

The device may only be used within the permitted operation limits that are listed in this technical manual. Every use besides these limits as agreed can lead to serious dangers.

The device meets the legal requirements of all relevant EC directives. CE 0158

Safety notes for electrical operating supplies for explosive hazardous areas

If a device is installed and operated in explosive hazardous areas, the general Ex construction standards (EN60079-14, VDE0165), this safety notes and the enclosed EC conformity certificate incl. supplements must be observed.
The installation of explosive hazardous systems must be carried out principally by specialist staff.

The device meets the classification

II 1 G Ex ia IIC T4 Ga	**T_a = –20... +60 °C**
II 2(1) G Ex ia IIC T4 Ga	**T_a = –40... +85 °C**
II 2 G Ex ib IIC T4 Gb	**T_a = –40... +85 °C**

The devices are conceived for measuring of temperatures in explosive hazardous areas.
The measured medium may also be combustible gases, vapors, liquids and dusts.

A warning marking points out to the safety measures, that must be applied because of the electrostatic charging of the plastic housing in operation and especially in the case of maintenance activities.
avoid friction - no dry cleaning - no assembling in pneumatic conveying stream

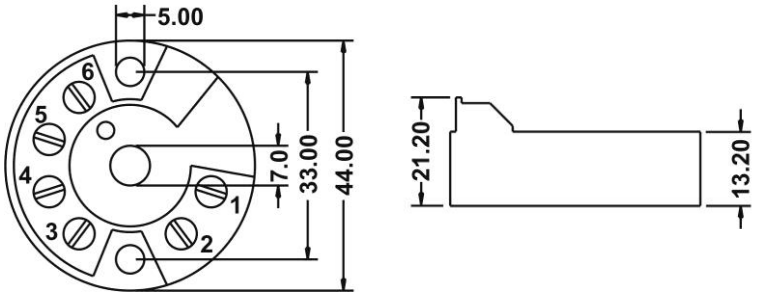
Installation

The device can be installed into a connection head style B acc. to DIN 43729 or into a field installation housing.

For the installation of the device proceed like follows:

- Feed the sensor inset cables through the central hole in the head transmitter
- Place the installation springs onto the screws
- Feed the installation screws through the holes in the head transmitter and the holes in the sensor inset. Fix both screws using the circlips.
- Position the head transmitter in the connection head in such a way so that the power supply input terminals (terminal 1 and 2) are towards the cable entry gland.
- Fix the head transmitter and sensor inset into the connection head.
- Attention: In order to avoid damaging the head transmitter do not over tighten the installation screws.

The devices must be installed wheather and stroke protected, ideally at places without direct solar radiation. This is especially important in warm climatic regions.



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Electrical connection

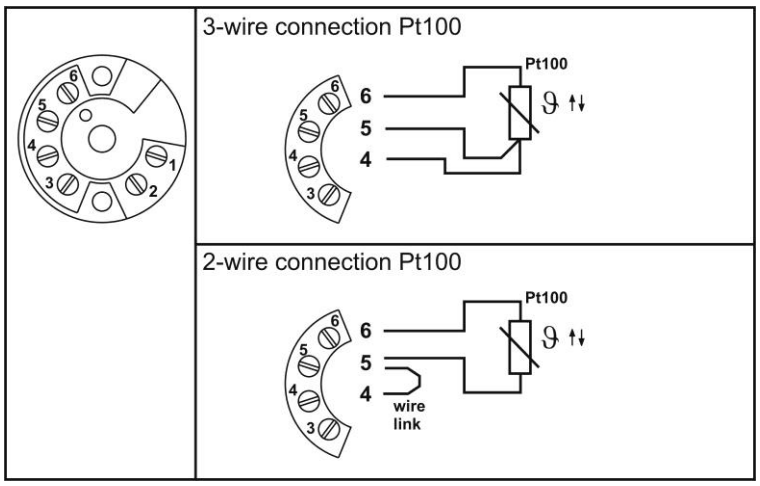
The electrical connection of the device must be carried out according to the respective country specific standards. Incorrect installation or adjustment could cause applicationally conditioned risks.

Measuring input and signal output are not galvanically isolated from each other.

Connection of the Pt100 – measuring input

The resistance temperature sensor Pt100 is connected to the head transmitter in 2- or 3-wire-connection. Because the measured Pt100 voltage signal is very small, the resistance of the leads can cause an error source that may not be neglected. The constant feed current also produces at the resistance of the leads a voltage drop and according to the requirements of the measurement it must be tried to neutralize this measurement error. Using resp. connecting a Pt100 in 3-wire-connection it is possible to completely eliminate the influence of the lead resistance.
If a Pt100 in 2-wire-connection is used, the measuring error, that is generated by the lead resistance, will result in the case of a signal increasement.

Connection scheme



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Electrical connection

Connection of the power supply voltage / signal output

Use only twisted shielded signal and measurement wires and install these wires separated from power leading wires. Connect the cable shield only at one side to earth, ideally at the installation place of the device.

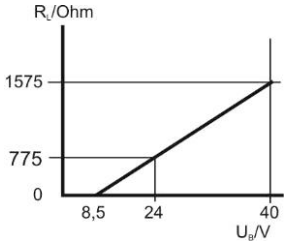
The voltage applied to the terminal contacts may not exceed 40 V at the variants A0 / AS resp. 35 V at the variant B0, to avoid damage of the electronic. All connections are polarity protected.

A load, e.g. the measuring shunt of an evaluation device, in series with a temperature head transmitter of the variant A0 / AS with 4...20 mA current signal in 2-wire-technology reduces the supply voltage available at the head transmitter. This results in a maximum value for this resistor, where a correct function is still possible.

The maximum load at signal current 20mA can be calculated by the equation:

R_L max = ($V_{S\ act.}$ – 8,5V) / 20mA with $V_{S\ act.}$ = applying supply voltage.

The following graph shows the characteristics for the resistor values at 24 V and 40 V.

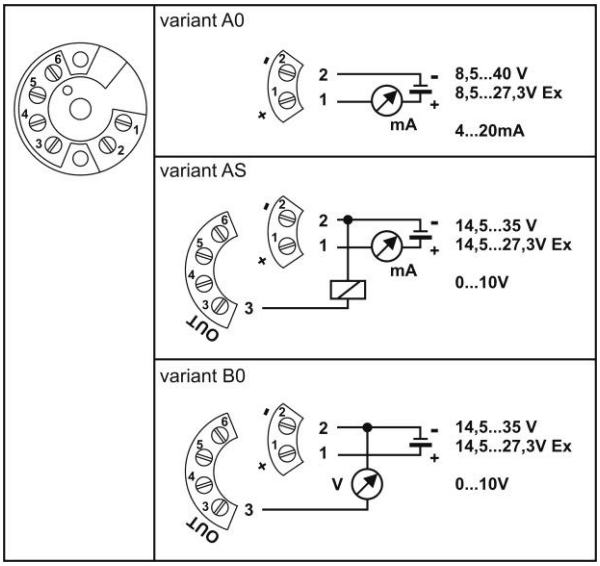


For inauguration it is suggested, to deactivate all connected control devices, to avoid unwanted control reactions.

Inductive loads at the pnp switching output, e.g. relays or contactors may only be used with a free-wheeling diode or a RC protection circuit to avoid high voltage peaks.

The load at the PNP switching output will be connected to the terminal +terminal of the supply voltage by a semiconductor switch contactless and by this bounce-free. At an activated switching state a positive signal near supply voltage is feed to the output.
At deactivated switching state and at failure of supply voltage the semiconductor switch is shut off.
The PNP switching output is current limited to 0,2...0,25 A and is overload and short circuit protected.

Connection scheme



Maintenance

The device is free of maintenance.

Repair

Due to it's construction, the device can not be repaired. When sending back the device for check, add a note with the description of the error and the application.

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Auxiliary power supply

Permitted supply voltage:	Reverse polarity protected		
	Variant A0	8,5...40 V DC	Ex 8,5...27,3 V DC
	Variant AS	8,5...40 V DC	
	Variant B0	14,5...35 V DC	
Ripple voltage:	≤ 2 V_{PP} condition: within the permitted supply voltage range		
Supply current:	2-wire-technology	4...20 mA	≤ 22 mA PNP switching outputs no load
	3-wire-technology	0...10 V	≤ 10 mA

Signal input

Temperature resistor Pt100:	3- / 2-wire-connection, temperature linear, meas. current 2 x 0,5mA ± 0,2mA
Measuring signal range:	-100°C...+600°C, dependent on settings resp. configuration
Wire resistance:	≤ 15 Ω per wire

Signal output 4...20 mA

Direct current:	Linear characteristic from 3,55 mA ... 20,7 mA, 2-wire-technology
Error monitoring input:	Output signal 20,7 mA at wire break Output signal 3,55 mA at short circuit terminals 4/6 resp. 5/6 Measurement in 2-wire-connection at short circuit terminals 4/5
Permitted load:	R_L max = ($V_{S\ act.}$ – 8,5) / 20mA
Minimum delay time:	≤ 2 ms

Signal output 0...10 V

Direct voltage:	Linear characteristic from ≤ 0,01 V ... 10,35 V, 3-wire-technology
Error monitoring input:	Output signal 10,85 V at wire break Output signal ≤ 0,01 V at short circuit terminals 4/6 resp. 5/6 Measurement in 2-wire-connection at short circuit terminals 4/5
Permitted load:	R_L ≥ 2500 Ω, equals 4 mA at signal 10 V, current limited
Minimum delay time:	≤ 2 ms

PNP switching output

Function:	PNP switching to +Vs / normally open NO – working current principle Adjustment by multi-turn potentiometer	
Output voltage:	V_{OUT} ≥ +Vs – 1,5 V	
Output current:	≤ 250 mA, min. 200 mA	current limited, short circuit protected
Rise up time:	≤ 700 µs	output load ≤ 3000 Ω resp. ≥ 4,5 mA
Delay time:	≤ 2 ms	
Switching cycles:	≥ 100.000.000	

Measuring accuracy

Accuracy [2) 8) 12)]:	≤ 0,2K or 0,1%	higher value is valid
Characteristic deviation [3) 5) 8) 12)]:	≤ 0,08%	
Temperature deviation [2) 8) 12)]:	≤ 0,05% / 10K	
Long term drift [2) 8) 12)]:	≤ ±0,1 K / year or 0,05% / year	higher value is valid
Influence of output load [13)]:	≤ 0,02% / 100Ω	
Influence of supply voltage [8) 12) 13)]:	≤ 0,02% / 10V	

2) Referring to nominal measuring span resp. full scale (FS)
3) Nonlinearity + Hysteresis + Reproducibility
5) At limit value adjustment
8) At reference conditions
12) Higher values for special measuring range
13) Of the nominal output signal end value 20mA/10V

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Materials

Connection housing:	PC – polycarbonate
Potting:	PUR – polyurethane

Connection terminals

Number:	6 terminals, everlasting screws
Connection cross-section:	Maximum 1 x 1,75 mm^2

Housing style

Housing:	Suitable for installation in connection head style B acc. to DIN 43729
Installation angle:	No limit
Weight:	40 g

Environmental conditions

Environmental temperature:	– 40°C...+785°C – 40°C...+60°C		at ExKTM category 1
Climatic classification:	Class C	DIN EN 60654-1	
Moisture condensation:	Allowable		
Vibration protection:	4g / 2 to 150Hz	DIN EN 60068-2-6	
Protection classification:	IP020	DIN EN 60529	higher protection classification with respective protection housing
EM – compatibility:	Emission Immunity	DIN EN 61326-1 DIN EN 61326-1	operation device class A industrial range
Reference conditions:	DIN EN 60770-1 T = 25 °C, relative humidity 45...75 %, environmental air pressure 860...1060 kPa		

Order code

Type:

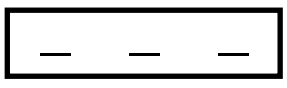
KTM	Standard	
Ex KTM	ATEX II 1 G Ex ia IIC T4	only possible for ExKTM _ A0

Temperature range:

A	Range	0°C to +50,0°C	H	Range	0°C to +400,0°C	
B	Range	0°C to +100,0°C	J	Range	0°C to +500,0°C	
C	Range	0°C to +150,0°C	L	Range	0°C to +600,0°C	
E	Range	0°C to +200,0°C	Q	Range	-40°C to +60,0°C	
F	Range	0°C to +250,0°C	O	Range	-50°C to +100,0°C	
G	Range	0°C to +300,0°C	N	Range	-100°C to +50,0°C	
			Y	special measuring range		separate spec. necessary

Transmitter electronic:

A0	4...20 mA	2-wire-technology		
AS	4...20 mA	2-wire-technology	with PNP switching output	not for variant ExKTM
B0	0...10 V	3-wire-technology		not for variant ExKTM



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