Chapter IX

Temperature transmitters

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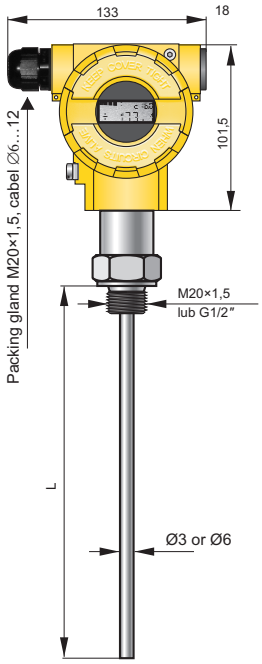
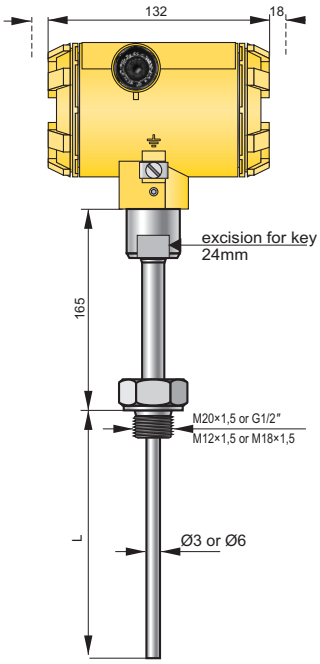
Smart temperature transmitter
APT-2000ALW

HART COMMUNICATION PROTOCOL

- ✓ **4…20 mA output signal + HART protocol**
- ✓ **Programmable range, zero shift, characteristic and damping ratio with local panel keys**
- ✓ **ATEX Intrinsic safety , ATEX Explosion proof**
- ✓ **Resistant or thermocouple measuring element**
- ✓ **MID (Measuring Instruments Directive) – certificate acc. to 2004/22/WE directive and OIML R140:2007 recommendations.**

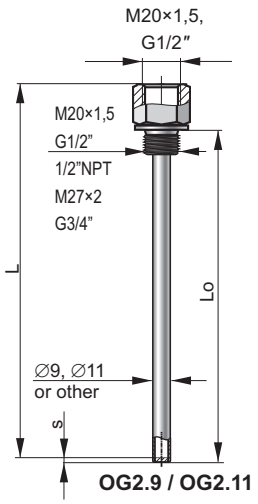


APT-2000ALW/GB

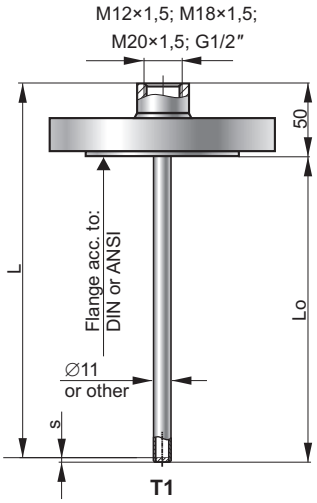


APT-2000ALW/GN

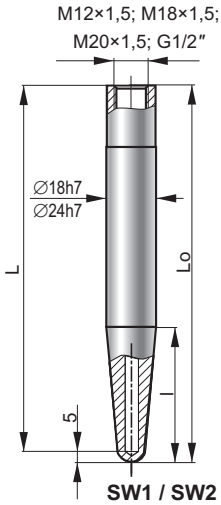
Thermowell



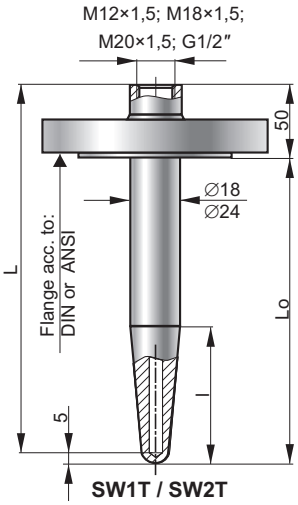
OG2.9 / OG2.11



T1



SW1 / SW2



SW1T / SW2T

Technical data

Metrological parameters

Error (digital value)
± (0,2 + 0,002·|t|)°C for Pt100 sensor
± 1,5°C for TC type K sensor and t ≤ 375°C
± (0,004·t)°C for TC type K sensor and t > 375°C

Additional error for analog output ±0,04%·z
where:
|t| – absolute value of the measured temperature °C
t - value of the measured temperature °C
z – transmitter setting range °C

Measuring range

Sensor type	Min set range	Nominal range
Pt100	10°C	-200…550°C*
K	10°C	-40…550°C

* for GB version -50…150°C

Electrical parameters

Powerr supply 12...55 V DC (Ex 13,5...28 V)
Additional voltage drop when display illumination switched on 3 V

Output signal 4...20 mA + Hart protocol

Resistance required for communication (HART) min. 240Ω

Load resistance $R[\Omega] = \frac{U_{ZAS}[V] - 12V\ *}{0{,}0225A}$

* – 15 V when display illumination switched on

Operating conditions

Ambient temperature -40...85°C
for version with Ex ia -40...80°C
for version with Ex d -40…75ºC

Min. immersion length **L=100mm**

Materials

Casing Aluminium,
316Lss- special version
Sensor material 321ss
Thermowell according to table page.

Communication and configuration

The communication standard for data interchange with the transmitter is the Hart protocol.
Communication with the transmitter is carried out with:
– a KAP-03, KAP-03Ex communicator,
– some other Hart type communicators,
– a PC using an HART/USB converter and Raport 2 configuration software.

The data interchange with the transmitter enables the users to:

- identify the transmitter;
- configure the output parameters:
- read the currently measured temperature value of the output current and the percentage output control level;
- force an output current with a set value;
- calibrate the transmitter in relation to a model temperature.

Standard thermowell data

Thermowell type		Standard dimensions of thermowell						Thermowell material	Available process connection	
		Ø[mm]		L[mm]		l[mm]				
OG2.9		9x1		100, 160, 250, 400		-		316Lss	M20x1,5 , M27x1 G½'', G¾'', ½''NPT	
OG2.11		11x2		100, 160, 250, 400		-		316Lss	M20x1,5 , M27x1 G½'', G¾'', ½''NPT	
T1		11x2		100, 160, 250, 400		-		316Lss	Flange according to DIN and ANSI	
SW1	SW2	18h7	24h7	100 140 200	140 200	35 65 65	65 65	15HM, 10H2M 316Lss	-	
SW1T	SW2T	18h7	24h7	100 140 200	140 200	35 65 65	65 65	15HM, 10H2M 316Lss	Flange according to DIN and ANSI	
SW1G	SW2G	18h7	24h7	100 140 200	140 200	35 65 65	65 65	15HM, 10H2M 316Lss	M20x1,5, G1/2"	M27x1,5, G3/4"

Ordering procedure

APT-2000ALW/___/___/___/___/ L = ... mm /___/___÷___°C/___/___

Special version:
Exia - ATEX certificate
Ex II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb

Exia(Da) - ATEX certificate
Ex II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb
II 1D Ex ia IIC T105ºC Da
I M1 Ex ia I Ma (version with SS housing)

Exd - ATEX certificate
Ex II 1/2G Ex ia/d IIC T* Ga/Gb
II 1/2D Ex ia/t IIIC T* Da/Db
I M2 Exd ia I Mb (version with SS housing)
T* - temperature class transmitter (for gas)
or maximum surface teperature (for dust)

SS - Housing material 316SS
IP67, IP66/67

Version: **GB, GN**

Thermowell type: according to table

Type of thread of flange connection:
M20×1,5; G1/2"; M27×2; G1" or flange

Immersion length

Type of measuring element: **Pt100, K**

Set measuring range

Alarm signal: 3,8 or 23 mA

Elcetrical connection: **without marking** (M20x1,5) or **US** (1/2"NPTF)

SMART TEMPERATURE TRANSMITTER APT-2000ALW with MID

Application

Smart temperature transmitters APT-2000ALW MID is applicable to the measurement of the temperature in application designed according to directive 2004/22/WE (MID), harmonized standard PN-EN12405-1:2005 + A2:2010 and recommendation OIML R140:2007. Device subcomponent suitable for custody transfer measurement of gas with MID approval. Mechanical construction and installation of the transmitter enclosure shall comply with the transmitter APT-2000ALW are described on page IX/ 2, IX/ 3 of catalogue. Transmitter due to factory blockade of transmitter's configuration cannot be configurable by user. Electrical connection of the transmitter is according to drawing on page IX/ 3. Available are only terminals SIGNAL + and SIGNAL -. Temperature transmitter APT-2000ALW MID are produce with GB type of sensor and with resistant sensor Pt100.
Note! For custody transfer applications, the cover clamp screws have to be locked with seal wire.

Metrological parameters

Max. permissible error according to EN12405-1
(calculated in relation to the measured value)

- in reference conditions 20±3°C(±1 during the measurement)	≤ 0,1%
- nominal operating conditions	< 0,2%
special version	< 0,1%
Long-term stability	< 0,2% / 5 years
Operating temperature range	-25...55°C
Immersion length	150...290mm
Power supply	Exia: 13,5...28VDC Exd: 13,5...45VDC

MID Parts Cerfificate No. 28/12
Exia: Ex II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb
Exd: Ex II 1/2G Ex ia/d IIC T* Ga

Measuring range

Measuring range:	-20...60°C

Ordering procedure

APT-2000ALW/MID/___/___/ L = ... mm

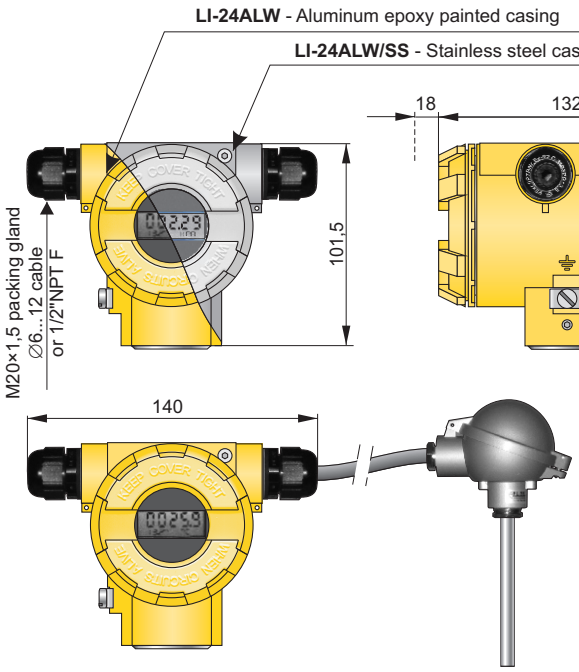
Special version:
Exia - Intrinsic safety version (ATEX)
Exd - Explodion proof version (ATEX)
SS - Housing material 316SS

Process connection type: **M20x1,5 , G1/2"**

Immersion length

Smart temperature transmitter
LI-24ALW

- ✓ **Output signal 4…20mA with Hart protocol**
- ✓ **Galvanic insulation (In, Out)**
- ✓ **Programmable sensor type**
- ✓ **Programmable measuring range**
- ✓ **Thermoresistance line compensation**
- ✓ **Compensation of thermocouple cold junction**
- ✓ **Autodiagnostic system**
- ✓ **Intrinsic safety certificate (ATEX, IECEx)**
- ✓ **Explosion proof certificate (ATEX, IECEx)**



LI-24ALW with remote mounted temperature sensor

LI-24ALW with direct mounted temperature sensor

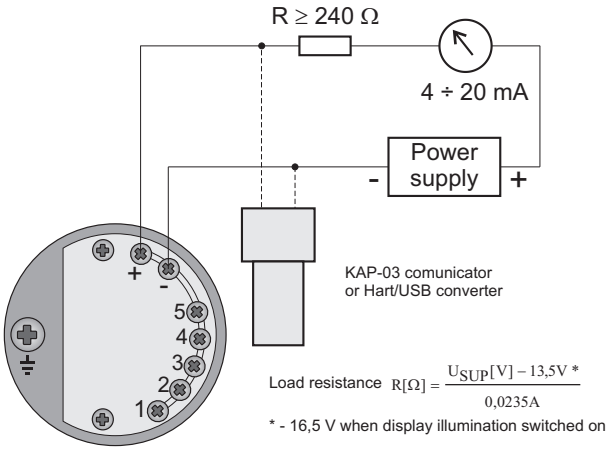
Application and function

The temperature transmitter LI-24ALW is applicable to converting resistance of temperature or voltage of thermocouple sensor to standard current signal 4-20mA. The transmitter has two separate channels enabling measurement of temperature difference, averange, averange with redundancy, max. or min. temperature. Transmitter has compensation of ambient temparature influence and compensation of thermocouple cold junction using internal/external (Pt100) sensor or constant temperature. Most of parameters such as: sensor type, measuring range, current alarm signal when electric circuit is broken, output characteristic correction, user characteristic (60 points) are programmed using PC with HART/USB converter and Aplisens RAPORT 2 configuration software. For request Aplisens can set temperature transmitter parameters like measuring range, type of sensor. Their values are printed on label. Transmitter LI-24/ALW is designed for field use. LI-24ALW can be used with temprature sensors mounted directly in transmitter's casing or with external sensors connected with cable.

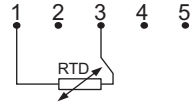
Technical data

Input signal	K, J,S,B,N,T, R, E, voltage Pt100,Ni100 resistance
Limit process	-10mV< E<100mV or -100mV< E<1000mV 0Ω<R<400Ω or 0Ω<R<2000Ω
Min. measuring range	10mV or 10Ω or 10K
Output signal	4 - 20 mA + Hart
Power supply	13,5…55 VDC (Ex 13,5..30 VDC) when display illumination switched on 16,5…55 VDC (Ex 16,5..30 VDC)
Max. wires resistance	500Ω
Alarm signal	3,75mA / 21,5mA (NORMAL) or 3,6 mA / 21 mA (NAMUR NE89)or setting by user
Sensor current	0,42mA
Galvanic insulation	Optoelectrical
Accuracy	acc. to below table
Time constant	0,3s
Additional electronic damping	0..30s
Ambient temperature	-40…+80°C (Ex -40…+75°C)

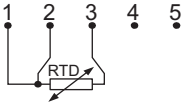
Electrical diagrams



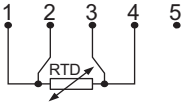
Electrical diagrams



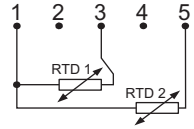
RTD
2-wires connection



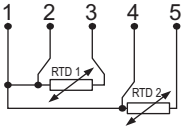
RTD
3-wires connection



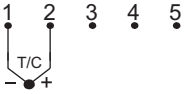
RTD
4-wires connection



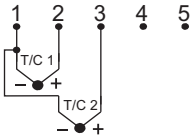
2 × RTD
2-wires connection



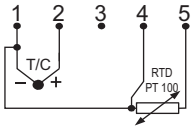
2 × RTD
3-wires connection



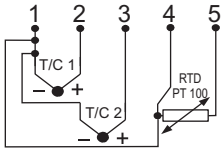
Thermocouple



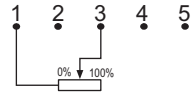
2 x Thermocouple



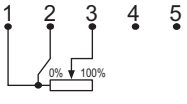
Thermocouple
with external
CJC



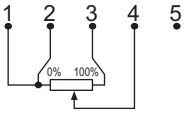
2 x Thermocouple
with external
CJC



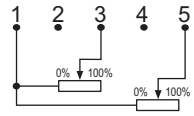
Potentiometer
2-wires connection



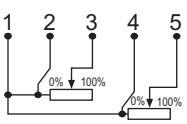
Potentiometer
3-wires connection



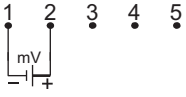
Potentiometer
4-wires connection



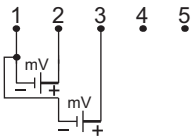
2 × Potentiometer
2-wires connection



2 × Potentiometer
3-wires connection



Voltage source



2 x Voltage source

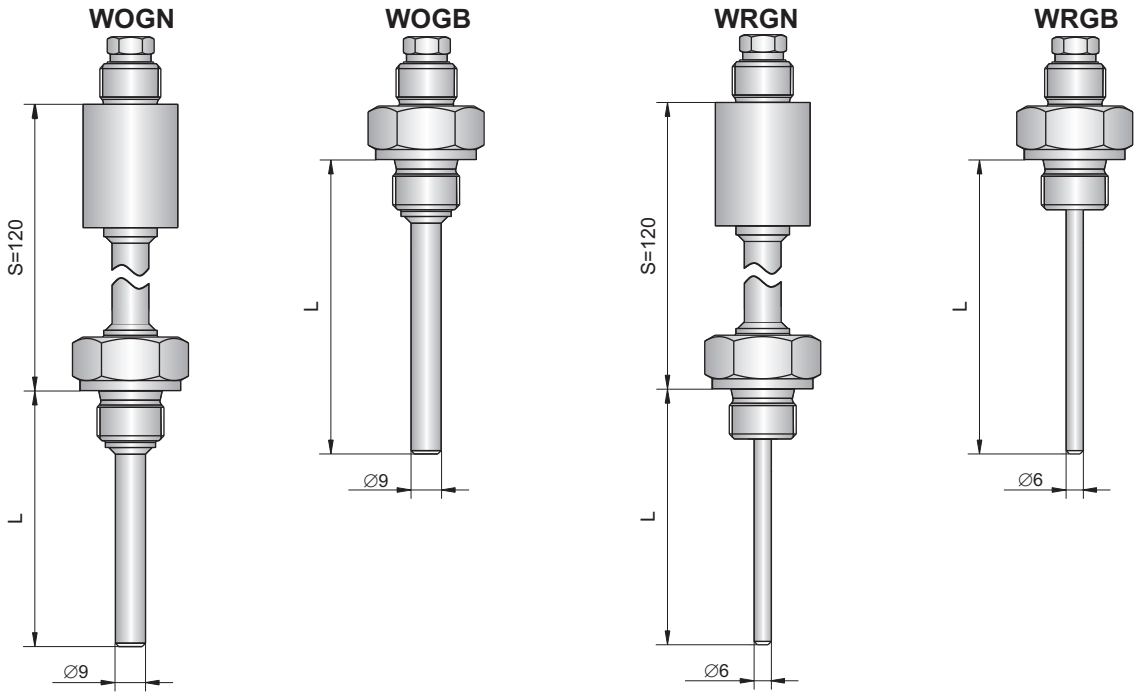
Type of input signals and metrological parameters

RTD sensor connected with 2, 3 or 4 wires						
Input – RTD						
Thermal resistance sensors				2, 3 or 4 wires connection		
Sensor current				~420uA		
Maximum wires resistance				25Ω		
Minimum range				10 °C		
Sensor type	Standard	Basic range	Min. range span	Processing error **Δp**	Temperature processing error **Δtp**	Analogue output error
		°C	°C	K	K/K	%
1	2	3	4	5	6	7
Pt10 (α=0.003850)	EN 60751+A2, IEC751, DIN43760, JISC 1604-97, BS 1904	-200÷850	10	±0.8	±0.035	Analogue output error is 0.05% FSO (Full Scale Output) over the operating temperature range.
Pt50 (α=0.003850)		-200÷850	10	±0.2	±0.0070	
Pt100 (α=0.003850)		-200÷850	10	±0.07	±0.0035	
Pt200 (α=0.003850)		-200÷850	10	±0.2	±0.0020	
Pt500 (α=0.003850)		-200÷850	10	±0.05	±0.0007	
Pt1000 (α=0.003850)		-200÷266	10	±0.03	±0.0003	
Pt 98 (α=0.003923)	SAMA RC-4-1966	-200÷650	10	±0.07	±0.0035	
Ni100 (W100=1.617)	PN-83/M-53952	-60 ÷ 180	10	±0.07	±0.0030	
Cu100 (W100=1.426)		-50 ÷ 180	10	±0.07	±0.0030	
Pt10 (α=0.003916)	JIS C1604-81	-200÷630	10	±0.8	±0.035	
Pt50 (α=0.003916)		-200÷630	10	±0.2	±0.0070	
Pt100 (α=0.003916)		-200÷630	10	±0.07	±0.0035	
Pt10 (W100=1.3910)	GOST 6651-94	-200÷1100	10	±0.8	±0.035	
Pt50 (W100=1.3910)		-200÷1100	10	±0.2	±0.0070	
Pt100 (W100=1.3910)		-200÷1100	10	±0.07	±0.0035	
Pt500 (W100=1.3910)		-200÷1100	10	±0.05	±0.00070	
Cu50 (W100=1.426)		-50 ÷ 200	10	±0.2	±0.0070	
Cu100 (W100=1.426)		-50 ÷ 200	10	±0.07	±0.0030	
Cu50 (W100=1.428)		-185 ÷ 200	10	±0.2	±0.0070	
Cu100 (W100=1.428)		-185 ÷ 200	10	±0.07	±0.0030	
Ni100 (W100=1.617)		-60 ÷ 180	10	±0.07	±0.0030	
Resistance (resistor, potentiometer)						
		Ω	Ω	mΩ	mΩ/K	As above
Measuring range No.1		0…400	10	±30	±2	
Measuring range No.2		0…2000	10	±120	±2	
1	2	3	4	5	6	7

Thermocouples						
Input – Thermocouples						
Input impedance				>10MΩ		
Maximum wires resistance				500Ω (wires + thermocouple)		
Cold junctions compensation				internal sensor, external sensor Pt100 temperature constant of the cold junctions		
Minimum range				50 °C		
Sensor type	Standard	Basic range	Min. range span	Processing error **Δp**	Temperature processing error **Δtp**	Analogue output error
		°C	°C	K	K/K	%
1	2	3	4	5	6	7
B (Pt30Rh-Pt6Rh)	EN 60751+A2, IEC584, NIST MN175, DIN43710, BS4937, ANSI MC96.1, JIS C1602, NF C42-321	250 ÷ 1820	10	±0.55	<±0.001	Analogue output error is 0.05% FSO (Full Scale Output) over the operating temperature range.
E (Ni10Cr-Cu45Ni)		-200 ÷ 1000	10	±0.15	<±0.001	
J (Fe-Cu45Ni)		-210 ÷ 1200	10	±0.20	<±0.001	
K (Ni10Cr-Ni5)		-200 ÷ 1372	10	±0.30	<±0.001	
N(Ni14CrSi-NISi)		-200 ÷ 1300	10	±0.25	<±0.001	
R(Pt13Rh-Pt)		-20 ÷ 1768.1	10	±0.35	<±0.001	
S(Pt10Rh-Pt)		-30 ÷ 1768.1	10	±0.40	<±0.001	
T(Cu-Cu45Ni)		-200 ÷ 400	10	±0.15	<±0.001	
TC Type L	EN 60751+A2, GOST P 8.585-2001	-200 ÷ 800	10	±0.20	<±0.001	

Voltage						
		mV	mV	µV	µV/K	As above
Measuring range No.1		-10…100	10	±6	<±0.06	
Measuring range No.2		-100…1000	10	±50	<±0.5	
1	2	3	4	5	6	7

Direct mounted sensors



Sensor type	Standard dimensions of sensor			Sensor material	Available process connection
	Ø[mm]	L[mm]	S[mm]		
WOGN	9	100, 160, 250, 400	120	304ss, 316Lss	M20x1,5 , G½'', G¾'', ½''NPT
WOGB	9	100, 160, 250, 400	-	304ss, 316Lss	M20x1,5 , G½'', G¾'', ½''NPT
WRGN	6	100, 160, 250, 400	120	304ss, 316Lss	M20x1,5 , G½'', G¾'', ½''NPT
WRGB	6	100, 160, 250, 400	-	304ss, 316Lss	M20x1,5 , G½'', G¾'', ½''NPT

WOGN, WOGB - welded sensors; WRGN, WRGB - spring-loaded sensors (to use with additional thermowell)

Ordering code

LI-24ALW /___/___/___÷___°C/___/___

Sensor type (optionally):
Direct: **WOGN, WOGB, WRGN, WRGB**
(According to below ordering code)
Remote: According to **Chapter X**

Settings (optionally):
Type of measuring element,
measuring range, alarm signal

Version:

Exia – Intrinsic safety certificate (ATEX, IECEx)

1)	2)
II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb	II 2(1)G Ex ia [ia Ga] IIC T4/T5/T6 Ga/Gb
IECEx Ex ia IIC T4/T5/T6 Ga/Gb	IECEx Ex ia [ia Ga] IIC T4/T5/T6 Ga/Gb

Exia(Da) – Intrinsic safety certificate (ATEX, IECEx)

1)	2)
II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb II 1D Ex ia IIIC T105°C Da I M1 Ex ia I Ma (with SS enclosure)	II 2(1)G Ex ia [ia Ga] IIC T4/T5/T6 Ga/Gb II 1D Ex ia IIIC T105°C Da I M1 Ex ia I Ma (with SS enclosure)
IECEx Ex ia IIC T4/T5/T6 Ga/Gb Ex ia IIIC T105°C Da Ex ia I Ma (with SS enclosure)	IECEx Ex ia [ia Ga] IIC T4/T5/T6 Gb Ex ia IIIC T105°C Da Ex ia I Ma (with SS enclosure)

Exd – Explosion proof certificate (ATEX, IECEx)

1)	2)
II 2G Ex d IIC T* Gb II 2D Ex t IIIC T* Db I M2 Ex d I Mb (with SS enclosure)	II 2(1)G Ex d [ia Ga] IIC T4/T5/T6 Gb II 2(1)D Ex t [ia Da] IIIC T105°C Db I M2 Ex d [ia Ma] I Mb (with SS enclosure)
IECEx Ex d IIC T* Gb Ex t IIIC T* Db Ex d I Mb (with SS enclosure)	IECEx Ex d[ia Ga] IIC T4/T5/T6 Gb Ex d[ia Da] IIIC T105°C Db Ex t[ia Ma] I Mb (with SS enclosure)

1) transmitter with sensor mounted in casing 2) transmitter without sensor or with cable senor

IP67 – protection class IP67
SS – housing material SS316
US – electrical and sensor connection 1/2"NPT F

WOGN/Exia/L=400mm/S=120mm/G1/2"/Pt100-A-2/316Lss/1/2"NPT

Type of sensor
Version: Standard, Exia, Exd
Dimmensions L and S [mm]
Process connection
Connection thread between sensor and transmitter
Sensor material
Type of measuring element

NEW

Smart temperature transmitter type APT-28

- ✓ **Programmable measuring range**
- ✓ **Output signal 4 ÷ 20 mA**
- ✓ **Stainless steel casing**

Application and construction

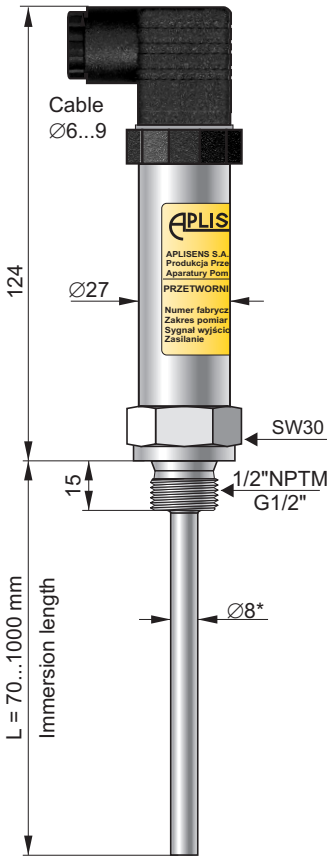
Smart temperature transmitter type APT-28 is designed for temperature measurement in range from -50 to +80°C (up to +140°C in special version). Resistance signal from RTD element is converted to standard 4…20mA output signal. Casing of transmitter is made in stainless steel. Standard electrical connection is DIN EN 175301-803 connector with ingress protection class IP 65.

Configuration

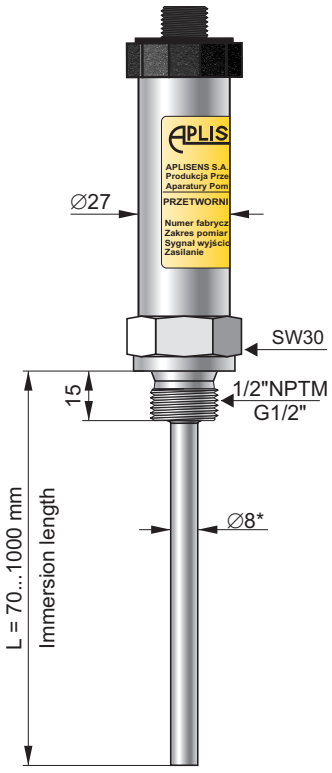
Transmitter is delivered with measuring range according to customer's order, however it can be change by user. For configuration user will need: PC computer, RS converter, APT-28 converter and AT software. Beside changes of measuring range customer will be able to proceed calibration of the transmitter and make correction of output characteristic. Configuration is available only in transmitters with PD and ALW electrical connection.

Electrical connections

PD type
IP65



PM12 type
IP67

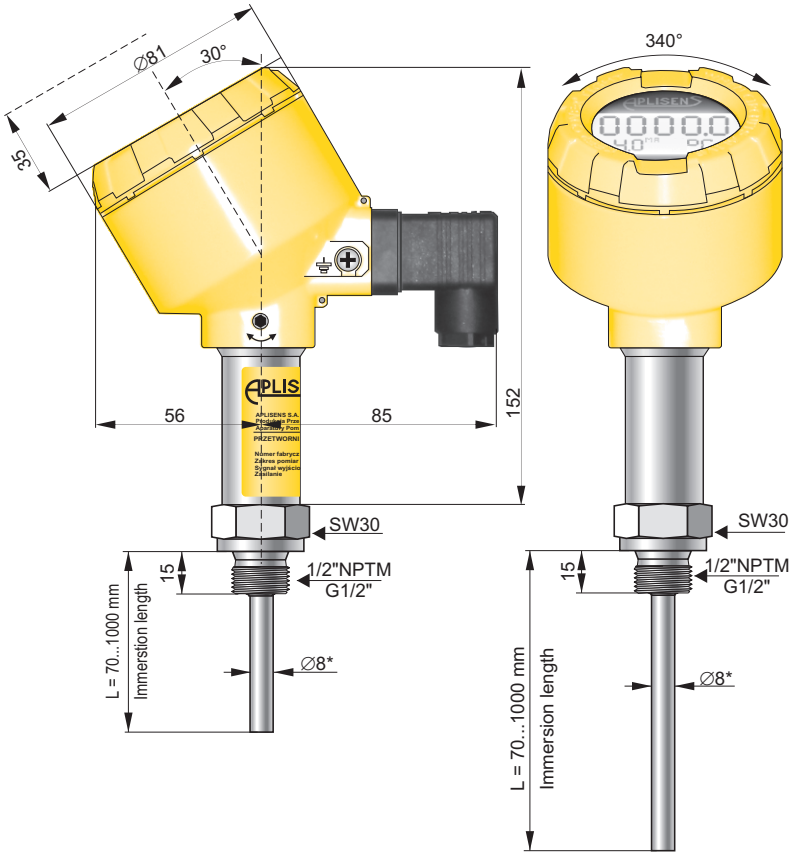


* - other diameters on request

Electrical connection type ALW

Aluminum casing with programable local display. The design of the casing enables the use of a local display, rotation of the display, rotation of the casing by 0–340° relative to the sensor.
Electrical connection DIN EN 175301-803, IP65.

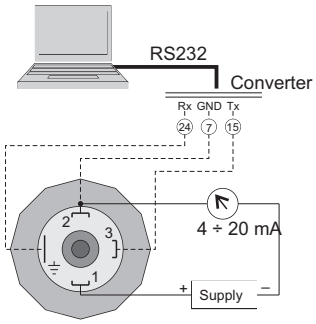
Display with backlight allows to read:
- measured temperature in user units or % of measuring range
- current in output loop in mA



Technical data

Measuring range	-50...+80°C
Minimal width of measuring range	30°C
Transmitter accuracy	±0,16%
Sensor accuracy	±(0,15 + 0,002·|t|)°C
|t| – absolute value of the measured temperature °C	
Error due to ambient temp. changes	0,1% / 10°C
Error due to supply voltage changes	0,1%
Output signal	4 ÷ 20 mA, 2-wires
Power supply U_{zas}	7...29 V DC
APT-28/ALW	10…29 V DC
Additional voltage drop when backlight is on	3V
Load resistance	$R[\Omega] \le \frac{U_{zas}[V] - 7V}{0{,}023\,A}$
Alarm signal	3,8 mA or 23 mA factory setting: 23 mA
Ambient temperature	-25...+80°C
Materials: sensor shield and process connection	ss321
casing	ss304
Ingres protection class	PD – IP65, PM12 – IP67

Electrical diagrams



Ordering procedure

APT-28/___/L = ... mm/___/___/__÷__°C/___

Electrical connection: **PD** (connector DIN EN 175301-803)
PM12 (connector M12x1)
ALW (with display)
Immersion length: **L=...mm**
Diameter of sensor: **8 mm** (other on request)
Connection thread: **G1/2"**, **1/2"NPT**, **M20x1,5**
Measuring range
Alarm signal: **3,8** or **23 mA**

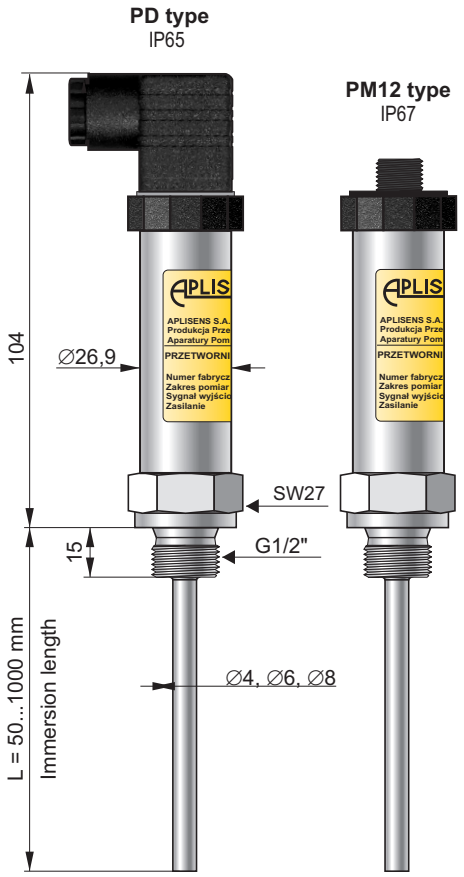
NEW

Temperature transmitter type PT-25

- ✓ **Output signal 4 ÷ 20mA**
- ✓ **Stainless steel casing and wetted parts**
- ✓ **Factory configured**

Application and construction

Temperature transmitter type PT-25 is designed for temperature measurement of liquid and gaseous media in range from -40 to +200°C. Resistance signal from RTD element is converted to standard 4…20mA output signal. Casing of transmitter and wetted parts are made in stainless steel. Transmitter is manufactured in two versions: with removable measuring insert and not removable measuring insert which has additional protection against vibrations. Available electrical connections are angular connector DIN EN 175301-803 or connector M12x1.



Technical data

Output signal	4...20mA
Measuring range	acc. to request from range -40...200°C
Minimum span	25K
Accuracy	± 1%
Power supply	8...35 V DC
Alarm signal	<3,1mA or >26,1mA
Wetted parts material	316L
Sensor diameter	∅4, ∅6, ∅8mm
Process connection	G1/2", other on request
Immersion length	50...1000mm
Extension neck	on request
Ingress protection	PD - IP65, PM12 - IP67

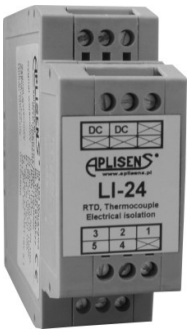
Ordering procedure

PT-25/___/L = ... mm/___/___/___/___/__÷__°C/___

Electrical connection: **PD** (connector DIN EN 175301-803)
PM12 (connector M12x1)
Immersion length: **L=...mm** (standard: 50, 100, 150, 200, 250 mm other length on request)
Diameter of sensor: 4, **6**, **8 mm**
Connection thread: **G1/2"**, other on request
Measuring range
Alarm signal: **3,1** or **26,1 mA**
Measuring instert: **R** - removable, **NR** - not removable

Rail-mounted smart temperature transmitters type LI-24L and LI-24/Ex

LI-24L



LI-24/Ex

- ✓ **Galvanic insulation (In, out)**
- ✓ **Programmable sensor type**
- ✓ **Programmable measuring range**
- ✓ **Thermoresistance line compensation**
- ✓ **Compensation of thermocouple cold junction**
- ✓ **Output signal 4…20mA + Hart protocol**
- ✓ **Ambient temperature from -25 to +75 °C**
- ✓ **Rail mounting system.**
- ✓ **Autodiagnostic system**
- ✓ **Hart protocol**
- ✓ **ATEX certificate (LI-24/Ex)** Ex II 1G Ex ia IIC T4/T5 Ga I M1 Ex ia I Ma

HART COMMUNICATION PROTOCOL

SIL2 Manufacturer's declaration

Technical data

Input signal	K, J, S, B, N, T, R, E voltage Pt10, Pt50, Pt100, Pt200, Pt500, Pt1000, Ni100, Cu100, resistance
Limit process	- 10mV< E<100mV or -100mV< E<1000mV 0Ω<R<400Ω or 0Ω<R<2000Ω
Min. measuring range	10mV or 10Ω
Output signal	4...20mA + HART
Power supply	LI-24L: 8,5…50V DC LI-24/Ex 14...30V DC
Max. Wires resistance	500Ω
Alarm signal	21,5mA or 3,75 mA or setting by user
Sensor current	0,42mA
Accuracy	± 0,1%
Time constant	0,3s - 1,2s
Additional electronic damping	0..30s
Ambient temperature	-25…+75°C
Dimensions (WxHD)	LI-24L: 12,5mmx99mmx114,5mm LI-24/Ex: 27,5mmx80mmx106,7mm

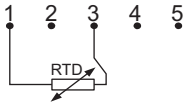
Application and function

The temperature transmitter LI-24L and LI-24/Ex are applicable to converting resistance of temperature or voltage of thermocouple sensor to standard current signal 4-20mA. The transmitters have two separate measuring channels enabling measurement of temperature difference, averange, averange with redundancy, max or min temperature. Transmitter has compensation of ambient temparature influence and compensation of thermocouple cold junction using internal/external (Pt100) sensor or constant temperature.

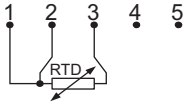
Most of parameters such as: sensor type, measuring range, current alarm signal when electric circuit is broken, output characteristic correction, user characteristic (60 points) are programmed using PC with HART/USB converter and Raport 2 configuration software.

For request Aplisens can set temperature transmitter parameters like measuring range, type of sensor. Their values are printed on label. Transmitter for rail mounting (TS-35).

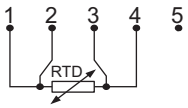
Electrical diagrams



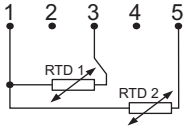
RTD 2-wires connection



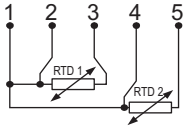
RTD 3-wires connection



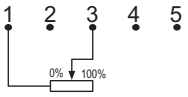
RTD 4-wires connection



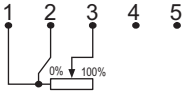
2 × RTD 2-wires connection



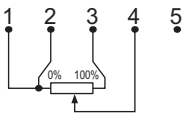
2 × RTD 3-wires connection



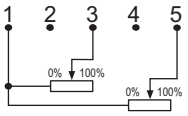
Potentiometer 2-wires connection



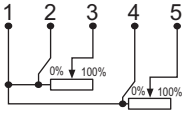
Potentiometer 3-wires connection



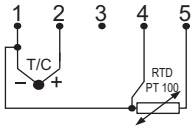
Potentiometer 4-wires connection



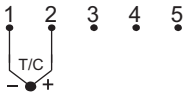
2 × Potentiometer 2-wires connection



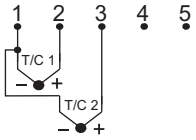
2 × Potentiometer 3-wires connection



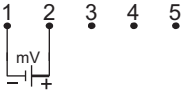
Thermocouple with external CJC



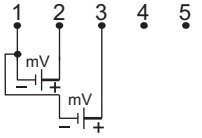
Thermocouple



2 x Thermocouple



Voltage source



2 x Voltage source

LI-24L/___/___/___/___

Version: SIL2 or none

Sensor type

Measuring range

Alarm signal

LI-24/ Ex /___/___/___

Sensor type

Measuring range

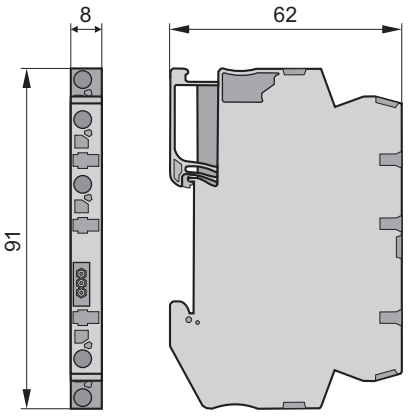
Alarm signal

Rail-mounted temperature transmitter type ATL

- ✓ **Programmable sensor type PT100 i Ni100**
- ✓ **Programmable measuring range.**
- ✓ **Thermoresistance line compensation (3 wires line)**
- ✓ **Output signal 4…20mA**
- ✓ **Rail- mounting system.**

Application and function

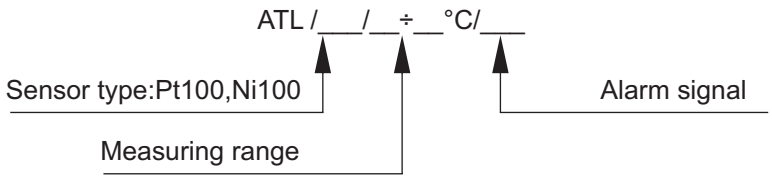
The temperature economical transmitter ATL is applicable to converting resistance of temperature sensor to standard current signal 4…20mA.
Most of parameters such as: sensor type, input signal, measuring range may be adapted by user for specific requirements of his measuring system.
The transmitter is programmed using PC with RS converter and Aplisens AT configuration software.
If you define type of sensor, measuring range in the order, then the transmitter is programmed with required parameters and their values are printed on serial number label.
Transmitter for rail mounting.



Technical data

Input signal	Pt 100, Ni 100
Limit process	20Ω <R<380Ω
Min. measuring range	10 Ω
Output signal	4 – 20 mA
Power supply	6…29V DC
Load resistance	R_o[kΩ]<(U_z – 7V)/25mA
Alarm signal	23mA or 3,8mA
Accuracy for ΔR>20Ω	± 0,2%
Thermal error	± 0,1% / 10°C
Ambient temperature	-25…+80°C
Error due to supply voltage changes	±0,1%

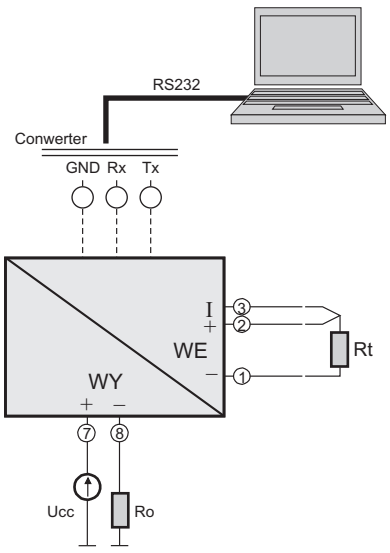
Ordering procedure.



Example: temperature transmitter ATL, sensor type Pt100, measuring range 0…100°C, alarm signal 23mA.

ATL/Pt100/ 0…100°C/23mA

Electrical diagrams

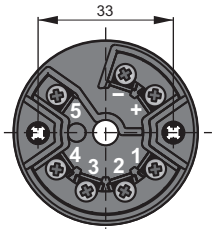


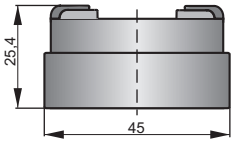
Head-mounted smart temperature transmitter type LI-24G

SIL2 Manufacturer's declaration

HART COMMUNICATION PROTOCOL

- ✓ **Galvanic insulation (In, out)**
- ✓ **Programmable sensor type**
- ✓ **Programmable measuring range**
- ✓ **Resistant thermoresistance line compensation**
- ✓ **Compensation of thermocouple cold junction**
- ✓ **Output signal 4…20mA + Hart protocol**
- ✓ **Ambient temperature from -25 to +75 °C**
- ✓ **Autodiagnostic system**
- ✓ **Hart protocol**
- ✓ **Intrinsic Safety version**





Ex I M1 Ex ia I Ma
II 1G Ex ia IIC T5/T6 Ga
II 1D Ex ia IIIC T105°C Da

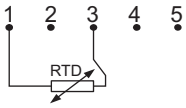
Technical data

Input signal	L, K, J, S, B, N, T, R, E voltage Pt10, Pt50, Pt98, Pt100, Pt200, Pt500, Pt1000, Ni100, Cu50, Cu100, resistance
Limit process	- 10mV< E<100mV or -100mV< E<1000mV 0Ω<R<400Ω or 0Ω<R<2000Ω
Min. measuring range	10mV or 10Ω
Output signal	4...20mA + HART
Power supply	8,5...36V DC
Max. sensor resistance	150Ω/200Ω
Alarm signal	21,5mA or 3,75 mA or setting by user
Sensor current	0,42mA
Accuracy	± 0,1%
Time constant	0,55s - 1,5s
Additional electronic damping	0..30s
Ambient temperature	-25…+75°C

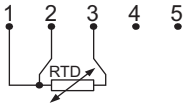
Application and function

The temperature transmitter LI-24G is applicable to converting resistance of temperature or voltage of thermocouple sensor to standard current signal 4-20mA. The transmitter has two separate measuring channels enabling measurement of temperature difference, averange, averange with redundancy, max or min temperature. Transmitter has compensation of ambient temparature influence and compensation of thermocouple cold junction using internal/external (Pt100) sensor or constant temperature.
Most of parameters such as: sensor type, measuring range, current alarm signal when electric circuit is broken, output characteristic correction, user characteristic (60 points) are programmed using PC with HART/USB converter and Raport 2 configuration software.
For request Aplisens can set temperature transmitter parameters like measuring range, type of sensor. Their values are printed on label.

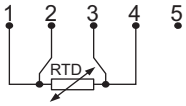
Electrical diagrams.



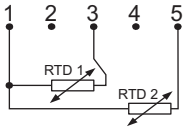
RTD
2-wires connection



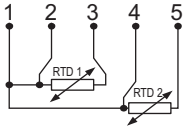
RTD
3-wires connection



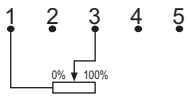
RTD
4-wires connection



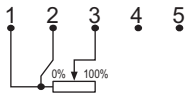
2 × RTD
2-wires connection



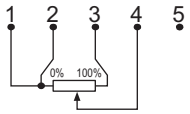
2 × RTD
3-wires connection



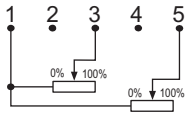
Potentiometer
2-wires connection



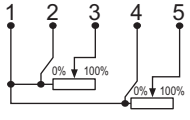
Potentiometer
3-wires connection



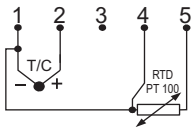
Potentiometer
4-wires connection



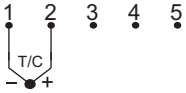
2 × Potentiometer
2-wires connection



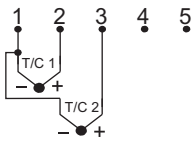
2 × Potentiometer
3-wires connection



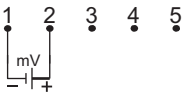
Thermocouple
with external
CJC



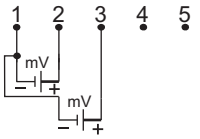
Thermocouple



2 x Thermocouple



Voltage source

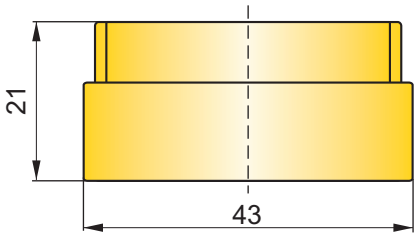


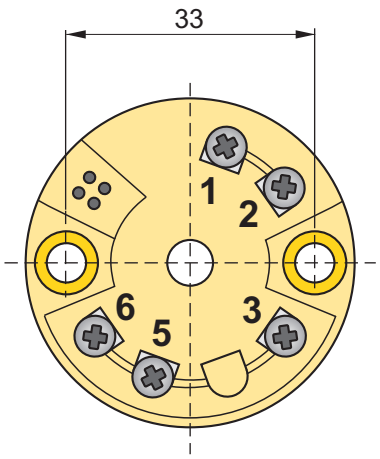
2 x Voltage source

LI-24G /___/___/___/___

Version: Exia, SIL2, none
Sensor type
Alarm signal
Measuring range

Head-mounted temperature transmitter type AT-2





- ✓ **Sensor type PT100 or Ni100**
- ✓ **Thermoresistance line compensation (3 wires line)**
- ✓ **Output signal 4…20mA**
- ✓ **Head- mounting system.**

Application and function

The temperature economical transmitter AT-2 is applicable to converting resistance of temperature sensor to standard current signal 4…20mA.
Most of parameters such as: sensor type, input signal, measuring range may be adapted by user for specific requirements of his measuring system.

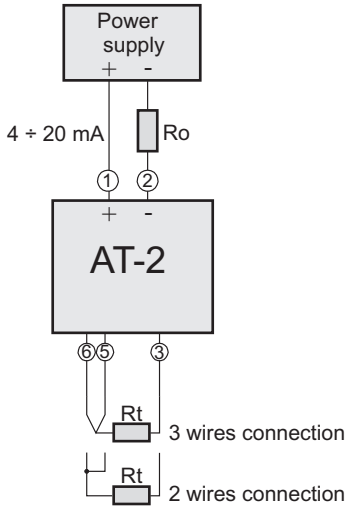
User define type of sensor, measuring range in the order, the transmitter are programmed with required parameters and their values are printed on serial number label.
Transmitter for head mounting.

Technical data

Input signal	Pt 100
Limit process	20Ω <R<380Ω
Min. measuring range	25C°
Output signal	4 – 20 mA
Power supply	7,5…30V DC
Load resistance	R_d[kΩ]<(U $_z$ – 7,5V)/22mA
Alarm signal	22mA or 3,6mA
Accuracy for ΔR>20Ω	± 0,1%
Thermal error	± 0,1% / 10°C
Ambient temperature	-40…+85°C
Error due to supply voltage changes	±0,01%/V

Note: for spans smaller than 75°C, the only permissible start values are: -40°C, -20°C, 0°C, +20°C and +40°C.

Electrical diagrams



Ordering procedure.

AT-2 /___/__÷__°C/___

Sensor type:Pt100,Ni100

Measuring range

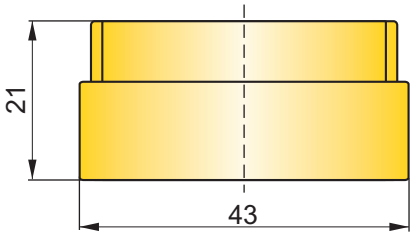
Alarm signal

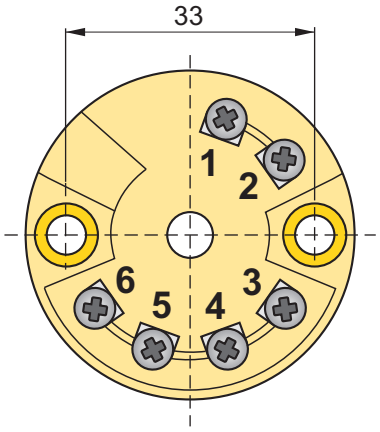
Example: temperature transmitter AT-2, sensor type Pt100, measuring range 0…100°C, alarm signal 22mA.

AT-2/Pt100/ 0…100°C/22mA

Head-mounted temperature transmitter type ATX-2

- ✓**Sensor type: Pt100, Pt500, Pt1000, Ni100**
- ✓**Thermoresistance line compensation**
- ✓**Output signal 4…20mA**
- ✓**ATEX certificate Ⓔx II 1G Ex ia IIC T6**
- ✓**Head-mounting system.**





Application and function

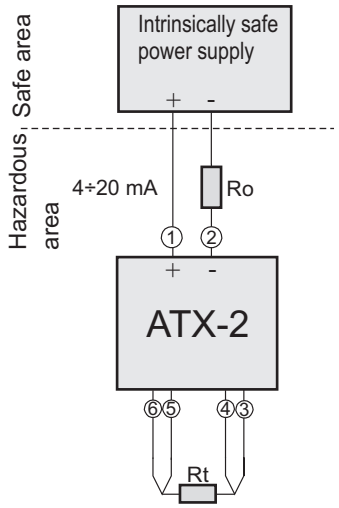
The temperature transmitters are applicable to converting resistance of temperature sensor to standard current signal 4…20mA.
Most of parameters such as: sensor type, input signal, measuring range, may be adapted by user for specific requirements of his measuring system.
User define type of sensor, measuring range in the order, the transmitter are programmed with required parameters and their values are printed on serial number label.
Transmitter for head mounting.

Technical data

Input signal	Pt,Ni
Min.measuring range	10°C
Output signal	4–20mA
Power supply	8…30VDC
Load resistance	R_d[kΩ]<(U_z–8V)/22mA
Alarm signal	21mAor3,5mA
Accuracy for ΔR>20Ω	±0,2%
Thermal error	±0,05%/10°C
Ambient temperature	-40…+85°C
Accuracy:	

PT100: -100÷200°C	±0,2°C	PT1000: -100÷200°C	±0,2°C
PT100: -200÷850°C	±0,4°C	PT1000: -100÷250°C	±0,4°C
PT500: -100÷200°C	±0,2°C	Ni100: -60÷250°C	±0,2°C

Electrical diagrams



Input parameters

Input terminals 3, 4, 5, 6:
Uo = 9,6V, Io = 4,5mA, Po = 11mW,
Lo = 4,5mH dla IIC; 8,5mH dla IIB
Co = 709nF dla IIC; 1300nF dla IIB
Supply terminals 1(+) 2(-):
Ui = 30V, Ii = 100mA, Pi = 750mW, Li ~ 0, Ci ~ 0

Ordering procedure

ATX-2 /___/__÷__°C/___

Sensor type:Pt100,Ni100

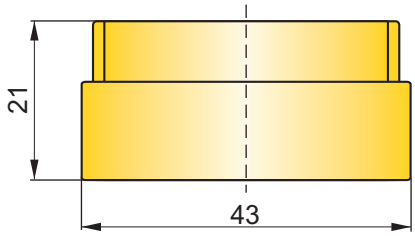
Measuring range

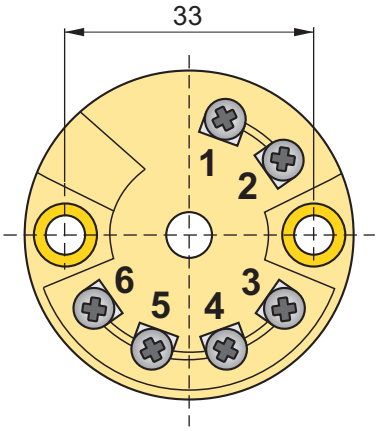
Alarm signal

Example: temperature transmitter ATX-2, sensor type Pt100, measuring range 0…100°C, alarm signal 23mA.

ATX-2/Pt100/0…100°C/23mA

Head-mounted temperature transmitter type GI-22-2, GIX-22-2





- ✓ **Galvanic insulation (In, out)e**
- ✓ **Thermoresistance line compensation (3 and 4 wires line)**
- ✓ **Compensation of thermocouple cold junction**
- ✓ **Output signal 4…20mA**
- ✓ **Head-mounting system**
- ✓ **Certificate ATEX ⟨Ex⟩II 1G Ex ia IIC T6 (GIX-22-2 version).**

Application and function

The temperature transmitters are applicable to converting resistance of temperature or voltage of thermocouple sensor to standard current signal 4…20mA.
Most of parameters such as: sensor type, input signal, measuring range, may be adapted by user for specific requirements of his measuring system.
User define type of sensor, measuring range in the order, the transmitter are programmed with required parameters and their values are printed on serial number label.
Transmitter for head mounting.

Technical data

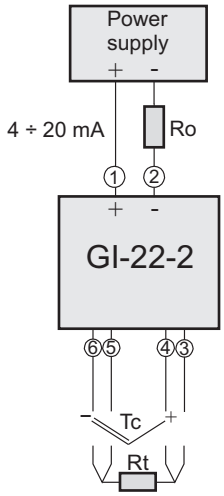
Input signal	J, L, U, T, E, K, N, S, R, B, Pt, Ni
Min. measuring range	10°C for Pt, Ni 50°C for J, L, U, T, E, K, N 500°C for S, R, B
Output signal	4 – 20mA
Power supply	8…35V DC 8-30V DC for GIX-22-2
Load resistance	$R_0[k\Omega]<(U_z - 11V)/25mA$
Alarm signal	22mA or 3,6 mA
Galvanic insulation	Optoelectrical

Accuracy

PT100: -100÷200°C	±0,2°C	J: -210÷1200°C	±0,5°C over -150°C
PT100: -200÷850°C	±0,4°C	L: -200÷900°C	±0,5°C
PT500: -100÷200°C	±0,2°C	U: -200÷600°C	±0,5°C
PT100: -200÷250°C	±0,4°C	T: -270÷400°C	±0,5°C over -200°C
PT1000: -100÷200°C	±0,2°C	E: -270÷1000°C	±0,5°C over -150°C
PT1000: -100÷250°C	±0,4°C	K:-270÷1372°C	±0,5°C over -140°C
Ni100: -60÷250°C	±0,2°C	N: -270÷1300°C	±1°C over -100°C
		S: -50÷1768°C	±2°C over +20°C
		R: -50÷1768°C	±2°C over +50°C
		B: 0÷1820°C	±2°C over +400°C

Thermal error	±0,05 %/10°C
Voltage error	±0,01%/V
Ambient temperature	-40…+85°C

Electrical diagrams



Ordering procedure

GIX-22-2 /___/__÷__°C/___

GI-22-2 /___/__÷__°C/___

Sensor type

Measuring range

alarm signal:
22mA or 3,6mA