Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical information

Temperature display

RIT261

Universal transmitter with a 5 digit LC display for resistance thermometers, thermocouples, resistance and voltage transmitters

Features and benefits

- 2-wire technology, 4 to 20 mA analogue output
- Galvanic isolation between sensor and analogue output
- Customer specific measurement range set-up or expanded SET-UP
- 5-digit LC display 26 mm high characters
- Trend bargraph in 10% steps
- Rear illumination
- Measurement range display from -19999 to 99999
- 2 cable entries
- Housing lead sealable
- IP66/NEMA 4X ingress protection
- GORE-TEX® membrane for pressure compensation
- Certification to:
  - ATEX
  - FM
  - CSA

Application areas

- Plant and panel manufacturers
- Field installations
- Laboratory fittings
- Process monitoring
- Suitable for application in Ex areas

CE

Ex FM CSA

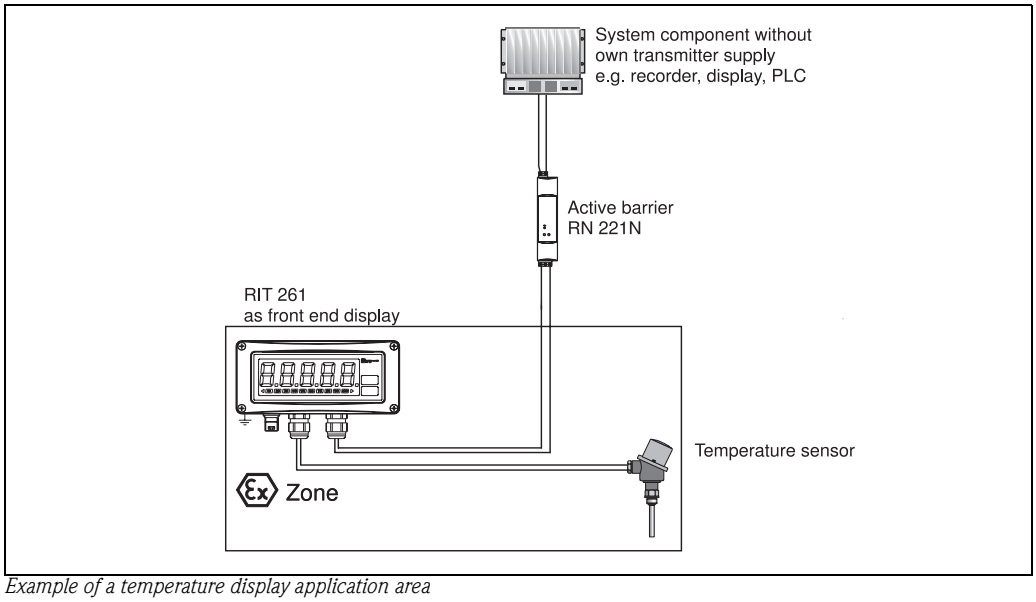
TI091R/09/en
51003923

Endress+Hauser

People for Process Automation

Operation and system construction

Measurement principle



Example of a temperature display application area

Temperature display for electronic monitoring, transforming and display in industrial temperature measurement.

Measurement system

The temperature display (RIT261) consists of two main components,
a) The temperature transmitter (iTEMP PCP TMT181 or iTEMP HART® TMT182) as a two wire transmitter with an analogue output, measurement inputs for resistance thermometers and resistance transmitters in 2-, 3- or 4-wire connection modes, thermocouples and voltage transmitters. Set-up is done either in the factory or using the configuration kit.
b) The microcontroller controlled display with rear illuminated LC display (RIA261).
The set-up for measurement range, decimal point and offset is done either in the factory or on an opened housing, using the three push buttons inside the unit. Set-up is possible during operation.

Input values

Measurement type

Temperature (linear temperature transmission), resistance and voltage

Measurement range

Dependent on the sensor connection, the temperature transmitter monitors various measurement ranges.

Input type

	Description	Measurement range limits	min. meas. range
Resistance thermometer (RTD)	Pt100 Pt500 Pt1000 to IEC 60751	-200 to 850 °C (-328 to 1562 °F) -200 to 250 °C (-328 to 482 °F) -200 to 250 °C (-328 to 482 °F)	10 K 10 K 10 K
	Ni100 Ni500 Ni1000 to DIN 43760	-60 to 250 °C (-76 to 482 °F) -60 to 150 °C (-76 to 302 °F) -60 to 150 °C (-76 to 302 °F)	10 K 10 K 10 K
	■ Connection mode: 2-, 3- or 4-wire connection ■ Software compensation of the cable resistance is possible on 2-wire connection (0 to 30 Ω) ■ Max sensor cable resistance of max. 11 Ω power cable on 3- or 4-wire connection ■ Sensor current: ≤ 0.2 mA		

	Description	Measurement range limits	min. meas. range
Resistance transmitter	Resistance (Ω)	10 to 400 Ω 10 to 2000 Ω	10 Ω 100 Ω
Thermocouple (TC)	B (PtRh30-PtRh6) C (W5Re-W26Re)[1] D (W3Re-W25Re)[1] E (NiCr-CuNi) J (Fe-CuNi) K (NiCr-Ni) L (Fe-CuNi)[2] N (NiCrSi-NiSi) R (PtRh13-Pt) S (PtRh10-Pt) T (Cu-CuNi) U (Cu-CuNi)[2] to IEC 60584-1	0 to +1820 °C (32 to 3308 °F) 0 to +2320 °C (32 to 4208 °F) 0 to +2495 °C (32 to 4523 °F) -270 to +1000 °C (-454 to 1832 °F) -210 to +1200 °C (-346 to 2192 °F) -270 to +1372 °C (-454 to 2501 °F) -200 to +900 °C (-328 to 1652 °F) -270 to +1300 °C (-454 to 2372 °F) -50 to +1768 °C (-58 to 3214 °F) -50 to +1768 °C (-58 to 3214 °F) -270 to +400 °C (-454 to 752 °F) -200 to +600 °C (-328 to 1112 °F)	500 K 500 K 500 K 50 K 50 K 50 K 50 K 50 K 500 K 500 K 50 K 50 K
	■ Cold junction compensation: internal (Pt100) ■ Cold junction compensation accuracy: ± 1 K		
Voltage transmitter (mV)	Millivolt transmitter (mV)	-10 to 75 mV	5 mV

1. to ASTM E988
2. to DIN 43710

Output values

Output signal

Analogue 4 to 20 mA, 20 to 4 mA

Transmission performance

Temperature linear, resistance linear, voltage linear

Fault condition signal

- Measurement range undercut:
  linear drop to 3.8 mA
- Measurement range excess:
  linear rise to 20.5 mA
- Sensor rupture; sensor short circuit:
  ≤ 3.6 mA or ≥ 21.0 mA (not for thermocouples TC)
- No measured values visible in the LC display, no rear illumination

Load

max. (V_{supply} - 11.5 V) / 0.023 A (current output)

Resolution

Digital filter 1st order: 0...60 s

Current requirement

≤ 3.5 mA

Current limit

≤ 23 mA

Power up delay

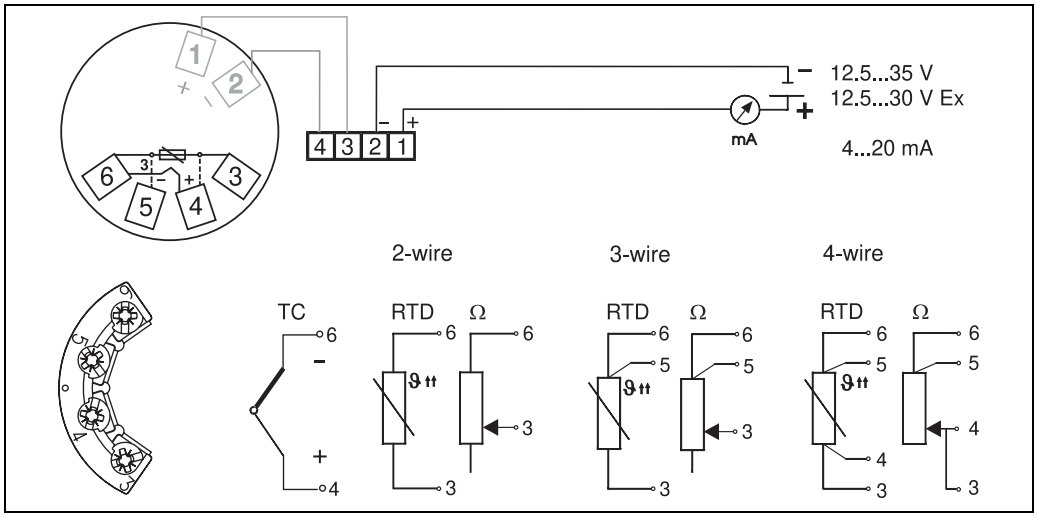
4 s (during power up sequence I_a = 3.8 mA)

Galvanic isolation

U = 2 kV AC (input/output)

Power supply

Electrical connections



Power supply

U_b = 11.5 to 35.0 V, pole secured

Ripple

Allowable ripple $U_{ss} \leq 3$ V at $U_b \geq 13$ V, $f_{max.} = 1$ kHz

Cable entries

2 x cable entries, cable diameters ∅ 5–10 mm

alternative:
2 x ½" NPT connections

Accuracy

Response time

1 s

Reference conditions

Calibration temperature: +23 °C ± 5 K

Measurement deviation (Analog output)

	Description	Measurement accuracy[1]
Resistance thermometer RTD	Pt100, Ni100 Pt500, Ni500 Pt1000, Ni1000	0.2 K or 0.08% 0.5 K or 0.20% 0.3 K or 0.12%
Thermocouple TC	K, J, T, E, L, U N, C, D S, B, R	typ. 0.5 K typ. 1.0 K typ. 2.0 K

	Measurement accuracy[1]	Measurement range
Resistance transmitter (Ω)	± 0.1 Ω or 0.08% ± 1.5 Ω or 0.12%	10 to 400 Ω 10 to 2000 Ω
Voltage transmitter (mV)	± 20 µV or 0.08%	-10 to 75 mV

1. % refers to the preset measurement range. The largest value is valid.

Power supply influence (Analog output)	≤ ± 0.01%/V deviation from 24 V[1]
Ambient temperature influence (temperature drift) (Analog output)	■ Resistance thermometer (RTD): T_d = ± (15 ppm/K * max. measurement range + 50 ppm/K * set-up range) * Δ ϑ ■ Resistance thermometer Pt100: T_d = ± (15 ppm/K * (FSD + 200) + 50 ppm/K * set-up range) * Δ ϑ ■ Thermocouple (TC): T_d = ± (50 ppm/K * max. measurement range + 50 ppm/K * set-up range) * Δ ϑ Δ ϑ = Deviation of ambient temperature from the reference conditions.
Long term stability (Analog output)	≤ 0.1K/year[2] or ≤ 0.05%/year[3 2]
Load influence (Analog output)	≤ ±0.02%/100 Ω[1]
Compensation point influence (Analog output)	Pt100 DIN IEC 751 Cl. B (internal compensation point on thermocouples TC)
Reference conditions (display)	T = 25 °C
Measurement deviation (display)	< 0.1% FSD
Ambient temperature influence (display)	Temperature drift = 0.01%/K ambient temperature

Application conditions

Installation	■ Installation area: Wall or stand pipe mounted, see accessories ■ Installation positioning: No limitation

Environmental conditions

Ambient temperature	–20 to +60 °C (for Ex-areas see Ex certification)
Ambient temperature limits	See ambient temperature details
Storage temperature	-25 to +70 °C
Climatic classification	To EN 60 654-1, Class D1
Ingress protection	IP66, NEMA 4X

1. All details are refered to FSD
2. Under reference conditions
3. % refer to the set-up measurement range. The largest value is valid.

EMC/immunity

Interference transmission
To EN 55011 Group 1, Class B

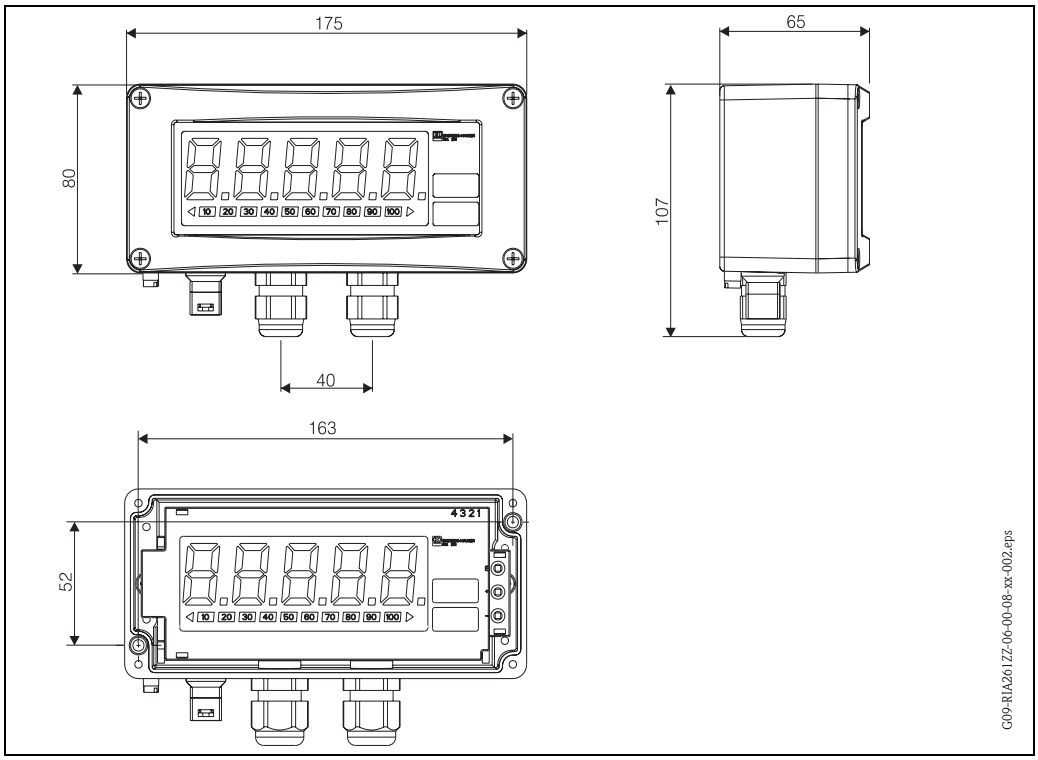
Immunity
- ESD to IEC 1000-4-2, 6 kV/ 8 kV

Electromagnetic fields to IEC 1000-4-3, 10 V/m
- Burst (supply) to IEC 1000-4-4, 4 kV
- Surge to IEC 1000-4-5, 1 kV
- Cable fed high frequency to 1000-4-6, 10 V

Mechanical construction

Model, dimensions

Unit dimensions in mm



Dimensions for wall mounted holes (lower diagram) in mm

- The temperature tranmitter (iTEMP PCP TMT181) is fitted behind the hinged electronic display unit. Terminals suitable for cables with max. section 1.75 mm^2
- Lead sealable housing. Ground connection on outside of the housing: Terminal range 2.5 mm^2
- GORE-TEX® membrane for pressure compensation mounted left of the cable entries

Weight

Approx. 840 g

Materials

Housing
Aluminium pressure die cast epoxy coated housing with glass insert

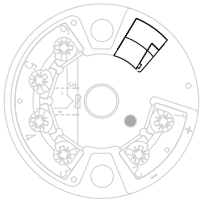
Wall/stand pipe mounting kit with tensioning tape
1.4301 stainless steel

Display and operating system

Display elements

- Display
  5 digit LC display, character size 26 mm, rear illuminated
  bargraph display in 10% steps, markings for measurement over/under range
- Display range
  -19999 to +99999
- Offset
  -19999 to +32767
- Operation
  3 push button operation (-/+/E) integrated in the unit, access on open housing
- Signalisation
  Measurement over/under range
- Rear illumination
  Illumination intensity increases with increasing loop current signal

Temperature transmitter set-up (changes to factory set-up)



Configuration kit
Configurations kit TMT181A, Set-up using PC programme (ReadWin) and PC interface connection cable TTL -/- RS 232 with plug

Possible parameter set-up
Sensor type and connection mode, measurement units (°C/°F), measurement range, internal/external compensation point, cable resistance compensation on 2-wire connection, fault conditioning,
Output signal (4 to 20/20 to 4 mA), digital filter (damping), offset, measurement point tagging (8 characters), output simulation

Certification

CE

The measurement system fulfils the legal requirements of the EU guidelines. Endress+Hauser acknowledges a successful test of the unit by applying the CE mark.

Ex certification

- ATEX II 2(1)G EEx ia IIC T6
- FM IS, Class I, Div. 1, Group A,B,C,D
- CSA Ex ia, Class I, Div. 1, Group A,B,C,D

Further details to the Exversions available (ATEX, FM, CSA, etc.) can be requested from the local E+H sales offices. All data relevant to Exprotection can be found in separate Exdocumatation. This will be forwarded on request.

How to order

Questionnaire

Questionnaire Endress+Hauser iTEMP temperature transmitter

Customer specific setup / Kundenspezifische Einstellung

Standard setup / Konfiguration Messbereich

Sensor

TC: ( ) B ( ) C ( ) D ( ) E ( ) J ( ) K ( ) L ( ) N ( ) R ( ) S ( ) T ( ) U

RTD: **( ) Pt100** ( ) Pt500 ( ) Pt1000 ( ) Ni100 ( ) Ni500 ( ) Ni1000

( ) 2 wire **( ) 3 wire** ( ) 4 wire

Unit / Einheit: **( ) °C** ( ) °F

Range / Messbereich

Low scale / Anfang: [ ][ ][ ][ ], [ ] (0 , 0)

High scale / Ende: [ ][ ][ ][ ], [ ] (1 0 0 , 0)

Bitte beachten!: Messbereich und min. Spanne (s. Techn. Daten)

Note!: Range and min. span (s. Techn. data)

Expanded setup / Erweiterte Konfiguration

Reference junction / Vergleichsstelle: **( ) intern** ( ) extern [ ][ ][ ] [0...80°C; 32...176°F] (only / nur TC)

Compensation wire resistance / Kompensation Leitungswiderstand: [ ][ ] [**0**...20 Ohm] (only / nur RTD 2 wire)

Failure mode / Fehlerverhalten: ( ) ≤ 3,6 mA **( ) ≥ 21,0 mA**

Output / Ausgang: **( ) 4...20 mA** ( ) 20...4 mA

Damping / Dämpfung: [ ][ ] [**0**, 1, 2,..., 60s]

Offset: [ ][ ][,][ ] [-9,9...**0**...+9,9K]

TAG / Messstellen-bezeichnung: [ ][ ][ ][ ][ ][ ][ ][ ] / [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

(HART: 8 char. TAG + 16 char. descriptor) (PCP: 8 char. TAG)

Endress+Hauser

People for Process Automation

Product structure

Temperature Display RIT261, Field

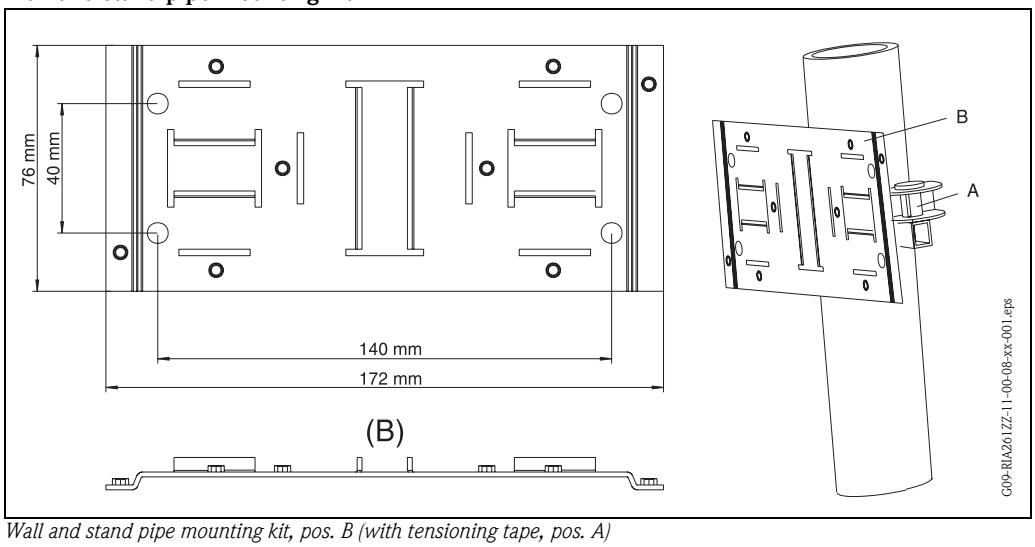
Loop powered. Display LC, 5-digit, Char. hight 26mm.
Bargraph -10...110%. 1 channel, head transmitter included.
Housing: Alu, IP66 NEMA4x. Display back lighted.

	Approval:									
	A	Non-hazardous area								
	B	ATEX II2(1)G EEx ia IIC T4/T5/T6								
	C	FM IS, NI, DIP/I,II,III/1+2 Gr.ABCDEFG								
	D	CSA Cl.I, Div 1, Gr.ABCD T6								
	E	ATEX II3G EEx nA IIC T4/T5/T6								
		Cable entry:								
		1	2x gland M20							
		2	2x thread NPT 1/2							
			Additional option:							
			1	Basic version						
			2	Mounting bracket, wall / pipe						
				Head transmitter:						
				A	TMT181 PCP, galvanic insulation RTD, TC, Ohm, mV					
				B	TMT182 HART, galvanic insulation RTD, TC, Ohm, mV					
					Config. connection:					
					A	Factory setup 3-wire				
					3	RTD 3-wire				
					4	RTD 4-wire				
					2	RTD 2-wire				
					1	Thermocouple TC				
						Config. sensor type:				
						A	Factory setup			
						1	Pt100, -200...850°C, min. span 10K			
						2	Ni100, -60..180°C, min. span 10K			
						3	Pt500, -200..250°C, min. span 10K			
						4	Ni500, -60..150°C, min. span 10K			
						5	Pt1000, -200..250°C, min. span 10K			
						6	Ni1000, -60..150°C, min. span 10K			
						7	Resist. transmitter 10.. 400 Ohm, min. span 10 Ohm			
						8	Resist. transmitter 10..2000 Ohm, min. span 100 Ohm			
						B	Tyep B, 400..1820°C, min. span 500K			
						C	Type C, 500..2320°C, min. span 500K			
						D	Type D, 500..2495°C, min. span 500K			
						E	Type E, -200..1000°C, min. span 50K			
						J	Type J, -200..1200°C,min. span 50K			
						K	Type K, -200..1372°C, min. span 50K			
						L	Type L, -200.. 900°C, min. span 50K			
						N	Type N, -100..1300°C, min. span 50K			
						R	Type R, -50..1768°C, min. span 500K			
						S	Type S, -50..1768°C, min. span 500K			
						T	Type T, -200.. 400°C, min. span 50K			
						U	Type U, -200.. 600°C, min. span 50K			
						V	Voltage transmitter -10..100 mV, min. span 5 mV			
							Configuration:			
							A	Factory setup 0-100°C		
							B	Measuring range, see additional spec.		
							C	TC, see questionnaire		
							D	RTD, see questionnaire		
								Additional option:		
								A	Basic version	
								B	Works calib. certif., 5-point	

RIT261-										⇐ Order code

Accessories

Wall and stand pipe mounting kit



Wall and stand pipe mounting kit, pos. B (with tensioning tape, pos. A)
Order number: "51003502"

TMT181A-VK: Configuration kit iTEMP PCP:
Set up programme (ReadWin) and PC interface cable (TTL/RS 232C) for setting up the built-in temperature transmitter (if the factory settings are to be changed).
Order number: "TMT181A" and "BA100R/09/a3"

TXU10-: Configuration kit
for PC-programmable transmitters, set-up programme+interface cable for PC with USB port
Order number: "TXU10-"

Further documentation

- Temperature display operating manual RIT261 (KA125R/09/a3)
- Temperature head transmitter iTEMP PCP TMT181 technical information (TI070R/09/en)
- Temperature head transmitter iTEMP PCP TMT181 operating manual (BA100R/09/a3)
- Field display RIA261 technical information (TI083R/09/en)
- Field display RIA261 operating manual (BA111R/09/a3)
- Additional Ex-documentation: ATEX (XA014R/09/a3) FM, CSA, etc.
- Brochure "Temperature measurement" (FA006T/09/en)
- Brochure "System components" (FA016K/09/en)

Subject to modification

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