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

Technical Information

Temperature Switch Thermophant T TTR31, TTR35

Temperature switch for the safe measurement, monitoring and control of process temperatures

Application
Temperature switch for the monitoring, display and control of process temperatures in a range from -50 to 150 °C (-58 to 302 °F):

Thermophant T TTR31
– with thread connections or coupling
Thermophant T TTR35
– for hygienic applications

- Versions for use in hygienic applications
- Electronic versions
  – one PNP switch output
  – two PNP switch outputs
  – 2 x PNP switch outputs or one PNP switch output and 4 to 20 mA output (active)

Benefits at a glance
This compact temperature switch impresses with the latest in technology being used:

- Integrated switching electronics for decentral and economic process monitoring and control
- Quick and flexible process connection thanks to modular connections
- High reproducibility and long-term stability
- Functional safety SIL 2 (in preparation)
- Function check and information on-site thanks to LEDs and digital display
- Long-term stable temperature sensor made of platinum (Pt100 class A as per IEC 751)
- High accuracy across the entire ambient temperature range and short response time
- Operation and visualisation also with PC and ReadWin® 2000 configuration software
- Upper part of housing can be rotated by 310°
- DESINA-compliant
- 3-A approved

TI105R/09/en
No. 51007865

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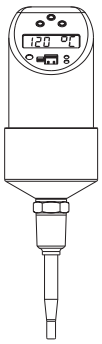
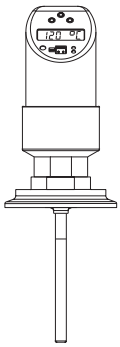
Function and system design

Measuring principle

Electronic recording and conversion of input signals in industrial temperature measurement. A platinum sensor located at the measuring tip changes its resistance value depending on the temperature. This resistance value is recorded electronically. The conversion of the resistance value into a temperature measurement signal is defined by the international standard IEC 751.

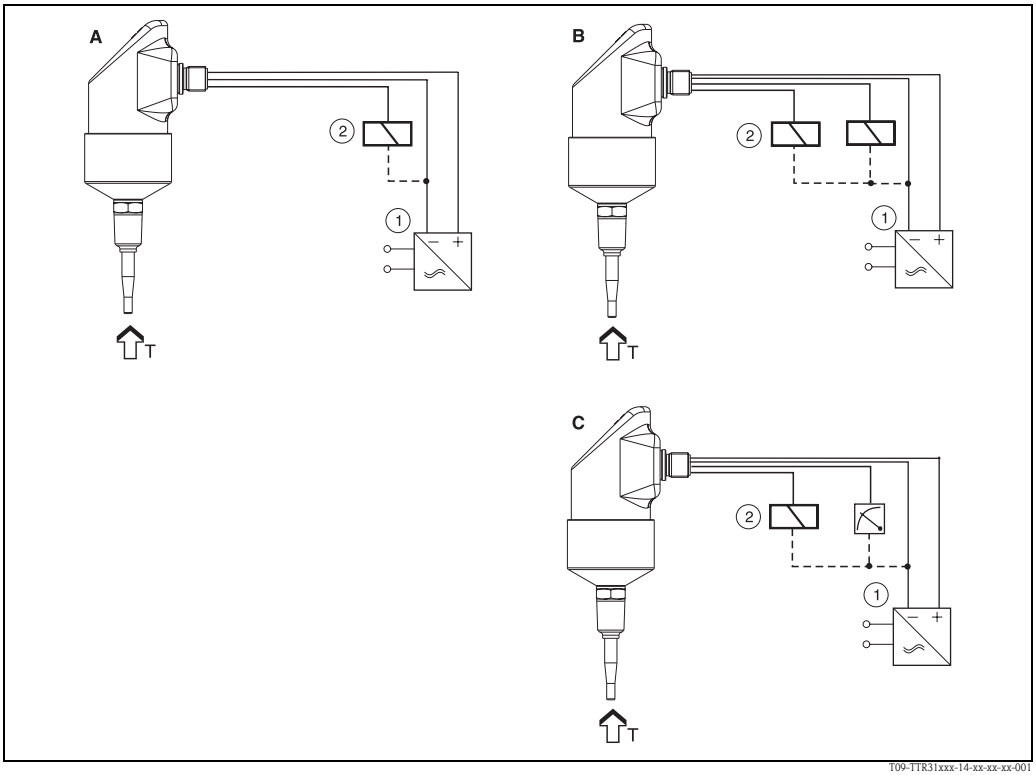
Measuring system

Overview

Thermophant product family	**TTR31**	**TTR35**
	 T09-TTR31xxx-14-xx-xx-xx-000	 T09-TTR35xxx-14-xx-xx-xx-000
Measurement probe	Pt100	Pt100
Field of application	Measurement and monitoring and control of process temperatures.	Measurement and monitoring and control of process temperatures in hygienic processes.
Process connection	Coupling (sensor length ≥ 100 mm) Thread – G ½A and G ¼A – ANSI ¼" NPT and ½" NPT	Hygiene – clamp 1" - 1½", 2" – Varivent F, N – DIN 11851 – APV inline
Measuring range (process temperature range)	-50 to 150 °C (-58 to 302 °F)	-50 to 150 °C (-58 to 302 °F) in hygienic processes

DC voltage version

PNP switch output of electronics.
Power supply e.g. with a power supply unit.
Preferably in conjunction with programmable logic controllers (PLC) or for controlling a relay.



A: 1x PNP switch output
B: 2x PNP switch output
C: PNP switch output with additional analog output 4...20 mA
① Power supply unit
② Load (e.g. programmable logic controller, process control system, relay)

Functional safety (SIL)

The Thermophant T temperature switches were developed according to the standards IEC 61508 and IEC 61511-1 (FDIS). The device version with PNP switch output and additional analog output is equipped with fault detection and fault prevention facilities within the electronics and software. It can, therefore, be used to monitor limit temperature up to SIL 2 (Safety Integrity Level).
The attainable SIL value is determined by the safety technical characteristics of probability of failure, hardware fault tolerance and the safe failure fraction. Details on this may be found in the Functional Safety Manual (in development).

Input

Measured variable

Temperature (temperature-linear transmission behaviour)

Measuring range

Designation	Measuring range limits	Min. span
Pt100 as per IEC 751	-50 to 150 °C (-58 to 320 °F)	10 K (18 °F)
■ Sensor current: ≤ 0.6 mA		

Output

Output signal

DC voltage version: (short-circuit proof version)

- 1x PNP switch output
- 2x PNP switch outputs
- 2x PNP switch outputs or one PNP switch output and 4 to 20 mA output (active)

Signal on alarm

- Analog output: ≤ 3.6 mA or ≥ 21.0 mA adjustable (if setting ≥ 21.0 mA the output is > 21.5 mA)
- Switch outputs: at safety condition (switch open)

Load

Max. ($V_{power\ supply}$ – 6.5 V) / 0.022 A (current output)

Range of adjustment

- Switch output:
  Switch point (SP) and Switch-back point (RSP) in increments of 0.1 °C (0.18 °F)
  Min. distance between SP and RSP: 0.5 % URL
- Analog output (if available):
  Lower range value (LRV) and upper range value (URV) can be set anywhere within the sensor range (min. measuring range 10 K (18 °F))
- Damping: can be set anywhere between 0...40 s in increments of 0.1 s
- Unit: °C, °F, K

Switching capacity

DC voltage version:

- Switch status ON: $I_a \leq 250$ mA, switch status OFF: $I_a \leq 1$ mA
- Switching cycles: > 10,000,000
- Voltage drop PNP: ≤ 2 V
- Overload protection
  Automatic testing of switching current; output is switched off in case of overcurrent, the switching current is tested again every 0.4 s; max. capacitance load: 14 µF for max. supply voltage (without resistive load)
  Periodic disconnection from a protective circuit in event of overcurrent (f = 2 Hz) and indication of 'Warning'

Input PLC

Input impedance $R_i \leq 2$ kΩ; input current $I_i \geq 10$ mA

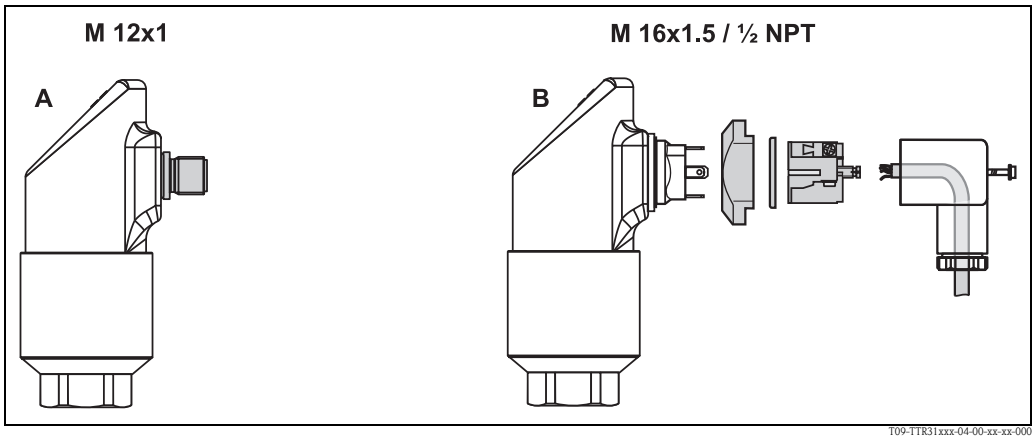
Inductive load

To prevent electrical interference, only operate an inductive load (relays, contactors, solenoid valves) when directly connected to a protective circuit (free-wheeling diode or capacitor).

Power supply

Electrical connection

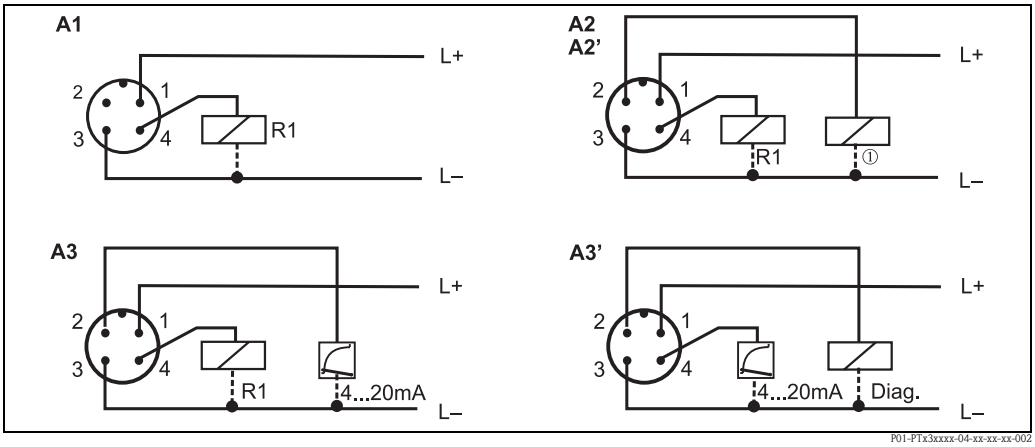
Plug connection



A: M 12x1 connector
B: M 16x1.5 or ½ NPT valve plug

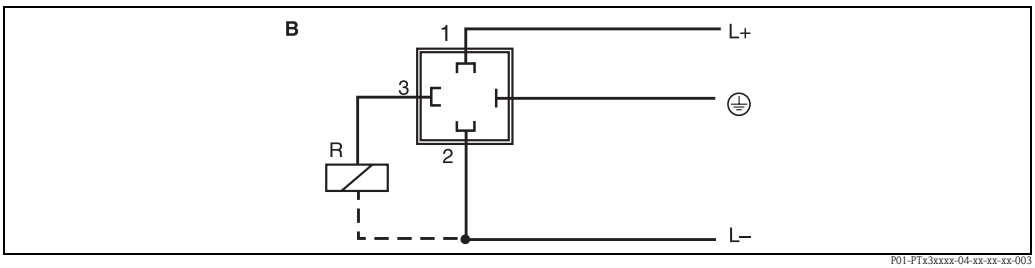
Device connection

- DC voltage version with M 12x1 connector



A1: 1x PNP switch output
A2: PNP switch outputs R1 and ① (R2)
A2': PNP switch outputs R1 and ① (diagnosis/break contact with adjustment "DESINA")
A3: PNP switch output with additional analog output
A3': PNP switch output with additional analog output (PIN assignment with "DESINA" setting).

- DC voltage version with M 16x1.5 or ½ NPT valve plug



B: 1 x PNP switch output

Supply voltage

- DC voltage version
  12...30 V DC (reverse polarity protection)

Current consumption

without load < 60 mA, with reverse polarity protection

Power supply failure

- Behaviour in case of overvoltage (> 30 V)
  The device works continuously up to 34 V DC without any damage.
  No damage is caused to the device in case of a short-term overvoltage up to 1 kV (as per EN 61000-4-5).
  The specific properties are no longer guaranteed if the supply voltage is exceeded.
- Behaviour in case of undervoltage
  If the supply voltage drops below the minimum value, the device switches off (status as if not supplied with power = switch open).

Performance characteristics

The percentage information in the "Performance characteristics" section refers to the sensor nominal value.

Reference operating conditions

As per DIN IEC 60770 or DIN IEC 61003
T = 25 °C (77 °F), relative humidity 45...75 %, ambient air pressure 860...1060 kPa (12.47...15.37 psi)
Supply voltage U = 24 V DC

Maximum measured error
Switch point and display

Electronics

0.2 K (0.36 °F)

Sensor

- Tolerance class A as per IEC 751, -50 to 150 °C (-58 to 302 °F)
- Maximum measured error in °C = 0.15 + 0.002 · ItI

ItI = Process temperature in °C without taking sign into account.

Total error

Total error = electronics error + sensor error,
e.g. for process temperatures:
-50 to 75 °C (-58 to 167 °F) ≤ 0.5 K (0.9 °F)
75 to 150 °C (167 to 302 °F) ≤ 0.65 K (1.17 °F)

Non-repeatability
Switch point

0.1 K (0.18 °F) as per EN 61298-2 (without ambient temperature influence)

Sensor response time

≤ 10 s (t_{90})

Long-term drift

≤ 0.1 K (0.18 °F) per year under reference operating conditions

Long-term reliability

Mean time between failure (MTBF) > 100 years
(calculated according to "British Telecom Handbook of Reliability Data No. 5")

Influence of ambient temperature

- Switch output and display: ≤ 30 ppm/K
- Analog output: ≤ 50 ppm/K + influence of switch output and display

Switch output response time

100 ms

Analog output

- Maximum measured error = switch point error and display error + 0.1%
- Rise time T_{90}: ≤ 200 ms
- Settling time T_{99}: ≤ 500 ms

Operating conditions: Installation instructions

Installation instructions

- Any orientation
- Any position-dependent zero shift can be corrected.
  Position factor (offset): ±10 % of the sensor nominal value
- Housing can be rotated up to 310 °

Operating conditions: Environment

Ambient temperature range

–40...+85 °C (-40 to 185 °F)

Storage temperature

–40...+85 °C (-40 to 185 °F)

Climate class

4K4H as per DIN EN 60721-3-4

Degree of protection

- With M 16x1.5 or ½ NPT valve plug: IP65
- With M 12x1 connector: IP66 (1 mH_2O for max. 1 hour)

Shock resistance

50 g as per DIN IEC 68-2-27 (11 ms)

Vibration resistance

- 20 g as per DIN IEC 68-2-6 (10-2000Hz)
- 4 g as per German Lloyd GL Guidelines

Electromagnetic compatibility

- Interference emission as per EN 61326, class B electrical equipment
- Interference immunity as per EN 61326, appendix A (industrial use) and NAMUR Recommendation NE 21

EMC influence: ≤ 0.5 %

Operating conditions: Process

Process temperature limits

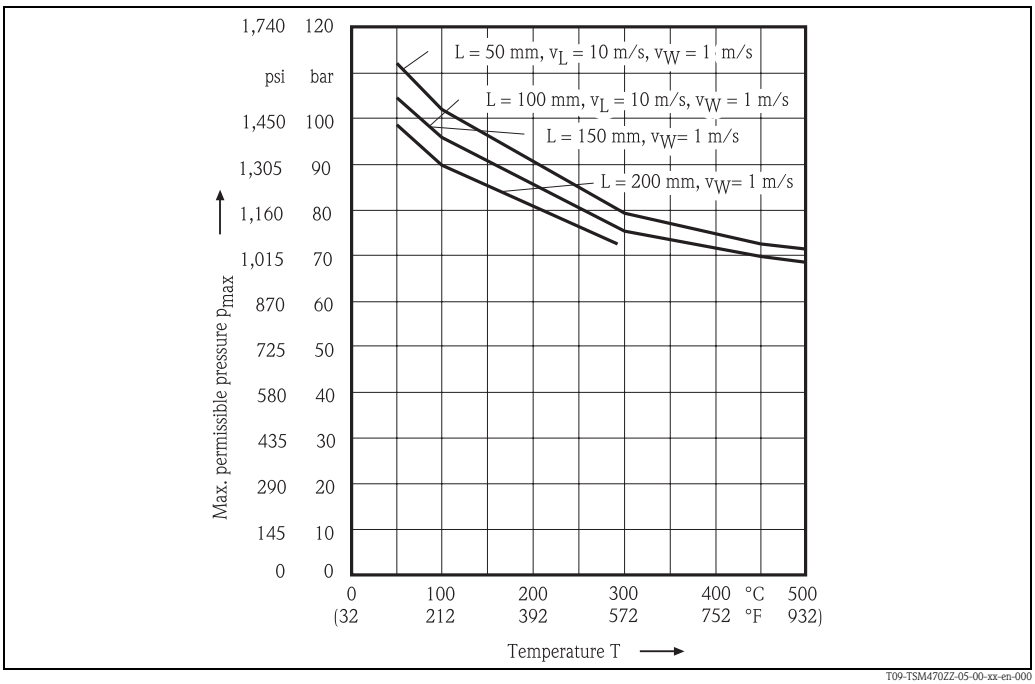
-50 to 150 °C (-58 to 302 °F)
Restrictions depending on process connection and ambient temperature:

- No restriction with coupling (see Accessories, order no. **51004751**, **51004753**) and neck tube length min. 20 mm (0.79")
- with process connection:

max. ambient temperature	max. process temperature
up to 25 °C (77 °F)	no restriction
up to 40 °C (104 °F)	135 °C (275 °F)
up to 60 °C (140 °F)	120 °C (248 °F)
up to 85 °C (185 °F)	100 °C (212 °F)

Process pressure limits

p/T load diagram as per DIN 43763 or Dittrich



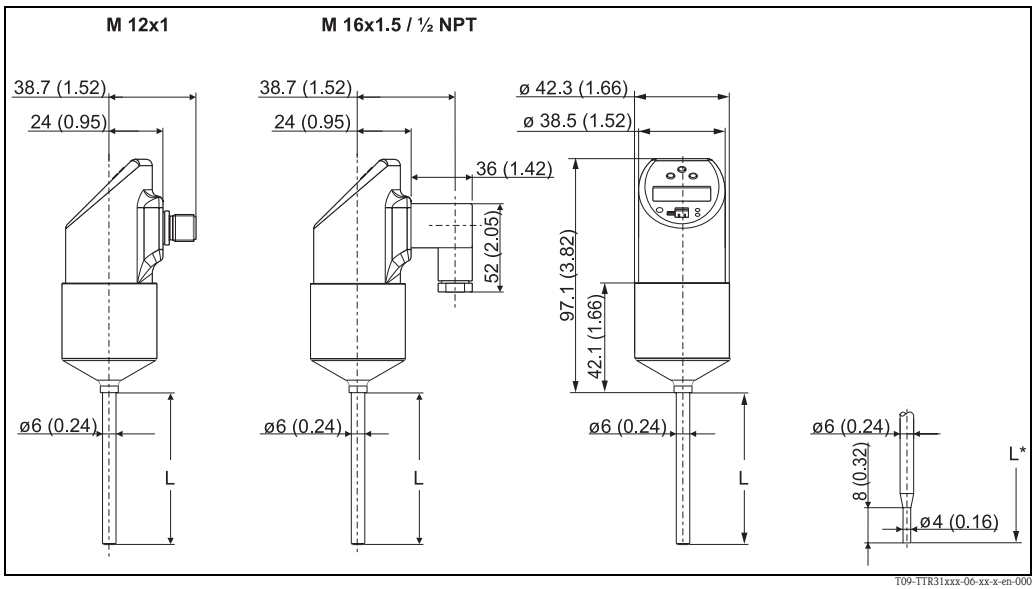
p/T load diagram

L = insertion length (1.97", 3.94", 5.91", 7.87")
v_L = medium velocity air (32.8 ft/s)
v_W = medium velocity water (3.28 ft/s)

Mechanical construction

Design, dimensions

Dimensions



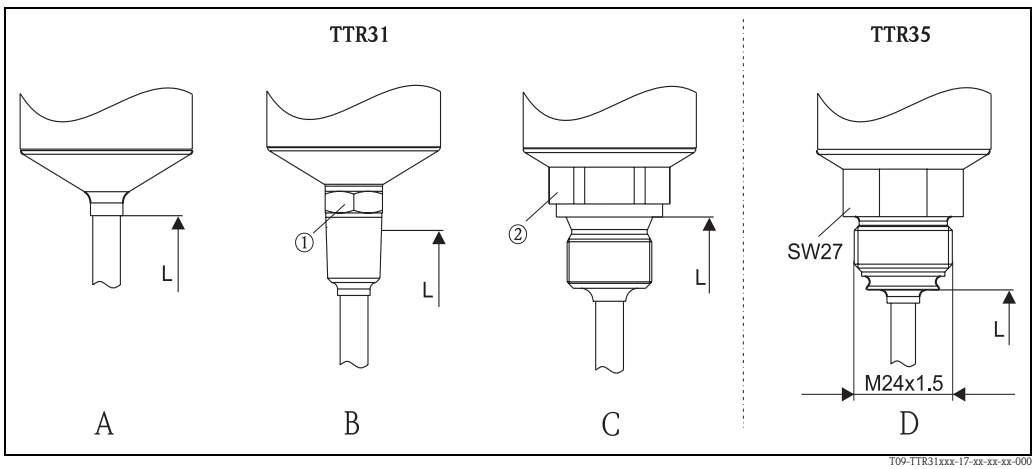
All dimensions in mm

Version L in 100 and 200 mm (3.94" and 7.87")
Version L = 50 mm (1.97") with reduced sensor tip*

M 12x1 connector as per IEC 60947-5-2

M 16x1.5 or ½ NPT valve plug as per DIN 43650A/ISO 4400

Process connection



Pos. A: Version without process connection ('w'). For suitable welding boss and coupling see 'Accessories'.

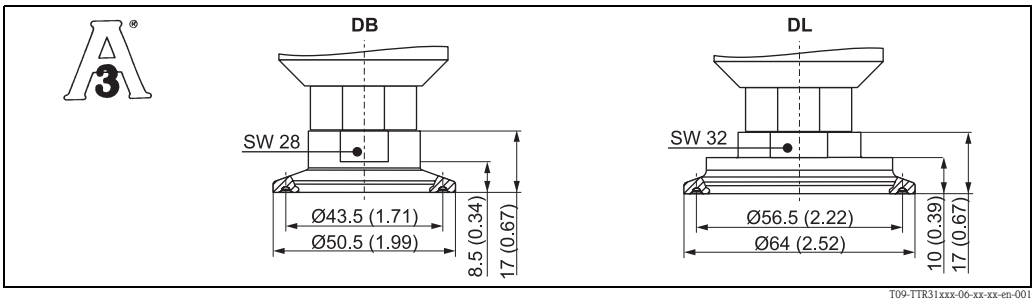
Pos. B: Version with thread process connection ANSI ¼" NPT (① = AF14) and ½" NPT (① = AF27).

Pos. C: Version with thread process connection G ¼A (② = AF14) and G ½A (② = AF27) as per ISO 228.

Pos. D: Adapter concept - version with M24x1.5 thread for adapters with process connection for hygienic processes.

Version L in 100 and 200 mm (3.94" and 7.87"), Version L = 50 mm (1.97") with reduced sensor tip

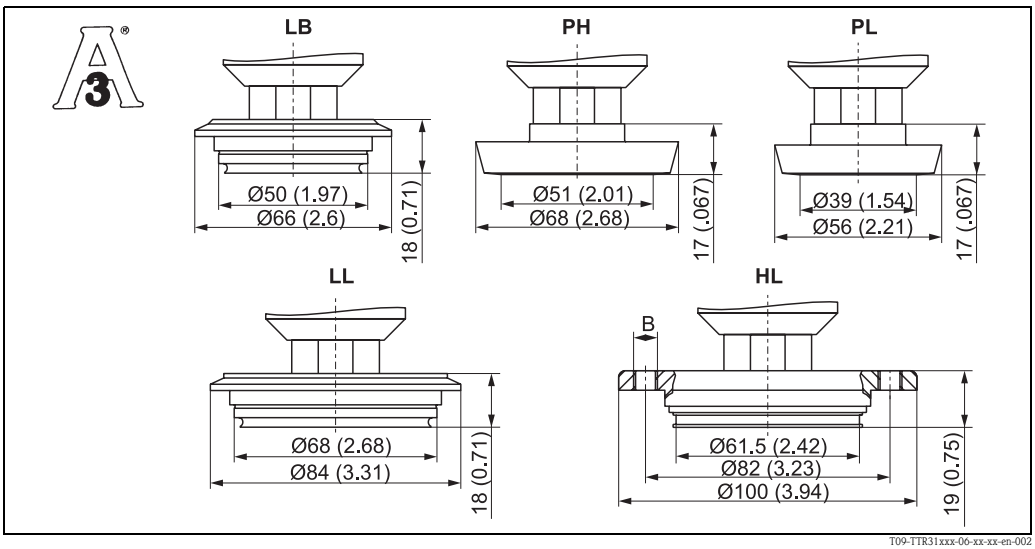
TTR35 Adapter
Clamp connections



Process connection versions (adapters)
DB: clamp 1"...1½" (ISO 2852) or DN 25...DN 40 (DIN 32676)
DL: clamp 2" (ISO 2852) or DN 50 (DIN 32676)

See also "Ordering information" section
(all dimensions in mm / inches)

TTR35 Adapter
Hygiene connections



Process connection versions (adapters)
LB: Varivent F pipe DN 25-32, PN 40
LL: Varivent N pipe DN 40-162, PN 40
PH: DIN 11851, DN 40, PN 40 (including coupling nut)
PL: DIN 11851, DN 50, PN 40 (including coupling nut)
HL: APV inline, DN 50, PN 40, 316L, 3A (B = 6 x Ø8.6 bores + 2 x M8 thread)

See also "Ordering information" section
(all dimensions in mm /inches)

Weight

approx. 300 g (10.6 oz), depends on sensor length and process connection

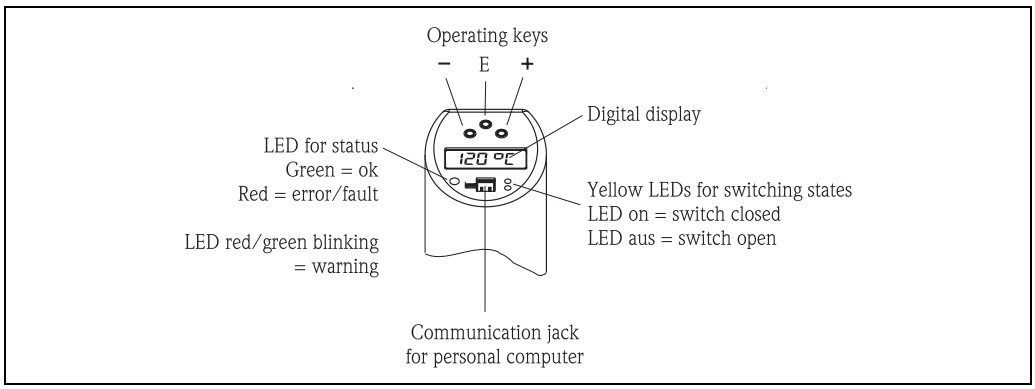
Material

- Process connection: AISI 316L
  Surfaces in contact with process in TTR35 with surface quality $R_a \leq 0.8$ µm
  Coupling nut: AISI 304
- Seals:
  EPDM, FDA number 21–CFR 177.2600, 3-A approved
- Housing: AISI 316L, with surface quality $R_a \leq 0.8$ µm
  O ring between housing and sensor modul: EPDM
- Electrical connection:
  M12 connector: exterior AISI 316L, interior polyamide (PA)
  Valve plug: outer polyamide (PA)
  M12 connector: exterior 316L
  Cable outer covering: polyurethane (PUR)
  O ring between electrical connection and housing: FKM
- Display:
  Polycarbonate PC-FR (Lexan®)
  Seal between display and housing: SEBS THERMOPLAST K®
- Keys: Polycarbonate PC-FR (Lexan®)

Human interface

Operating elements

Position of display and operating elements



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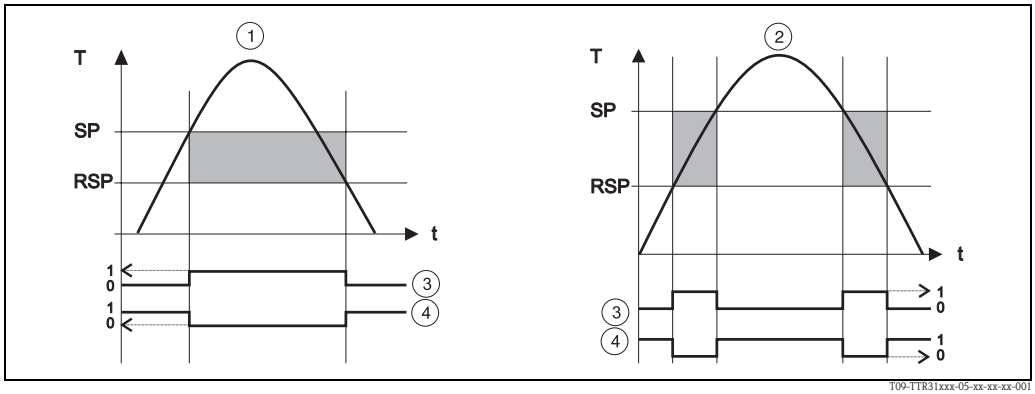
On-site operation

Menu-guided operation using operating keys.

Function group	Operating options
BASE (basic functions)	Unit selection: °C, °F, K
	Zero point, offset (automatic and manual)
	Damping display value, output signal: anywhere between 0...40 s (in increments of 0.1 s)
	Display: –Display of measured value or of configured switch point – Rotation of display by 180° – Switching off of display
	Behaviour according to DESINA: The PIN assignment of the M12 connector is in accordance with the guidelines of DESINA (DESINA = distributed and standardised installation technology for machine tools and manufacturing systems)
	in development: switch to SIL mode (functional safety)
OUT (configuration of 1st output) and OUT 2 (configuration of 2nd output, only for corresponding electronics version)	Output function: – Hysteresis or window function – NC contact or NO contact (See next diagram) – Analog output 4...20 mA
	Switch point: – Input value – Acceptance of applied value Switch point anywhere between 0.5...100 % URL (in increments of 0.1 %)
	Switch-back point: – Input value – Acceptance of applied value Switch-back point anywhere between 0...99.5 % URL (in increments of 0.1 %)
	Delay of switch point and switch-back point: can be set anywhere between 0...99 s (in increments of 0.1 s)
4-20 (configuration of analog output, only for corresponding electronic version)	Lower Range Value (LRV) and Upper Range Value (URV) of analog output: – Input value – Acceptance of applied value
	Setting of error current: choice of ≤ 3.6 mA / ≥ 21.0 mA / last current value
SERV (service functions)	Resetting of all settings to factory settings
	Setting of locking code
	Security locking
	Static Revision Counter, incremented each time the configuration is changed
	Display of last error to occur
	Switch output 1, switch output 2 and analog output simulation
	Display of max. measured temperature value
	Display of min. measured temperature value

Switch point functions

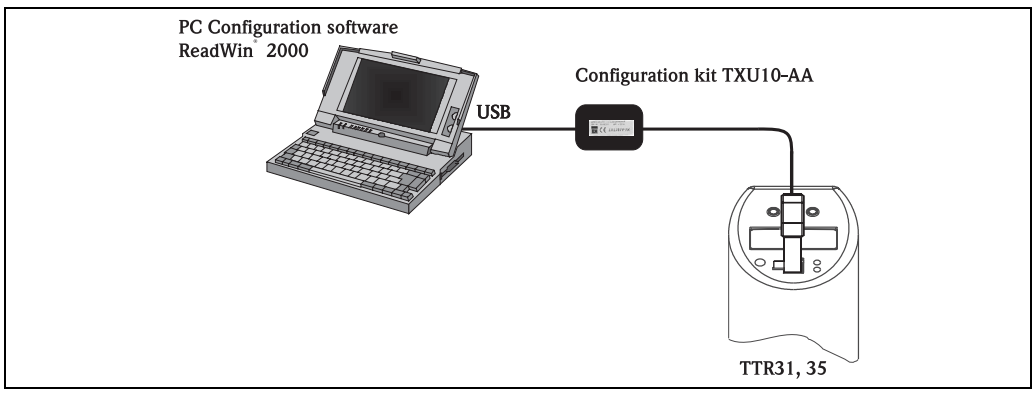
- Hysteresis function
  The hysteresis function enables two-point control via a hysteresis. Depending on the temperature T, the hysteresis can be set via the switch point SP and the switch-back point RSP.
- Window function
  The window function enables the setting of a process window.
- NO contact or NC contact
  This switch function is freely selectable.



① Hysteresis function, ② Window function, ③ NO contact, ④ NC contact, SP switch point, RSP switch-back point

Operation with ReadWin® 2000

Operation, visualisation and maintenance with PC and ReadWin® 2000 PC configuration software.



In addition to the operating options listed in the previous "On-site operation" section, the ReadWin® 2000 configuration software provides further information on the Thermophant T:

Function group	Description
SERVICE	Number of switch changes
	Device status/error

Function group	Description
INFO	Tag number
	Order code
	Limit switch serial number
	Electronics serial number
	Hardware version
	Software version
	Device version

Certificates and approvals

CE-Mark

The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

Other standards and guidelines

- IEC 60529:
  Degree of protection provided by housing (IP-Code)
- IEC 61010:
  Safety requirements for electrical measurement, control and laboratory use.
- IEC 1326:
  Electromagnetic compatibility (EMC requirements)
- NAMUR
  Standards working group for measurement and control technology in the chemical industry.
  (www.namur.de)

Functional safety

The device meets the functional safety requirements in accordance with IEC 61508 / IEC 61511-1 (FDIS). This device can, therefore, be used to monitor temperature up to SIL 2.

Hygiene standard

The TTR35 temperature switch meets the requirements of Sanitary Standard no. 74-02. Endress+Hauser confirms this by applying the 3–A symbol.

UL listed for Canada and USA

The device was examined by Underwriters Laboratories Inc. (UL) in accordance with the standards UL 61010B-1 and CSA C22.2 No. 1010.1-92 and listed under the number E225237 UL.

Ordering information

Questionnaire

Questionnaire Endress+Hauser Thermophant TTR31/TTR35
Customer specific setup / Kundenspezifische Einstellung

Unit / Einheit **( ) °C** ( ) °F

Ausgang 1 / Output 1

Type:
( ) 1=Fenster Öffner / Window normally closed
( ) 2=Hysterese Öffner / Hysteresis normally closed
( ) 3=Fenster Schließer / Window normally open
( ) 4=Hysterese Schließer / Hysteresis normally open

SP: ☐☐☐,☐ (-49.5...150 °C; -57.1...302 °F)

RSP: ☐☐☐,☐ (RSP ≤ (SP -0.5 °C); RSP ≤ (SP -0.8 °F))

Ausgang 2 (nur wenn vorhanden)/ Output 2 (only if available)

Type:
( ) 1 = Fenster Öffner / Window normally closed
( ) 2 = Hysterese Öffner / Hysteresis normally closed
( ) 3 = Fenster Schließer / Window normally open
( ) 4 = Hysterese Schließer / Hysteresis normally open
( ) 5 = 4…20 mA (nur wenn vorhanden / only if available)

SP: ☐☐☐,☐ (-49.5...150 °C; -57.1...302 °F)

RSP: ☐☐☐,☐ (RSP ≤ (SP -0.5 °C); RSP ≤ (SP -0.8 °F))

Analogausgang (nur wenn Ausgang 2 = 4...20 mA) / Analogue output (only if output 2 = 4...20 mA)

Messbereich Anfang:
Range low scale: ☐☐☐,☐ (-50...140 °C; -58...284 °F)
(min. Spanne / min. span: 10 K)

Messbereich Ende:
Range high scale: ☐☐☐,☐ (-40...150 °C; -40...302 °F)

Fehlerverhalten / Failure mode: ( ) ≤ 3.6 mA **( ) ≥ 21.0 mA**

Anschluss DESINA konform / Connection conform to DESINA
(nur bei 2 Ausgängen / only for two outputs)
( ) NO ( ) YES

TAG (2 x 18 Zeichen / characters)

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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People for Process Automation

R09-TTR31xxxx-16-06-xx-a2-001

Thermophant T TTR31
Product structure

Thermophant T TTR31
Temperature switch, intelligent, programmable. Sensor: Pt100, long-term stable.

Approval:

A	For non-hazardous areas
Y	Special version to be specified

Electrical connection:

1	Plug M12, IP66
2	Valve plug M16x1.5, ISO4400, IP65
3	Valve plug NPT1/2, ISO4400, IP65
9	Special version to be specified

Power supply; Output signal:

A	12-30 V DC; switch PNP
B	12-30 V DC; 2x switch PNP
C	12-30 V DC; switch PNP + 4-20 mA Functional safety SIL2, IEC61508
Y	Special version to be specified

Display:

1	Digital

Sensing element:

1	Pt100, class A, -50 °C..150 °C, (-58 to 302 °F)

Adjustment; Unit:

1	Unit °C
2	Unit °F
S	Switch output 1,see additional spec.
T	Switch output 1+2, see additional spec.
U	Switch output + analogue output, see additional spec.
V	Switch 1 + 2 DESINA, see additional spec.
W	Analogue output, switch DESINA, see additional spec.
Y	Special version to be specified

Process connection; Material:

AA	without (insertion length L ≥ 100 mm/3.94"), 316L, couplings
AB	Thread ISO228 G¼A, 316L
DA	Thread ANSI ¼ NPT, 316L
AE	Thread ISO 228 G½A, 316L
DE	Thread ANSI ½ NPT, 316L
YY	Special version to be specified

Insertion length L; Probe diameter D:

1B	L = 50 mm (1.97"); D = 6 mm (0.24"); reduced tip, 4 mm (0.16")
2C	L = 100 mm (3.94"); D = 6 mm (0.24")
2E	L = 200 mm (7.87"); D = 6 mm (0.24")

Additional option:

A	none
Y	Special version to be specified

Version:

A	Standard, documentation german
B	Standard, documentation english
C	Standard, documentation french
Y	Special version to be specified

TTR31-				**1**	**1**						⇒ **Order code**

Thermophant T TTR35
Product structure

Thermophant T TTR35
Temperature switch, intelligent, programmable. Sensor: Pt100, long-term stable. hygienic applications. 3-A 74-02 compliant.

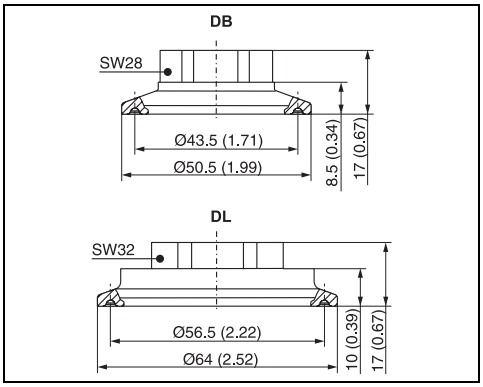
Approval:											
A	For non-hazardous areas										
Y	Special version to be specified										
	Electrical connection:										
	1	Plug M12, IP66									
	2	Valve plug M16x1.5, ISO4400, IP65									
	3	Valve plug NPT1/2, ISO4400, IP65									
	9	Special version to be specified									
		Power supply; Output signal:									
		A	12-30 V DC; switch PNP								
		B	12-30 V DC; 2x switch PNP								
		C	12-30 V DC; switch PNP + 4-20 mA; Functional safety SIL2, IEC61508								
		Y	Special version to be specified								
			Display:								
			1	Digital							
				Sensing element:							
				1	Pt100, class A, -50 °C..150 °C (-58 to 302 °F)						
					Adjustment; Unit:						
					1	Unit °C					
					2	Unit °F					
					S	Switch output 1,see additional spec.					
					T	Switch output 1+2, see additional spec.					
					U	Switch output + analogue output, see additional spec.					
					V	Switch 1 + DESINA, see additional spec.					
					W	Analogue output, switch DESINA, see additional spec.					
					Y	Special version to be specified					
						Process connection; Material:					
							Tri-Clamp connections				
						DB	ISO2852 DN25-38, 1-1½ inch, 316L, 3A, DIN32676 DN25-40				
						DL	ISO2852 DN40-51, 2 inch, 316L, 3A, DIN32676 DN50				
						HL	APV inline DN50 PN40, 316L, 3A				
						LB	Varivent F pipe DN25-32, PN40, 316L, 3A				
						LL	Varivent N pipe DN40-162, PN40, 316L, 3A				
						PH	DIN11851, DN40 PN40, 316L, 3A				
						PL	DIN11851, DN50 PN40, 316L, 3A				
						YY	Special version to be specified				
								Insertion length L; Probe diameter D:			
								1B	L = 50 mm (1.97"); D = 6 mm (0.24"); reduced tip, 4 mm (0.16")		
								2C	L = 100 mm (3.94"); D = 6 mm (0.24")		
								2E	L = 200 mm (7.87"); D = 6 mm (0.24")		
										Additional option:	
										A	none
										Y	Special version to be specified
											Version:
											A Standard, documentation german
											B Standard, documentation english
											C Standard, documentation french
											Y Special version to be specified
TTR35-				**1**	**1**						⇒ **Order code**

Accessories

All dimensions in mm (inches).

Clamp adapter

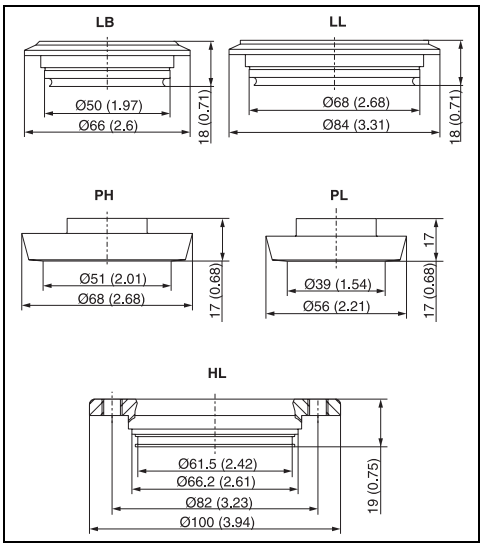
- TTR35: order numbers for clamp adapter versions.
  DB version: order no. 52023994
  DL version: order no. 52023995



P01-PTx3xxxx-06-xx-xx-en-009

Hygiene adapter

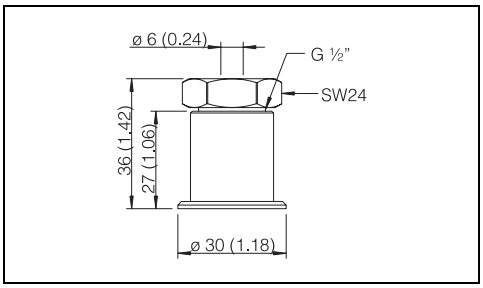
- TTR35: order numbers for hygiene adapter versions.
  LB version: order no. 52023996
  LL version: order no. 52023997
  PH version: order no. 52023999
  PL version: order no. 52023998
  HL version: order no. 52024000



P01-PTx3xxxx-06-xx-xx-en-010

Welding boss with sealing taper

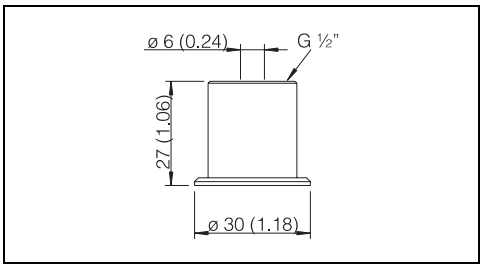
Collar welding boss
Seal, moveable coupling, material of parts in contact with process: 316L, PEEK
Order no. 51004751



T09-TSM470AX-06-09-00-en-000

Collar welding boss

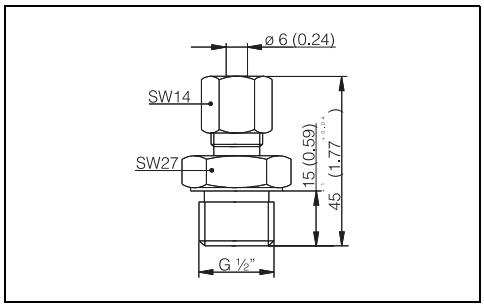
Material of parts in contact with process: 316L
Order no. 51004752



T09-TSM470BX-06-09-00-en-000

Coupling with sealing taper

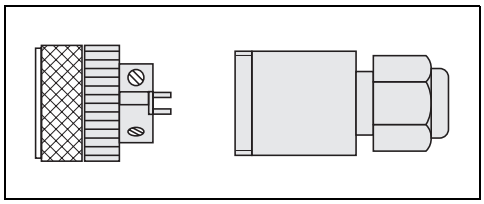
G ½" process connection
Seal, moveable coupling, material of parts in contact with process: 316L
Order no. 51004753



T09-TSM470AX-06-09-00-en-001

Plug-in jack

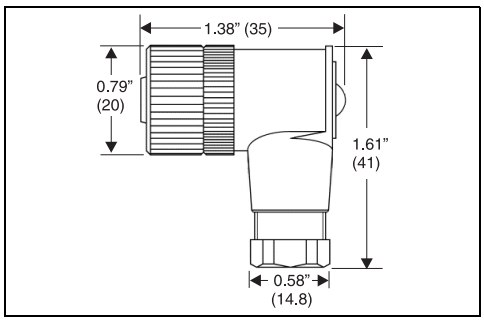
- M 12x1 plug-in jack
  Self-made connection to M 12x1 housing connector
  Order number: 52006263



P01-PMP13xxx-00-xx-00-xx-003

Elbow plug

- Elbow plug
  4-pole M12 connector for customised cable construction, elbowed, IP67, PG7
  Order number: 51006327



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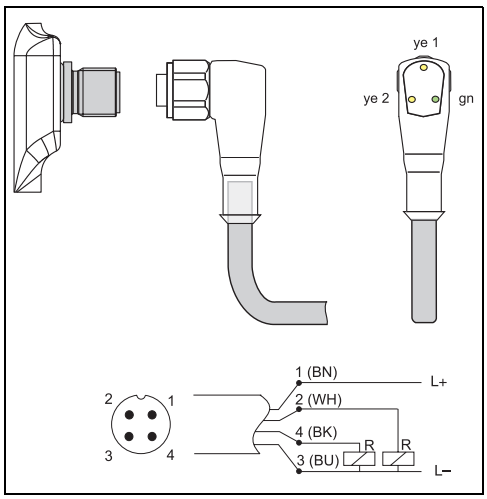
Connecting cable

- Cable, 4 x 0.34 mm^2 (22 AWG) with M12 socket, elbowed, screw plug, length 5 m (16.4 ft), PVC cable
  Order number: 52010285
- Cable, 4 x 0.34 mm^2 (22 AWG) with M12 socket, with LED, elbowed, 316L screw plug, length 5 m (16.4 ft), PVC cable, specially for hygiene applications,
  Order number: 52018763
  Display:
  –gn: device operational
  –ye1: switch status 1
  –ye2: switch status 2

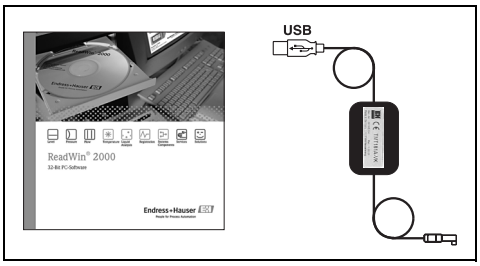


T09-TTR31xxx-00-00-xx-xx-001

Core colours:
- *1 = BN brown*
- *2 = WH white*
- *3 = BU blue*
- *4 = BK black*

Configuration kit

- Configuration kit for PC-programmable transmitters – ReadWin® 2000 setup program and interface cable for PCs with USB port; Adapter for transmitters with 4-pole post connector
  Order code: TXU10-AA
- ReadWin® 2000 can be downloaded free of charge directly from the internet at the following address:
  www.endress.com/readwin



T09-TTR31xxx-00-00-xx-xx-000

Documentation

Technical information

Process pressure switch Ceraphant T PTC31, PTP31, PTP35:
TI384P/00/en

Operating Instructions

- Thermophant T TTR31 / TTR35 temperature switch: KA174r/09/en
- Configuration software ReadWin® 2000: BA137R/09/en

Safety instructions

- ATEX Safety instructions for electrical equipment for use in hazardous locations (in development).
- Functional Safety Manual SIL (in development).

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