



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Ceraphant T PTC31, PTP31, PTP35

Process pressure

Pressure switch for safe measurement and monitoring of absolute and gauge pressures



Application

Pressure switch for monitoring absolute and gauge pressures in gases, vapours, liquids and dust:

Ceraphant T PTC31

– with ceramic process isolating diaphragm;

Ceraphant T PTP31

– with metallic process isolating diaphragm;

Ceraphant T PTP35

– for hygienic applications

- Finely graduated measuring ranges from vacuum to 400 bar (6000 psi)
- Versions for use in hygienic applications
- Electronic versions
 - one PNP switch output
 - two PNP switch outputs
 - PNP switch output with additional analog output 4...20 mA (active)

Your benefits

This compact pressure switch impresses with the latest in technology being used:

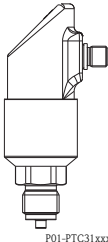
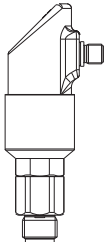
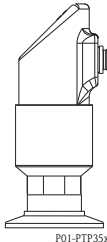
- Integrated switching electronics for decentral and economic process monitoring and control
- Quick and flexible process integration thanks to modular connections
- High reproducibility and long-term stability
- Function check and information on site thanks to LEDs and digital display
- Ceraphire® process isolating diaphragm: corrosion-proof, abrasion-proof and extremely overload-resistant
- Excellent accuracy and briefest response time right to the smallest measuring range
- Operation and visualisation also with personal computer and ReadWin® 2000 or FieldCare®
- Upper part of housing can be rotated by 310°, therefore best readability of measured values in all orientations
- DESINA compliant
- 3A approved

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Function and system design

Device selection

Ceraphant T - product family	PTC31	PTP31	PTP35
	 P01-PTC31xxx-14-xx-xx-xx-001	 P01-PTP31xxx-14-xx-xx-xx-001	 P01-PTP35xxx-14-xx-xx-xx-001
Measuring cell	With capacitive measuring cell and ceramic process isolating diaphragm (Ceraphire®)	With piezoresistive measuring cell and metallic process isolating diaphragm	With piezoresistive measuring cell and metallic process isolating diaphragm for hygienic applications
Field of application	Measurement and monitoring of absolute and gauge pressures	Measurement and monitoring of absolute and gauge pressures	Measurement and monitoring of absolute and gauge pressures in hygienic processes
Process connection	Thread – G ¼ female – G ¼A and G ½A – G ½A, hole 11.4 mm – M12x1,5 – 7/16-20 UNF – ¼ FNPT and ½ MNPT	Thread – G ¼ female – G ¼A and G ½A – G ½A, hole 11.4 mm – M12x1,5 – 7/16-20 UNF – ¼ FNPT and ½ MNPT – G ½A flush mounted	Hygiene – Clamp ½" - 2" – G 1A – Varivent F, N – DIN 11851 – APV inline – SMS 1½"
Measuring range	0 to 0.1 bar (1.5 psi) to 0 to 40 bar (600 psi)	0 to 1 bar (15 psi) to 0 to 400 bar (6000 psi)	0 to 1 bar (15 psi) to 0 to 40 bar (600 psi)
Process temperature	–40°C to +100°C (–40°F to +212°F)	–40°C to +100°C (–40°F to +212°F)	–40°C to +100°C (–40 °F to +212 °F) 135°C (275°F) max. 1 hour

Measuring principle

Ceraphant T PTC31

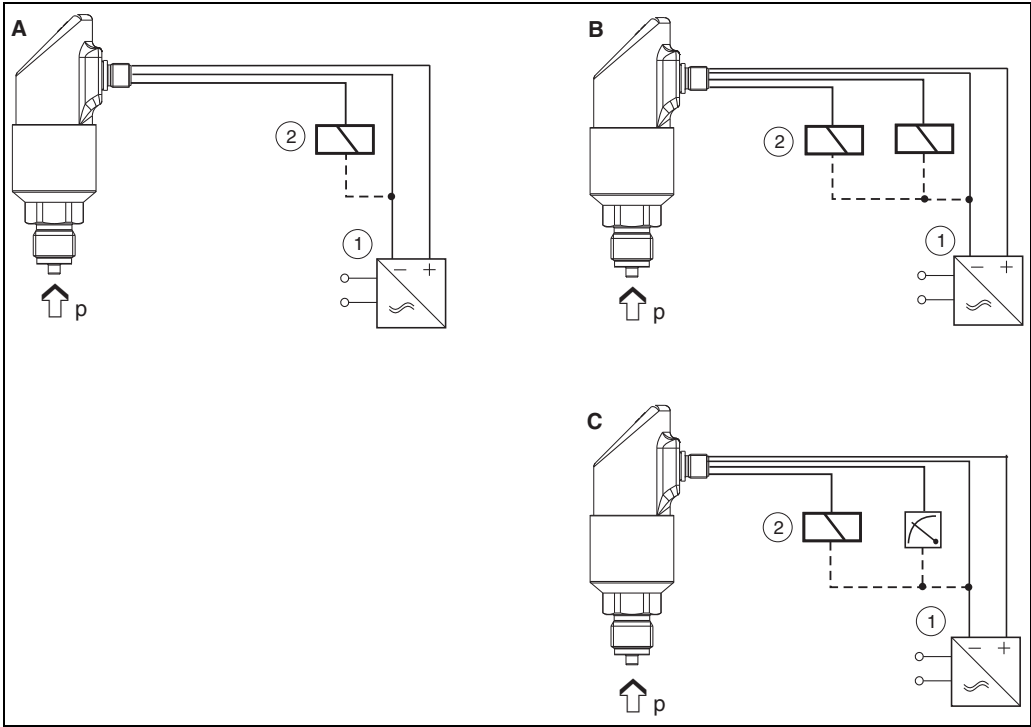
The process pressure acts on the ceramic process isolating diaphragm and the pressure-dependent change in capacitance of the ceramic sensor is measured. A microprocessor evaluates the signal and switches the output or outputs the corresponding measured value.

The ceramic sensor is a dry sensor i.e. no fill fluid is needed for pressure transmission. This means that the sensor can fully support a vacuum. Extremely high durability, on a par with the material Alloy, is achieved through the use of the highly pure material Ceraphire® as a ceramic.

Ceraphant T PTP31 and PTP35

The process pressure acting upon the metallic process isolating diaphragm of the sensor is transmitted to a resistance bridge via a fluid. The change in the output voltage of the bridge is proportional to the pressure and can be measured directly.

Measuring system



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

Input

Measured variable	The measured variable for the pressure switch can be selected as either gauge pressure or absolute pressure.
Measuring range	Measuring ranges up to 400 bar (6000 psi), see "Ordering information" section.

Output

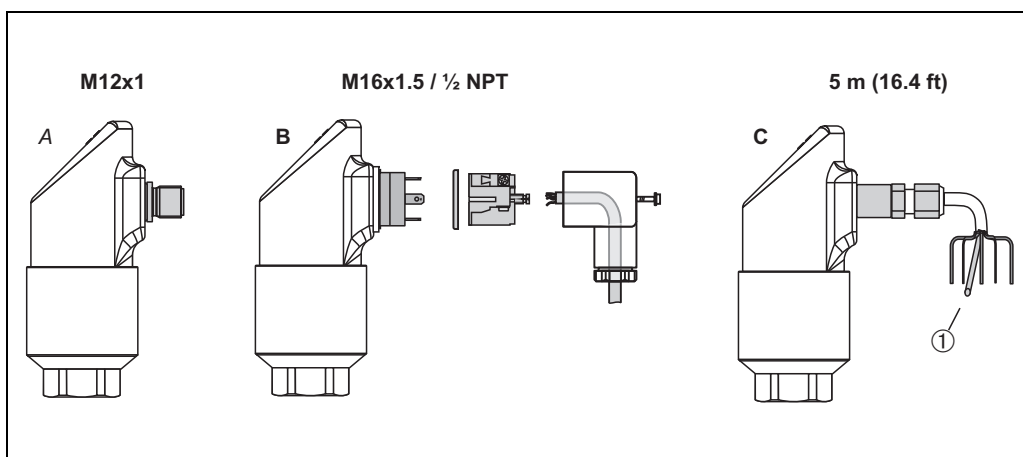
Output signal	DC voltage version: Positive voltage signal (rate depends on power supply voltage) at electronics switch output (PNP). Short-circuit proof version. ■ 1x PNP switch output ■ 2x PNP switch output ■ PNP switch output with additional active analog output 4...20 mA. The analog output continuously represents the measuring range configured or specified by the sensor.
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Range of adjustment	■ Switch output: Switch point (SP): 0.5...100 % in increments of 0.1 % (min. 1 mbar * (0.015 psi)) of the upper range limit (URL) Switch-back point (RSP): 0...99.5 % in increments of 0.1 % (min. 1 mbar * (0.015 psi)) of the upper range limit (URL) Min. distance between SP and RSP: 0.5% URL * measuring ranges with negative gauge pressure up to 4 bar (60 psi) in increments of min. 10 mbar (0.15 psi) ■ Analog output (if available): Lower range value (LRV) and upper range value (URV) can be set anywhere within the sensor range (LRL – URL). Turn down of the analog output up to 4:1 of the upper range limit (URL). ■ Damping: can be set anywhere between 0...40 s in increments of 0.1 s ■ Factory setting (if no customer-specific settings have been ordered): Switch point SP 1: 45 %; Switch-back point RSP 1: 44.5 % Switch point SP 2: 55 %; Switch-back point RSP 2: 54.5 % Analog output: LRV 0 %; URV 100 % LRL = Lower Range Limit / URL = Upper Range Limit LRV = Lower Range Value / URV = Upper Range Value
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 resistance: Automatic load check of switching current; max. capacitance load: 14 μF at max. supply voltage (without resistive load) max. period length: 0.5 s; min. t_{on}: 40 μs Periodic disconnection from a protective circuit in event of overcurrent ($f = 2$ Hz) and indication of "Warning"
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).
Signal on alarm	■ Analog output $\leq 3,6$ mA / last current value / $\geq 21,0$ mA adjustable (if setting ≥ 21.0 mA the output is ≥ 21.5 mA) ■ Switch outputs: In safe state (switch normally open)
Load	Max. ($U_{Supply} - 6.5$ V) / 0.22 A (analog output)

Power supply

Electrical connection

Connector and cable connection

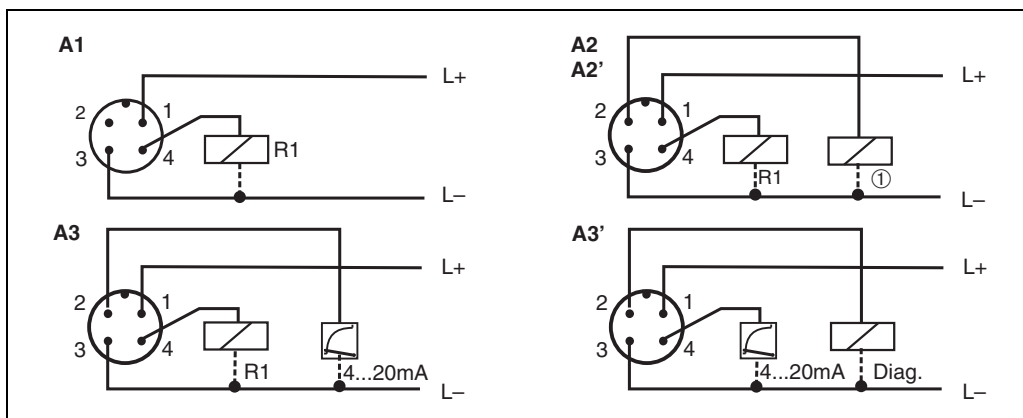


P01-PTx3xxxx-04-xx-xx-xx-001

A: M12x1 connector;
 B: M16x1.5 or 1/2 NPT valve plug
 C: cable, 5 m (16.4 ft) long, 5-core
 ① reference pressure supply

Device connection

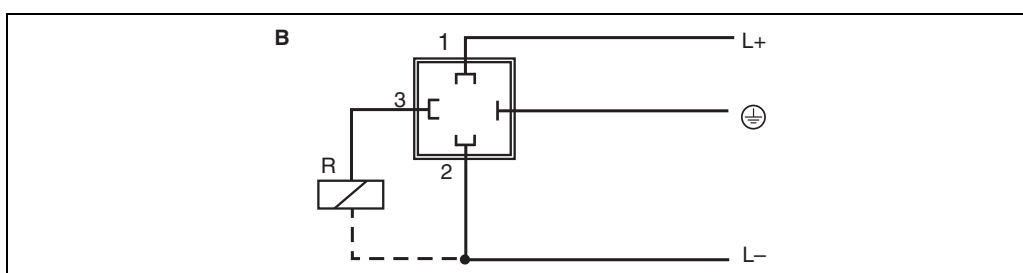
■ DC voltage version with M12x1 connector



P01-PTx3xxxx-04-xx-xx-xx-002

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)

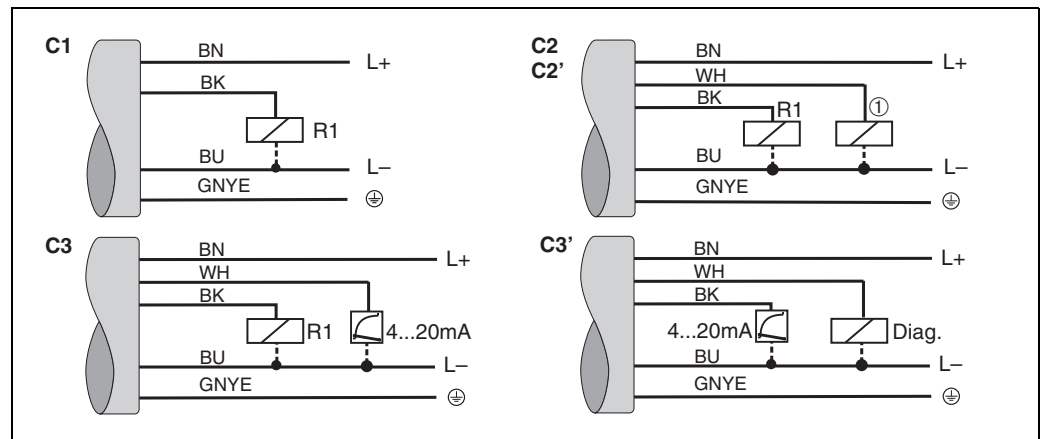
■ DC voltage version with M16x1.5 or 1/2 NPT valve plug



P01-PTx3xxxx-04-xx-xx-xx-003

B: 1x PNP switch output

■ DC voltage version with cable



P01-PTx3xxxx-04-xx-xx-xx-004

C1: 1x PNP switch output

C2: 2x PNP switch output

C2': PNP switch outputs R1 and ① (diagnosis/break contact with adjustment "DESINA")

C3: PNP switch output with additional analog output

C3': PNP switch output with additional analog output (assignment with "DESINA" setting)

Cable specification: all three connection versions 5-core; 4 x 0.2 mm² (AWG25), PE 0.75 mm² (AWG18)

– Core colours: BN = brown, BK = black, WH = white, BU = blue, GNYE = green/yellow

Supply voltage

- DC voltage version
12...30 V DC

Current consumption

Without load < 60 mA, with reverse polarity protection

Power supply failure

- Behaviour in case of overvoltage (>30 V)
The device works continuously without any damage up to 34 V DC.
The specific properties are no longer guaranteed if the supply voltage is exceeded.
No damage is caused to the device in case of a short-term overvoltage up to 1 kV (as per EN 6100-4-5)
- 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 refer to the upper range limit (URL).

Reference operating conditions	To DIN IEC 60770 or DIN IEC 61003 T = 25 °C (77 °F), relative humidity 45 to 75 %, ambient air pressure 860 to 1060 hPa
Switch output	■ Accuracy: deviation <0.5 % ■ Non-repeatability: <0.2 % ■ Response time: ≤20 ms
Analog output	■ Maximum measured error: Non-linearity + hysteresis + non-repeatability: ≤0.5 % (as per limit point method) ■ Non-linearity: ≤0.2 % (as per limit point method) ■ Rise time T₉₀: ≤200 ms ■ Settling time T₉₉: ≤400 ms
Influences of air pressure changes	In the case of air pressure changes the following additional measuring errors might occur: 400 bar (6000 psi): max. 0.0275 % 100 bar (1500 psi): max. 0.1 %
Long-term drift	≤0.15 % per year
Long-term reliability	Mean time between failure (MTBF) > 100 years (calculated according to "British Telecom Handbook of Reliability Data No. 5)
Thermal change	≤ ± 1.5 % (-20 to +45°C (-4 to +113°F)) ≤ ± 2.0 % (-40 to +85°C (-40 to +185°F)) ≤ ± 2.5 % (-40 to +100°C (-40 to +212°F))

Operating conditions (installation)

Installation instructions

- Any orientation
- Any position-dependent zero shift can be corrected. Offset: $\pm 20\%$ URL
- Housing can be rotated up to 310°

Oxygen applications

Oxygen and other gases can react explosively to oils, grease and plastics, such that, among other things, the following precautions must be taken:

- All components of the system, such as measuring devices, must be cleaned in accordance with BAM requirements (DIN 19247). (BAM = Federal Institute for Materials Research and Testing).
- Depending on the materials used, a certain maximum temperature and a maximum pressure must not be exceeded in oxygen applications. The maximum temperature $T_{\max}$ for oxygen applications is 60°C (140°F).

The devices suitable for gaseous oxygen applications are listed in the following table, indicated by $p_{\max}$.

Order code for devices cleaned for oxygen applications	$p_{\max}$ for oxygen applications
PTC31 – * * * * * 6 *, for devices with sensors, nominal value < 10 bar (150 psi)	Overpressure limit (OPL) of sensor ¹⁾
PTC31 – * * * * * 6 *, for devices with sensors, nominal value ≥ 10 bar (150 psi)	30 bar (450 psi)

1) → See Page 23 ff "Ordering information", feature 80 "Sensor seal".

Operating conditions (environment)

Ambient temperature range –40 to $+85^\circ\text{C}$ (–40 to $+185^\circ\text{F}$), briefly up to $+100^\circ\text{C}$ (212°F)

Storage temperature –40 to $+85^\circ\text{C}$ (–40 to 185°F)

Degree of protection

- M12x1 connector
Gauge pressure sensors IP 65; Absolute pressure sensors: IP 66
- M16x1.5 or $\frac{1}{2}$ NPT valve plug
IP 65
- Cable: IP 66

For applications where the device is installed outdoor or cleaned from outside we recommend the use of a protection cap.

Shock resistance 50 g to DIN IEC 68-2-27 (11 ms)

Vibration resistance 20 g to DIN IEC 68-2-6 (10–2000Hz)

Electromagnetic compatibility

- Interference emission as per EN 61326, class B electrical equipment
- Interference immunity as per EN 61326, appendix A (industrial use)

Operating conditions (Process)

Medium temperature range

- PTC31, PTP31: $-40^{\circ}\text{C} \dots +100^{\circ}\text{C}$ (-40°F to $+212^{\circ}\text{F}$)
- PTP35: $-40^{\circ}\text{C} \dots +100^{\circ}\text{C}$ (-40°F to $+212^{\circ}\text{F}$), $+135^{\circ}\text{C}$ ($+275^{\circ}\text{F}$) for max. 1 hour

Please also note the temperature limits of the seal used (see page 12: Material)

Extreme jumps in temperature can result in temporary errors. Temperature compensation takes effect after several minutes. Internal temperature compensation is faster the smaller the temperature jump and the longer the time interval

Limiting medium pressure range

- For overload resistance see "Ordering information" section
- Vacuum resistance
 - For ceramic sensor with nominal value >100 mbar (1.5 psi): $0 \text{ mbar}_{\text{abs}}$ (0 psi)
 - For ceramic sensor 100 mbar (1.5 psi): $700 \text{ mbar}_{\text{abs}}$ (10.5 psi)
 - For metal sensor: $10 \text{ mbar}_{\text{abs}}$ (0.15 psi)

Pressure specifications

The maximum pressure for the measuring device is dependent on the weakest element with regard to pressure, see the following sections "Ordering information: Measuring range" and "Mechanical construction"

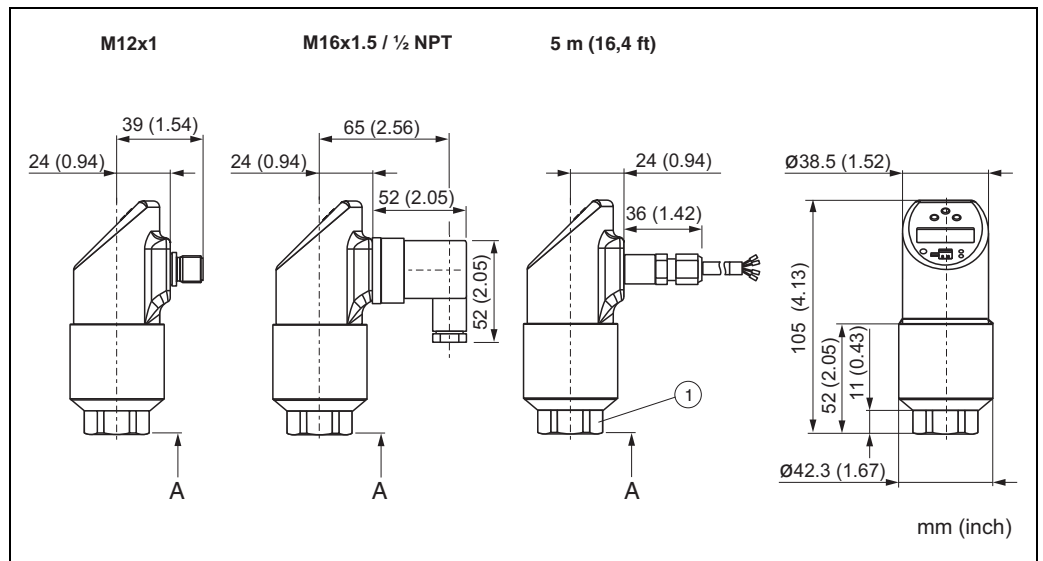
The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of $+20^{\circ}\text{C}$ (-68°F) and may be applied to the device for an unlimited time.

The test pressure (Over Pressure Limit OPL) corresponds to 1.5 times the MWP and may be applied for a limited time only in order to avoid lasting damage.

Mechanical construction

Design, dimensions

Dimensions



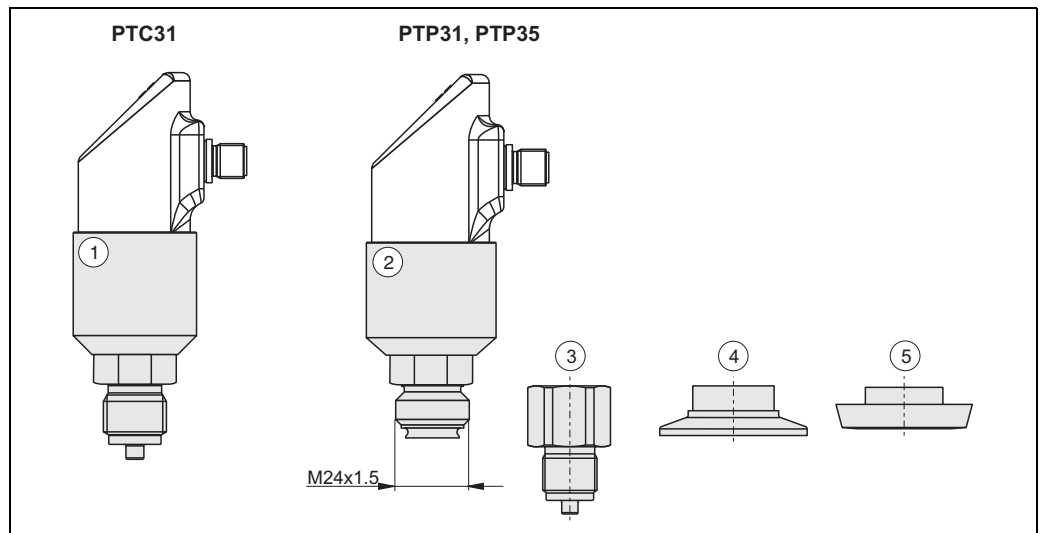
M12x1 connector as per IEC 60947-5-2

M16x1.5 or 1/2 NPT valve plug as per DIN 43650A/ISO 4400

Cable 5 m (16.4 ft) long, cable outer diameter 7.7 mm (0.3 in); cores 4 x 0.2 mm² (AWG 24), PE 0.75 mm² (AWG 18)
reference pressure hose with outer diameter 2.5 mm (0.1 in)

① Across flats AF 27 mm (for 400 bar (6000 psi) sensor AF 32 mm)
A = height dimension of process connections – see next diagrams

Process connection



PTC31: sensor module ① with process connection.

PTP31/35: sensor module ② with M24x1.5 adapter thread for adapters with process connection.

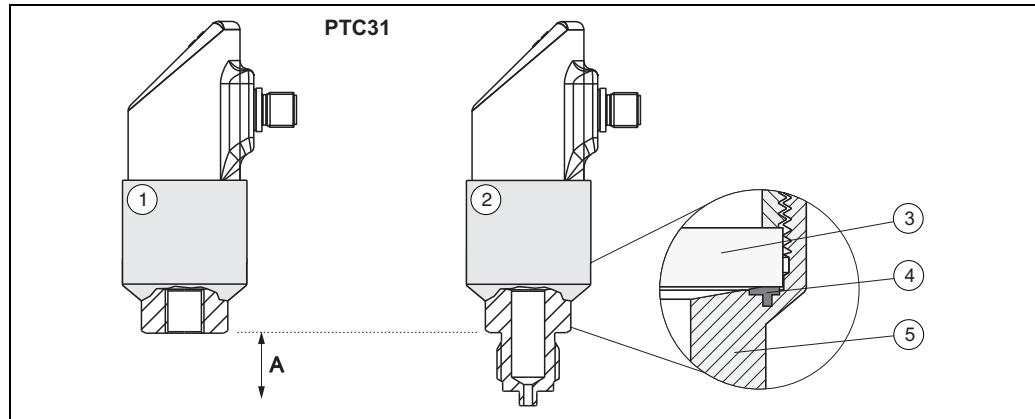
Adapter (mounted onto sensor module at the factory, 400 bar (6000 psi) thread adapter welded onto sensor module)

③ Adapter with thread connection

④ Adapter with clamp connection (except 1/2" clamp)

⑤ Adapter with hygienic connection (except G 1A)

Process connection PTC31 Sensor module with ceramic process isolating diaphragm



P01-PTx3xxxx-14-xx-xx-xx-003

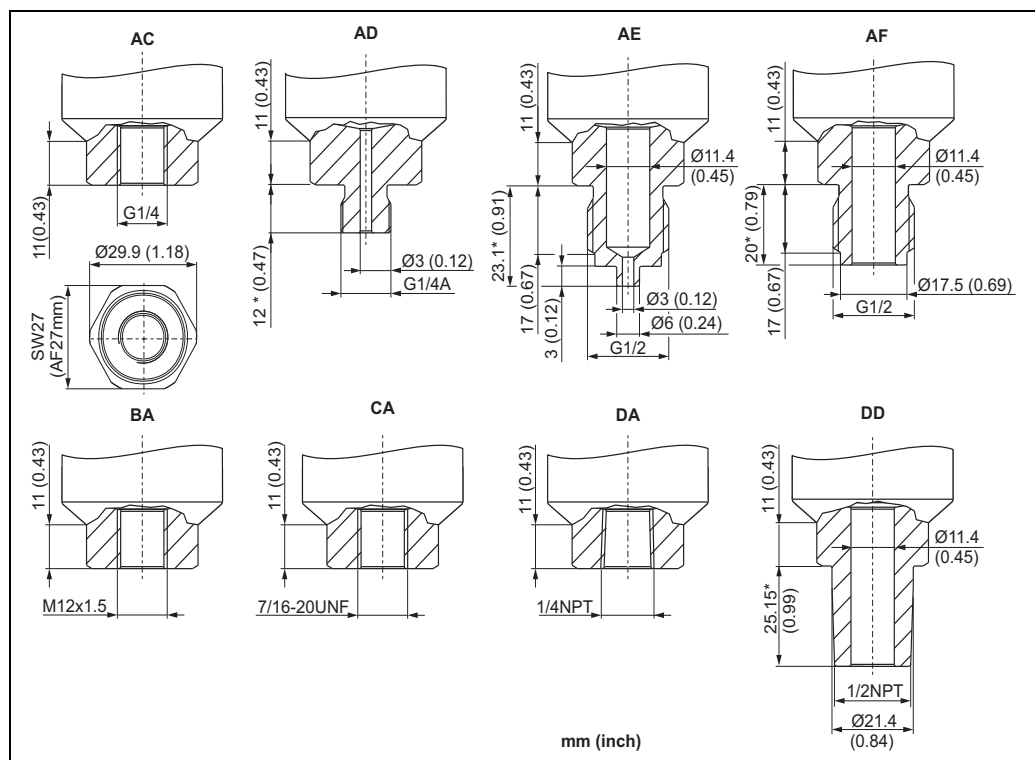
PTC31; sensor module with process connection

- ① with internal thread
- ② with external thread

"Seal" detail: ③ Ceraphire ceramic sensor, ④ moulded seal, in contact with process, ⑤ sensor module

Dimension A: see the following dimension drawings (dimension with *)

Thread connections

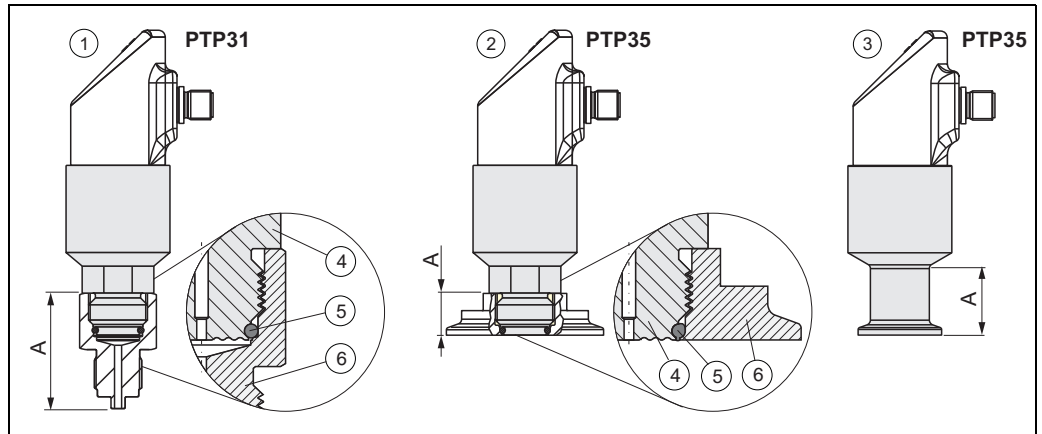


P01-PTx3xxxx-06-xx-xx-xx-002

Process connection versions (see also "Ordering information" section)

- AC: thread ISO 288, G $\frac{1}{4}$ (female)
- AD: thread ISO 288, G $\frac{1}{4}$ A
- AE: thread ISO 288, G $\frac{1}{2}$ A
- AF: thread ISO 288, G $\frac{1}{2}$ A, bore 11 mm (0.43 in)
- BA: Thread DIN 13, M12x1.5
- CA: thread 7/16-20 UNF (SAE)
- DA: thread ANSI $\frac{1}{4}$ FNPT
- DD: thread ANSI $\frac{1}{2}$ MNPT

Process connection PTP
Sensor module with metallic
process isolating diaphragm



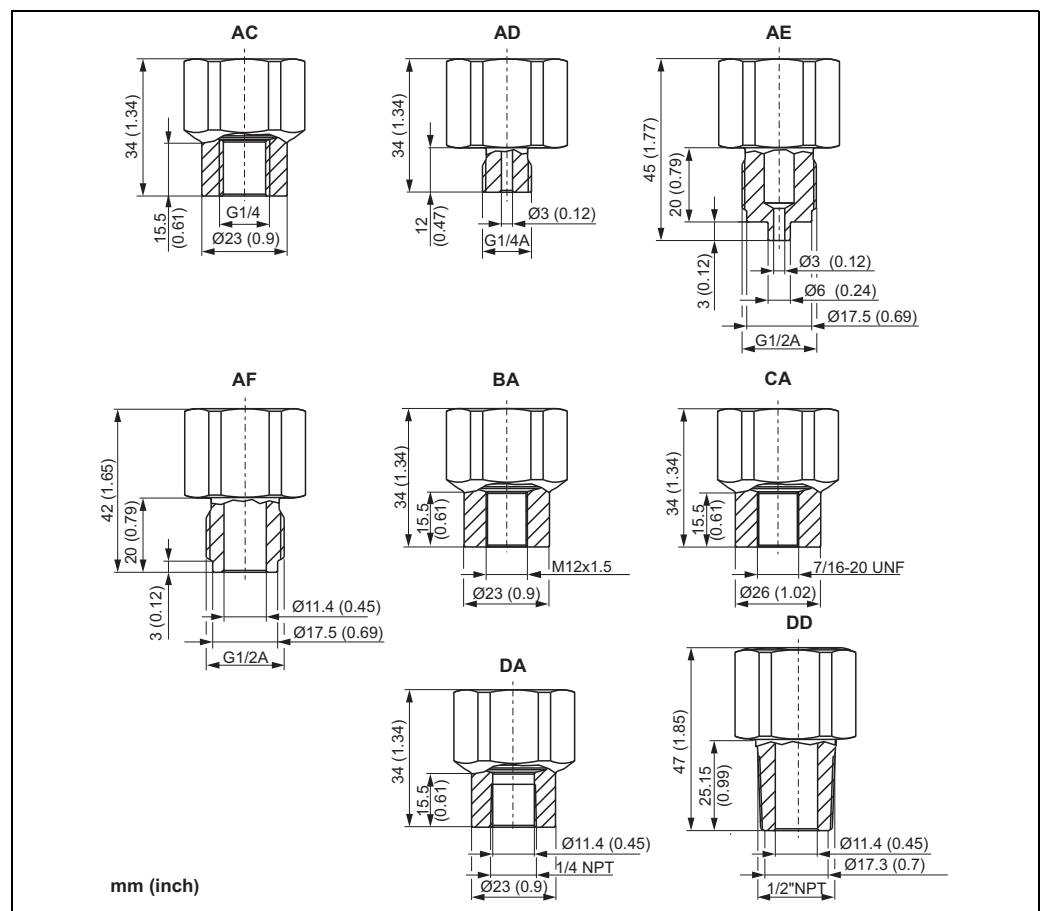
P01-PTx3xxxx-14-xx-xx-xx-002

- ① Sensor module with adapter thread for adapters with thread connection
- ② Sensor module with adapter thread for adapters with clamp or hygiene connection
- ③ Sensor module with clamp or hygiene connection (only versions DA, BA, BB)

"Seal" detail: ④ sensor module, ⑤ Standard O-ring, in contact with process, ⑥ adapter

Dimension A: see the following dimension drawing (dimension with *). For 400 bar (6000 psi) sensor see also Page 12.

Process connection PTP31 Thread connections



P01-PTx3xxxx-06-xx-xx-xx-020

Process connection versions: sensor module with adapter (see also "Ordering information" section)

AC: thread ISO 228, G $\frac{1}{4}$ (female)

AD: thread ISO 228, G $\frac{1}{4}$ A

AE: thread ISO 228, G $\frac{1}{2}$ A

AF: thread ISO 228, G $\frac{1}{2}$ A, bore 11 mm (0.43 in)

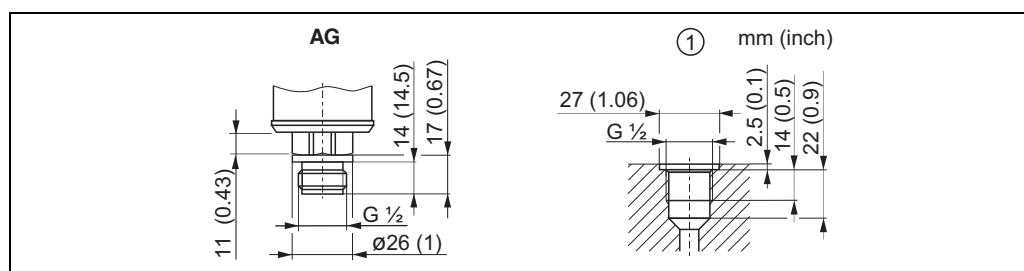
BA: Thread DIN 13, M12x1.5

CA: thread 7/16-20 UNF (SAE)

DA: thread ANSI $\frac{1}{4}$ FNPT

DD: thread ANSI $\frac{1}{2}$ MNPT

Process connection PTP31 Flush-mounted nozzle



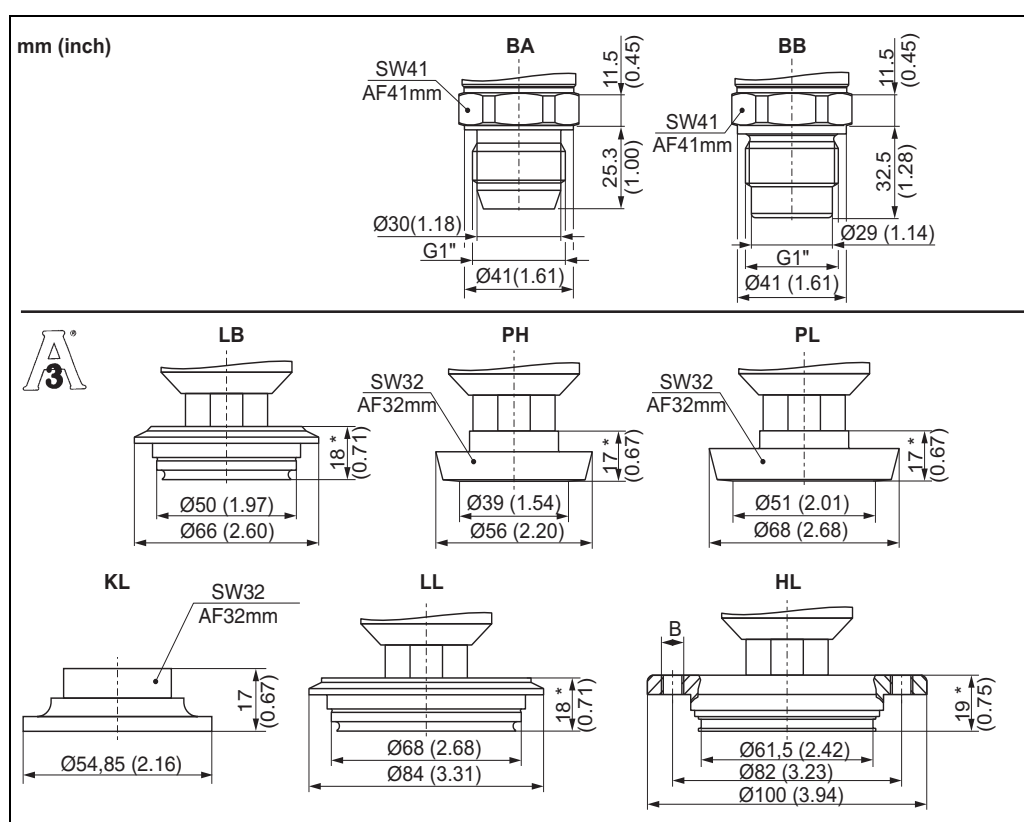
P01-PMP131xx-06-09-xx-xx-002

Process connection PTP31; Version AG

AG: Thread ISO 228 G 1/2, seal DIN 3852 flush-mounted

①: Dimensions for tapped hole G 1/2 as per DIN 3852-11 form X

Process connection PTP35 Hygiene connections



P01-PTX3xxxx-06-xx-xx-xx-004

Process connection versions

BA: thread ISO 228 G1A, metal taper seal

BB: thread ISO 228 G1A, O-ring seat seal

Process connection versions (sensor module with adapter)

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 slotted nut)

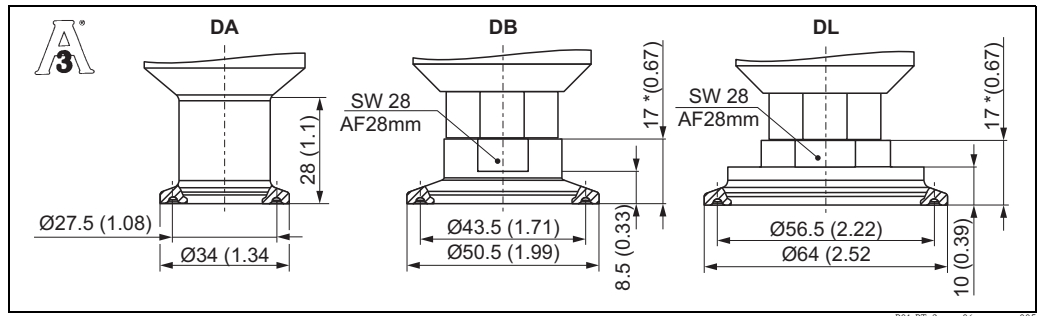
PL: DIN 11851, DN 50, PN 25 (including slotted nut)

HL: APV inline, DN 50, PN 40, (B = bores $b \times \text{Ø}8.6 + 2 \times \text{M}8$ thread)

KL: SMS 1 1/2 PN 25, 316L, 3A

See also "Ordering information" section

Process connection PTP35 Clamp connections



Process connection version

DA: Clamp ISO 2852 DN 22 (¾") or DN 20 (DIN 32676)

Process connection versions (sensor module with adapter)

DB: Tri-Clamp ISO 2852 DN 25...DN 38 (1"...1½") or DN 25...DN 40 (DIN 32676)

DL: Tri-Clamp ISO 2852 DN 40...DN51 (2") or DN 50 (DIN 32676)

See also "Ordering information" section

PTP31 with 400 bar (6000 psi) sensor

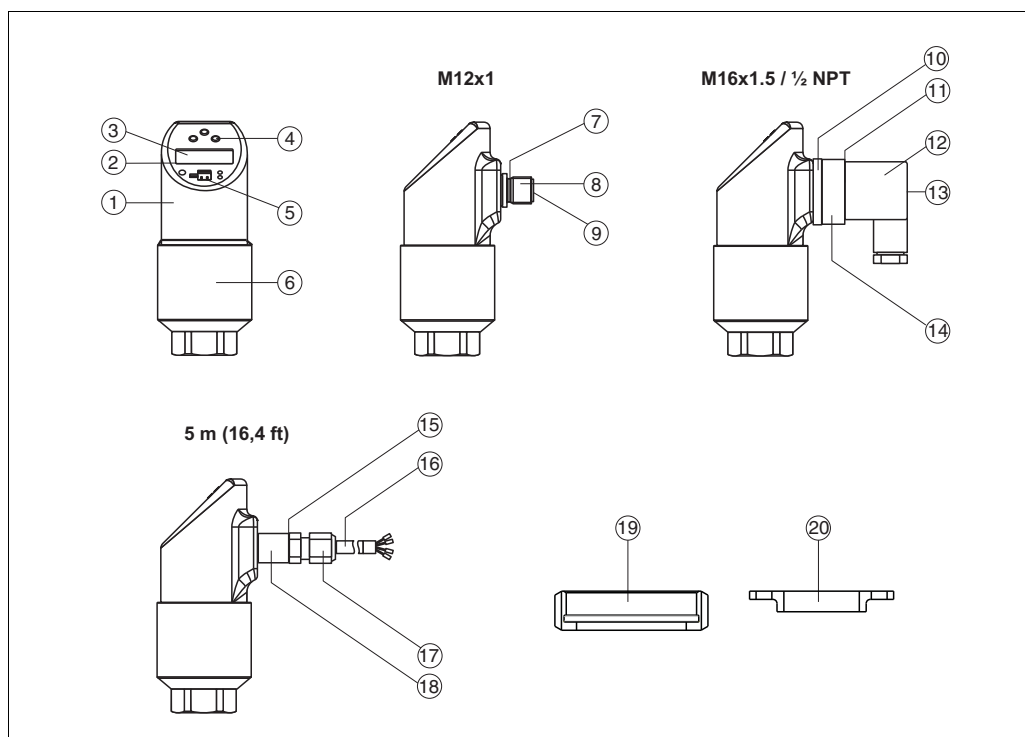
- Across flats on sensor module AF 32 mm
- Sensor module welded to thread adapter
- For ¼ NPT thread connections, M12x1.5, 7/16-20UNF: dimension A 5 mm (0.2 in) longer
- For ½ NPT thread connections, G ½A: dimension A 1 mm (0.04 in) longer

Weight

- PTC31: approx. 0.32 kg (0.71 lbs)
- PTP31: approx. 0.37 kg (0.82 lbs)
- PTP35: approx. 0.58 kg (1.28 lbs) with clamp process connection 1...1½"

Material (not wetted)

Housing



P01-PTx3xxxx-06-xx-xx-xx-012

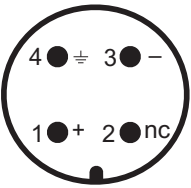
Front view, left-hand side view

Item number	Component part	Material
1	Housing F25	AISI 316 L (1.4404) with electropolished surface $R_a \leq 0,8 \mu\text{m}$ (31,5 μin)
2	Seal between display and housing	Closed-cell acrylate adhesive
3	Display	PC-FR LEXAN 943A
4	Keys	PC-FR LEXAN
5	CDI cover	TPE SANTOPRENE 151-60
6	Sensor jack	1.4435
7	O ring	FKM
8	M-12 jack	316L (1.4404/1.4435)
9	Inner jack	PA; contacts CuZn nickel-plated
10	Valve jack	316L (1.4404/1.4435)
11	Seal jack	NBR
12	ISO plug	PA
13	Screw	V2A
14	Jack	PBT-FR
15	O ring	EPDM
16	Cable	PUR/UL 94 V0
17	Cable gland	PA
18	M16 jack	316L (1.4404/1.4435)
19	Coupling nut SMS 11861	1.4307
20	Coupling nut DRD	1.4301

Filling oil

Filling oil for PTP31 and PTP35: synthetic oil, FDA number 21-CFR 172.882

Devices with M12 plug*PIN assignment for M12 connector*

	PIN	Meaning
	1	Signal +
	2	Not assigned
	3	Signal –
	4	Earth

Endress+Hauser offers the following accessories for devices with an M12 plug:

Plug-in jack M12x1, straight

- Material: body PA; slotted nut CuZn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 52006263

Plug-in jack M12x1, elbowed

- Material: body PBT/PA; slotted nut GD-Zn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 71114212

Cable 4x0.34 mm² (20 AWG) with M12 socket, elbowed, screw plug, length 5 m (16 ft)

- Material: body PUR; slotted nut CuSn/Ni; cable PVC
- Degree of protection (fully locked): IP67
- Order number: 52010285

Material (wetted)

Note!

Process wetted device components are listed in the "Mechanical construction" (→ [11](#)) and "Ordering Information" (→ [23](#)) sections.

TSE Certificate of Suitability

The following applies to all process wetted device components:

- They do not contain any materials derived from animals.
- No auxiliaries or operating materials derived from animals are used in production or processing.

Process connection

- Process connection: AISI 316L (1.4435)
Surfaces in contact with the process for PTP35 $R_a \leq 0,8 \mu\text{m}$ (31,5 μin)
- "Clamp connections" and "Hygienic connections" (see also "Ordering information" section):
AISI 316L (DIN/EN material number 1.4435)

Process isolating diaphragm

- PTC31: Ceraphire® (99,9 % Al₂O₃), FDA number 21-CFR 186.1256
- PTP31/35: AISI 316L (1.4435)

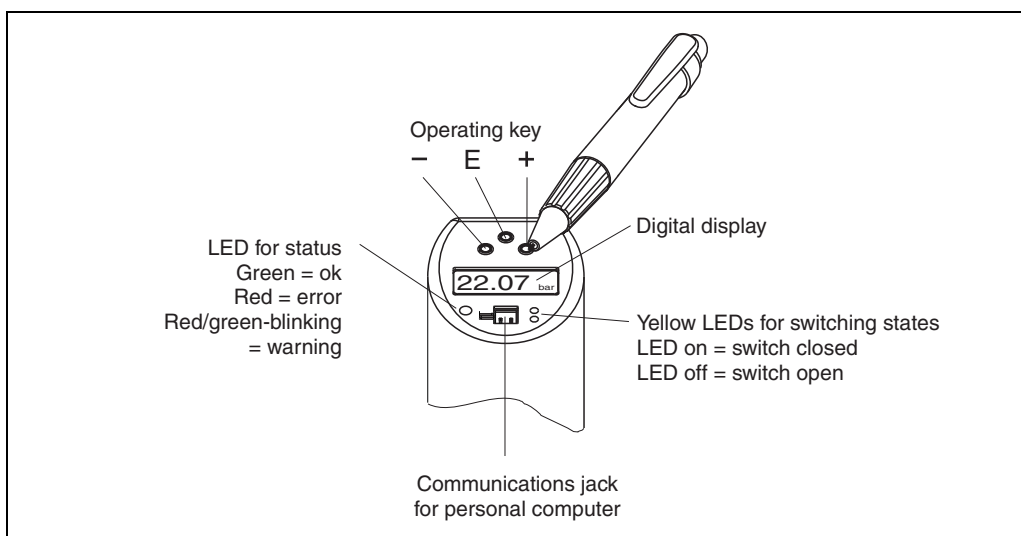
Seals

- FKM: Viton®, temperature range –20°C to +100°C (–4°F to +212°F)
- EPDM: FDA number 21-CFR 177.2600, Class II 3A Sanitary Standard 18, USP Class VI, temperature range –40°C to +100°C (–40°F to +212°F)
- FKM: Viton® for O₂ applications (70C3 CO2-70-0041V), temperature range –10 to 60 °C (+14 to 140°F)

Human interface

Operating elements

Position and meaning of display and operating elements.



P01-PTx3xxxx-19-xx-xx-en-003

The background illumination of the digital display indicates the status of the device:
white = ok; red = error

On-site operation

Menu-guided operation using operating keys.

Function group	Operating options
BASE (basic functions)	Selection of unit: bar, psi, kPa/MPa
	Offset: ± 20 % URL
	Damping display value, output signal: anywhere between 0...40 s (in increments of 0.1 s)
	Display: – Display of measured value or configured switch point – Rotation of display by 180° – Switching off 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)
OUT (Configuration of 1st output)	Output function: – Hysteresis function 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 %, min. 0.001 bar (0.015 psi))
	Switch-back point: – Input value – Acceptance of applied value Switch-back point anywhere between 0...99.5 % URL (in increments of 0.1 %, min. 0.001 bar (0.015 psi))
	Switch output delay: anywhere between 0...99 s (in increments of 0.1 s)

Function group	Operating options
OUT 2 (Configuration of 2nd output, only for corresponding electronics version)	Output function: – Hysteresis function or window function – NC contact or NO contact (see next diagram) – Analog output 4...20 mA
	Switch point 2: – Input value – Acceptance of applied value Switch point anywhere between 0.5...100 % URL (in increments of 0.1 %, min. 0.001 bar (0.015 psi))
	Switch-back point 2: – Input value – Acceptance of applied value Switch-back value anywhere between 0...99.5 % URL (in increments of 0.1 %, min. 0.001 bar (0.015 psi))
	Switch output delay: 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 Anywhere within sensor range (in increments of 0.1 %); turn down up to 4 : 1
	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
	Static Revision Counter (configuration counter; increases by one with every change in configuration)
	Locking by means of freely selectable code
	Display of last error to occur
	Simulation of switch output and analog output
	Display of max. measured pressure value
	Display of min. measured pressure value
Note	Measuring ranges with negative gauge pressure up to 4 bar (60 psi) in increments of min. 0.01 mbar (0.15 psi)

Functions of switch output

- Hysteresis function

The hysteresis function enables two-point control via a hysteresis. Depending on the pressure p , the hysteresis can be set via the switch point SP and the switch-back point RSP.

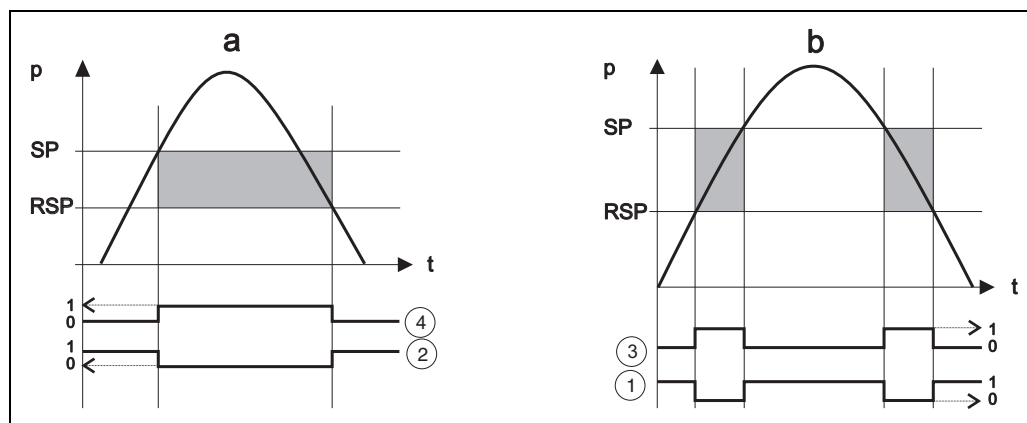
- Window function

The window function enables the monitoring of a process pressure range.

The hysteresis of the switch points SP and RSP is less than 0.1 % URL. Under rough EMC conditions quick switching is possible if the measured value is near to SP or RSP. Setting a damping of 0.1 s will avoid this effect.

- NO contact or NC contact

This switch function is freely selectable.



a Hysteresis function

b Window function

① Window NC contact switch status

② Hysteresis NC contact switch status

③ Window NO contact switch status

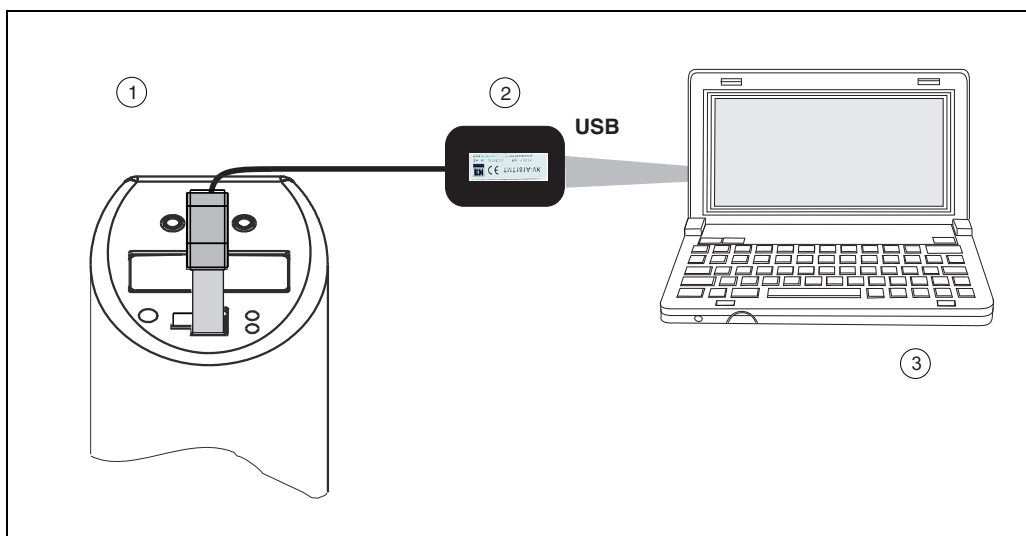
④ Hysteresis NO contact switch status

SP Switch point

RSP Switch-back point

Operation with PC

The device can be configured with the configuration software ReadWin® 2000 or FieldCare®. For the connection between the USB port of the computer and the device a configuration kit (e. g. TXU10 or FXA291) is necessary.



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- ① Ceraphant T with communication jack
- ② Configuration kit TXU10-AA or FXA291(USB interface)
- ③ Personal computer with ReadWin® 2000 or FieldCare® configuration software

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

Function group	Description
SERVICE	Number of switch changes
	Device status/error
INFO	Tag number
	Order code
	Device serial number
	Sensor serial number
	Electronics serial number
	Device release (change status)
	Hardware version
	Software version

Comprehensive information on the ReadWin® 2000 configuration software may be found in the Operating Instructions BA00137R/09/en.

The configuration kit TXU10-AA is available as an accessory (see chapter Accessories). For the order of the configuration kit FXA291 or software FieldCare please ask your E+H sales organisation.

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.
UL listing	The device was examined by Underwriters Laboratories Inc. USA (UL) in accordance with the standards UL 61010B-1 and CSA C22.2 No. 1010.1-92 and listed under the number E225237 UL for Canada and the USA.
Pressure Equipment Directive (PED)	This measuring device corresponds to Article 3 (3) of the EC Directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured according to good engineering practice.
Suitability for hygienic processes	The Ceraphant T PTP35 is suitable for the employment in hygienic processes. An overview of permitted process connections on page 14 and 15. Many versions meet the requirements of 3A-Sanitary Standard No. 74. Note! The gap-free connections can be cleaned without residue using the usual cleaning methods.
Standards and guidelines	DIN EN 60770 (IEC 60770): Transmitters for use in industrial-process control systems Part 1: Methods for performance evaluation. DIN EN 61003-1, publication date:1993-12 Industrial-process control systems - Instruments with analog inputs and two- or multi-state outputs - Part 1: Methods of evaluating the performance. DIN 16086 Electrical pressure measuring instruments; pressure sensors, pressure transmitters, pressure measuring instruments; concepts, specifications on data sheets IEC 60529 Degrees of protection provided by enclosures (IP code). EN 61326 Electrical equipment for measurement, control and laboratory use - EMC requirements. IEC 61010 Safety requirements for electrical equipment for measurement, control and laboratory use. EN 61000-4-5 Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques; Section 5: Surge immunity test



Ordering Information

Ceraphant T PTC31

This overview does not mark options which are mutually exclusive.

10	Certificate			
	A	For non-hazardous areas		
20	Electrical connection			
	1	M 12x1 connector: IP 65; with sensors for gauge pressure and absolute pressure: IP 66		
	2	M16x1.5 valve plug, ISO 4400: IP 65		
	3	½NPT valve plug, ISO 4400: IP 65		
	4	5 m (16.4 ft) cable: IP 66		
30	Electronics, output signal			
	A	12...30V DC, PNP switch, 3-wire		
	B	12...30V DC, 2 PNP switch, 4-wire		
	C	12...30 V DC, PNP switch + 4...20mA, 4-wire		
40	Display			
	1	With digital display		
50	Sensor			
		Gauge pressure	Max. working pressure MWP	Overload OPL
	1C	0...0.1bar / 0...10 kPa	2.7 bar	4 bar
	1F	0...0.4 bar / 0...40 kPa	5.3 bar	8 bar
	1H	0...1 bar / 0...100 kPa	6.7 bar	10 bar
	1M	0...4 bar / 0...400 kPa	16.7 bar	25 bar
	1P	0...10 bar / 0...1000 kPa	26.7 bar	40 bar
	1S	0...40 bar / 0...4000 kPa	40 bar	60 bar
		Negative gauge pressure	Max. working pressure MWP	Overload OPL
	5C	-0.1...0.1 bar / -10...10 kPa	2.7 bar	4 bar
	5F	-0.4...0.4 bar / -40...40 kPa	5.3 bar	8 bar
	5H	-1...1 bar / -100...100 kPa	6.7 bar	10 bar
	5M	-1...4 bar / -100...400 kPa	16.7 bar	25 bar
	5P	-1...10 bar / -100...1000 kPa	26.7 bar	40 bar
		Absolute pressure	Max. working pressure MWP	Overload OPL
	2F	0...0.4 bar / 0...40 kPa	5.3 bar	8 bar
	2H	0...1 bar / 0...100 kPa	6.7 bar	10 bar
	2M	0...4 bar / 0...400 kPa	16.7 bar	25 bar
	2P	0...10 bar / 0...1000 kPa	26.7 bar	40 bar
	2S	0...40 bar / 0...4000 kPa	40 bar	60 bar
60	Configuration and unit			
	1	Sensor range: bar		Calibration in sensor range
	2	Sensor range: kPa/MPa		Calibration in sensor range
	3	Sensor range: psi		Calibration in sensor range
	S	Switch output 1, see additional specification		Calibration in sensor range
	T	Switch output 1 + 2, see additional specification		Calibration in sensor range
	U	Switch and analog output, see additional specification		Calibration in sensor range
	V	Switch output 1, switch output 2 DESINA, see add. spec.		Calibration in sensor range
	W	Analog output, switch output DESINA, see add. spec.		Calibration in sensor range
70	Process connection, material			
	AC	Thread ISO 288, G¾ (female), 316L		
	AD	Thread ISO 228, G¾A, 316L		
	AE	Thread ISO 228, G½A, 316L		
	AF	Thread ISO 228, G½A, bore 11.4 mm, 316L		
	BA	Thread DIN 13, M 12x1.5, 316L		
	CA	Thread 7/16-20 UNF (SAE), 316L		
	DA	Thread ANSI ¼ FNPT, 316L		
	DD	Thread ANSI ½ MNPT, 316L		
80	Sensor seal (in contact with process)			
	1	FKM Viton sensor seal		
	4	EPDM sensor seal		
	6	FKM Viton sensor seal, cleaned for O₂ service		
90	Additional equipment			
	A	Without additional equipment		
	B	Final inspection report		
	C	3.1 (process connection), inspection certificate to EN 10204		

[illegible]

Ceraphant T PTP31

This overview does not mark options which are mutually exclusive.

10	Certificate				
	A	For non-hazardous areas			
20	Electrical connection				
	1	M 12x1 connector: IP 65; with sensors for gauge pressure and absolute pressure: IP 66			
	2	M16x1.5 valve plug, ISO 4400: IP 65			
	3	½NPT valve plug, ISO 4400: IP 65			
	4	5 m (16.4 ft) cable: IP 66			
30	Electronics, output signal				
	A	12...30V DC, PNP switch, 3-wire			
	B	12...30V DC, 2 PNP switch, 4-wire			
	C	12...30 V DC, PNP switch + 4...20mA, 4-wire			
40	Display				
	1	With digital display			
50	Sensor				
		Gauge pressure	Max. working pressure MWP	Overload OPL	
	3H	0...1 bar / 0...100 kPa	2.7 bar	4 bar	
	3M	0...4 bar / 0...400 kPa	10.7 bar	16 bar	
	3P	0...10 bar / 0...1000 kPa	26.7 bar	40 bar	
	3S	0...40 bar / 0...4000 kPa	100 bar	160 bar	
	3U	0...100 bar / 0...10 MPa	100 bar	160 bar	
	3Z	0...400 bar / 0...40 MPa	400 bar	600 bar	
		Negative gauge pressure	Max. working pressure MWP	Overload OPL	
	7H	-1...1 bar / -100...100 kPa	2.7 bar	4 bar	
	7M	-1...4 bar / -100...400 kPa	10.7 bar	16 bar	
	7P	-1...10 bar / -100...1000 kPa	26.7 bar	40 bar	
		Absolute pressure	Max. working pressure MWP	Overload OPL	
	4H	0...1 bar / 0...100 kPa	2.7 bar	4 bar	
	4M	0...4 bar / 0...400 kPa	10.7 bar	16 bar	
	4P	0...10 bar / 0...1000 kPa	26.7 bar	40 bar	
	4S	0...40 bar / 0...4000 kPa	100 bar	160 bar	
	4U	0...100 bar / 0...10 MPa	100 bar	160 bar	
	4Z	0...400 bar / 0...40 MPa	400 bar	600 bar	
60	Configuration and unit				
	1	Sensor range: bar			Calibration in sensor range
	2	Sensor range: kPa/MPa			Calibration in sensor range
	3	Sensor range: psi			Calibration in sensor range
	S	Switch output 1, see additional specification			Calibration in sensor range
	T	Switch output 1 + 2, see additional specification			Calibration in sensor range
	U	Switch and analog output, see additional specification			Calibration in sensor range
	V	Switch output 1, switch output 2 DESINA, see add. spec.			Calibration in sensor range
	W	Analog output, switch output DESINA, see add. spec.			Calibration in sensor range
70	Process connection, material				
	AC	Thread ISO 288, G¼ (female), 316L			
	AD	Thread ISO 228, G¼A, 316L			
	AE	Thread ISO 228, G½A, 316L			
	AF	Thread ISO 228, G½A, bore 11.4 mm, 316L			
	AG	Thread ISO 228, G½A, seal DIN 3852, 316L, flush-mounted			
	BA	Thread DIN 13, M 12x1.5, 316L			
	CA	Thread 7/16-20 UNF (SAE), 316L			
	DA	Thread ANSI ¼FNPT, 316L			
	DD	Thread ANSI ½MNPT, 316L			
80	Seal, filling fluid				
	1	O-ring FKM Viton, synthetic oil			
	4	O-ring EPDM, synthetic oil			
	7	Welded, synthetic oil (only for 400 bar sensor)			
90	Additional equipment				
	A	Without additional equipment			
	B	Final inspection report			
	C	3.1 (process connection), inspection certificate to EN 10204			
	D	Final inspection report + 3.1 (process connection), inspect. certificate to EN 10204			

[illegible]

Ceraphant T PTP35

This overview does not mark options which are mutually exclusive.

10	Certificate				
	A	For non-hazardous areas			
20	Electrical connection				
	1	M 12x1 connector: IP 65; with sensors for gauge pressure and absolute pressure: IP 66			
	2	M16x1.5 valve plug, ISO 4400: IP 65			
	3	½NPT valve plug, ISO 4400: IP 65			
	4	5 m (16.4 ft) cable: IP 66			
30	Electronics, output signal				
	A	12...30V DC, PNP switch, 3-wire			
	B	12...30V DC, 2 PNP switch, 4-wire			
	C	12...30 V DC, PNP switch + 4...20mA, 4-wire			
40	Display				
	1	With digital display			
50	Sensor				
		Gauge pressure	Max. working pressure MWP	Overload OPL	
	3H	0...1 bar / 0...100 kPa	2.7 bar	4 bar	
	3M	0...4 bar / 0...400 kPa	10.7 bar	16 bar	
	3P	0...10 bar / 0...1000 kPa	26.7 bar	40 bar	
	3S	0...40 bar / 0...4000 kPa	100 bar	160 bar	
		Negative gauge pressure	Max. working pressure MWP	Overload OPL	
	7H	-1...1 bar / -100...100 kPa	2.7 bar	4 bar	
	7M	-1...4 bar / -100...400 kPa	10.7 bar	16 bar	
	7P	-1...10 bar / -100...1000 kPa	26.7 bar	40 bar	
		Absolute pressure	Max. working pressure MWP	Overload OPL	
	4H	0...1 bar / 0...100 kPa	2.7 bar	4 bar	
	4M	0...4 bar / 0...400 kPa	10.7 bar	16 bar	
	4P	0...10 bar / 0...1000 kPa	26.7 bar	40 bar	
	4S	0...40 bar / 0...4000 kPa	100 bar	160 bar	
60	Configuration and unit				
	1	Sensor range: bar			Calibration in sensor range
	2	Sensor range: kPa/MPa			Calibration in sensor range
	3	Sensor range: psi			Calibration in sensor range
	S	Switch output 1, see additional specification			Calibration in sensor range
	T	Switch output 1 + 2, see additional specification			Calibration in sensor range
	U	Switch and analog output, see additional specification			Calibration in sensor range
	V	Switch output 1, switch output 2 DESINA, see add. spec.			Calibration in sensor range
	W	Analog output, switch output DESINA, see add. spec.			Calibration in sensor range
70	Process connection, material				
		Clamp connections			
	DA	ISO 2852 DN12-22 (¾"), 316L, 3A, EHEDG ²⁾ , DIN32676, DN10-20			
	DB	ISO 2852 DN25-38 (1...1½"), 316L, 3A, EHEDG ²⁾ , DIN32676, DN25-40			
	DL	ISO 2852 DN40-51 (2"), 316L, 3A, EHEDG ²⁾ , DIN32676, DN50			
		Hygienic connections			
	BA	Thread ISO 228 G1A, metal taper seal, 316L, flush-mounted for sleeve 52005087			
	BB	Thread ISO 228 G1A, O-ring seat seal, 316L, flush-mounted for sleeve 52001051			
	KL	SMS 1½" PN 25, 316L, 3A ¹⁾ , EHEDG ²⁾			
	LB	Varivent F pipe DN 25-32, PN 40, 316L, 3A			
	LL	Varivent N pipe DN4 0-162, PN 40, 316L, 3A			
	PH	DIN 11851 DN 40 PN 40, slotted nut, 316L, 3A ¹⁾ , EHEDG ²⁾			
	PL	DIN 11851 DN 50 PN 25, slotted nut, 316L, 3A ¹⁾ , EHEDG ²⁾			
	HL	APV Inline DN 50 PN 40, 316L, EHEDG			
80	Seal, filling fluid				
	4	O-ring EPDM, oil conform to FDA			
	8	Without O-ring, oil conform to FDA (only for process connections BA, BB, DA)			

1)

Suitable fittings and seals must be used for hygienic design in accordance with 3A specifications.

2)

Suitable fittings and seals must be used for hygienic design in accordance with EHEDG specifications.

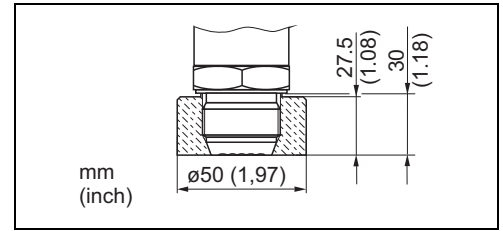
1) Suitable fittings and seals must be used for hygienic design in accordance with 3A specifications.

2) Suitable fittings and seals must be used for hygienic design in accordance with EHEDG specifications.

Accessories

Welding boss – with sealing taper

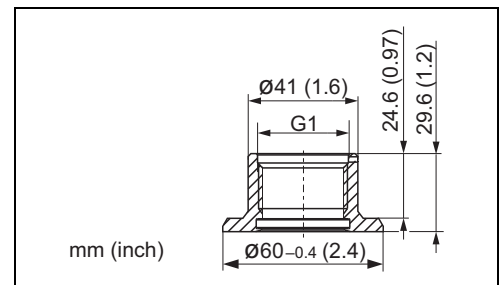
- Welding boss for flush mounting process connection G1 A with metallic sealing taper (version BA for PTP35)
Material: AISI 316L
Order number: 52005087
- Optional with inspection certificate 3.1
Order number: 52010171
- Welding aid (Dummy) for welding the welding boss without any problems, order number 52005087 or 52010171
Material: brass
Order number: 52005272



P01-Pxxxxxx-00-xx-00-xx-001

Welding boss – with sealing surface

- Welding boss for flush mounting process connection G1 A with sealing surface (version BB for PTP35)
Material: AISI 316L
Order number: 52001051
- Seal (enclosed): silicone O-ring
FDA approved materials according to 21 CFR Part 177.1550/2600
- Optional with inspection certificate 3.1:
Order number: 52011896



P01-PMP13xxx-00-xx-00-xx-002

Thread adapter

- PTP31: order numbers for thread adapter versions

Version AC: order no. 52023980
 Version AD: order no. 52023981
 Version AE: order no. 52023982
 Version AF: order no. 52023983
 Version BA: order no. 52023984
 Version CA: order no. 52023985
 Version DA: order no. 52023986
 Version DD: order no. 52023987

See chapter "Process connection PTP31 Thread connections" → 13.

Clamp adapter

- PTP35: Order numbers for clamp adapter versions

Version DB: order no. 52023994
 Version DL: order no. 52023995

Optional with inspection certificate 3.1:
 Version DB: order no. 52024001
 Version DL: order no. 52024002

See chapter "Process connection PTP35 Clamp connections" → 15.

Hygiene adapter

- PTP35: order numbers for hygiene adapter versions

Version KL: order no. 52026997
Version LB: order no. 52023996
Version LL: order no. 52023997
Version PH: order no. 52023999
Version PL: order no. 52023998
Version HL: order no. 52024000

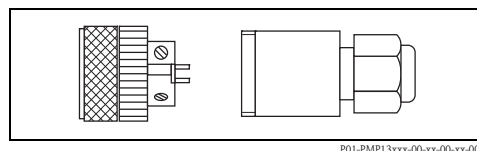
Optional with inspection certificate 3.1:

Version KL: order no. 52026999
Version LB: order no. 52023996
Version LL: order no. 52024004
Version PH: order no. 52024006
Version PL: order no. 52024005
Version HL: order no. 52024007

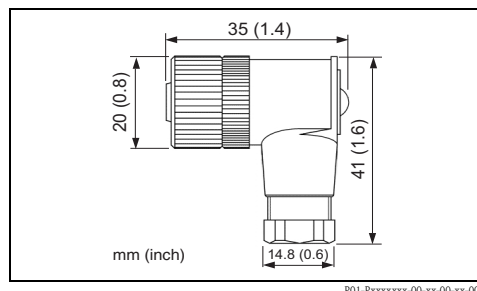
See chapter "Process connection PTP35 Hygiene connections" → 14.

Plug-in jack

- M12x1 plug-in jack
Self-made connection to M12x1 plug
Materials: Body PA
Coupling nut: Cu Zn, brass, nickeled
Protection: IP 67 (fully locked)
Order number: 52006263

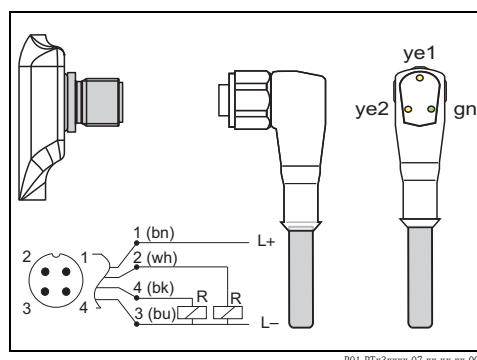


- M12x1 plug-in jack, elbowed
Self-made connection to M12x1 plug
Materials: Body PA
Coupling nut: GD-Zn, brass, nickeled
Protection: IP 67 (fully locked)
Order number: 51006327



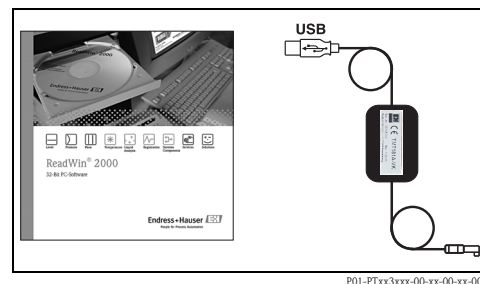
Connecting cable

- Cable, 4 x 0.34 mm² (AWG 21) with M12 socket, elbowed, screw plug, length 5 m (16 ft), sprayed cable
Materials: Body PUR
Coupling nut: Cu Zn/Ni, brass, nickeled
Cable: PVC
Protection: IP 67 (fully locked)
order number: 52010285
- Cable, 4 x 0.34 mm² (AWG 21) with M12 socket, with LED, elbowed, sprayed cable, length 5 m (16 ft), specially for hygiene applications (For devices with switch output only)
Materials: Body: PVC
Coupling nut: 316L
Cable: PVC
Protection: IP 69K (fully locked)
Order number: 52018763
Display: gn: device operational;
ye1: switch status; ye 2: switch status 2



Configuration kit

- Configuration kit for PC-programmable transmitters. Setup program and interface cable for PCs with USB port. Adapter for transmitters with 4-pin post connector.
Order code: TXU10-AA
- ReadWin® 2000 is supplied with the configuration kit or it can be downloaded free of charge directly from the internet at the following address:
www.readwin2000.com



Power supply RNB130

- Primary switched-mode power supply for sensors
- Space saving DIN rail mounting as per IEC 60715.
- Nominal input voltage: 100-240 V AC (wide-range voltage input)
- Output voltage: 24 V DC, max. 30 V in the event of a fault
- Nominal output current: 1.5 A
- Connection to monophased a.c. networks or to two phase conductors of three-phase supply networks

Documentation

This supplementary documentation can be found on our product pages on www.endress.com

Field of Activities

Pressure measurement, Powerful instruments for process pressure, differential pressure, level and flow:
FA00004P/00/EN

Technical Information

Technical Information on the Thermophant T temperature switch:

- Thermophant T TTR31, TTR35: TI00105R/09/EN
- Flowphant T DTT31, DTT35: TI00125R/09/EN

Operating instructions

- Ceraphant T PTC31, PTP31, PTP35: KA00225P/00/EN
- Operating software ReadWin 2000: BA00137R/09/EN
- Operating software FieldCare: BA00027S/04/C4

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