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 sensor diaphragm;
Ceraphant T PTP31
– with metallic sensor 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® sensor 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

TI384P/00/en/12.08

Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

Ceraphant T PTC31

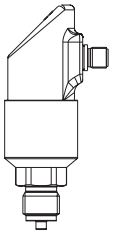
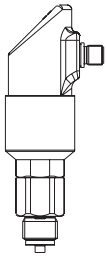
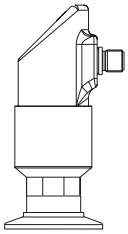
The process pressure acts on the ceramic sensor diaphragm and the pressure-dependent change in capacitance of the ceramic sensor is measured. A microprocessor evaluates the signal and switches the output or outputs the corresponding measured value.
The ceramic sensor is a dry sensor i.e. no fill fluid 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 separating 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.

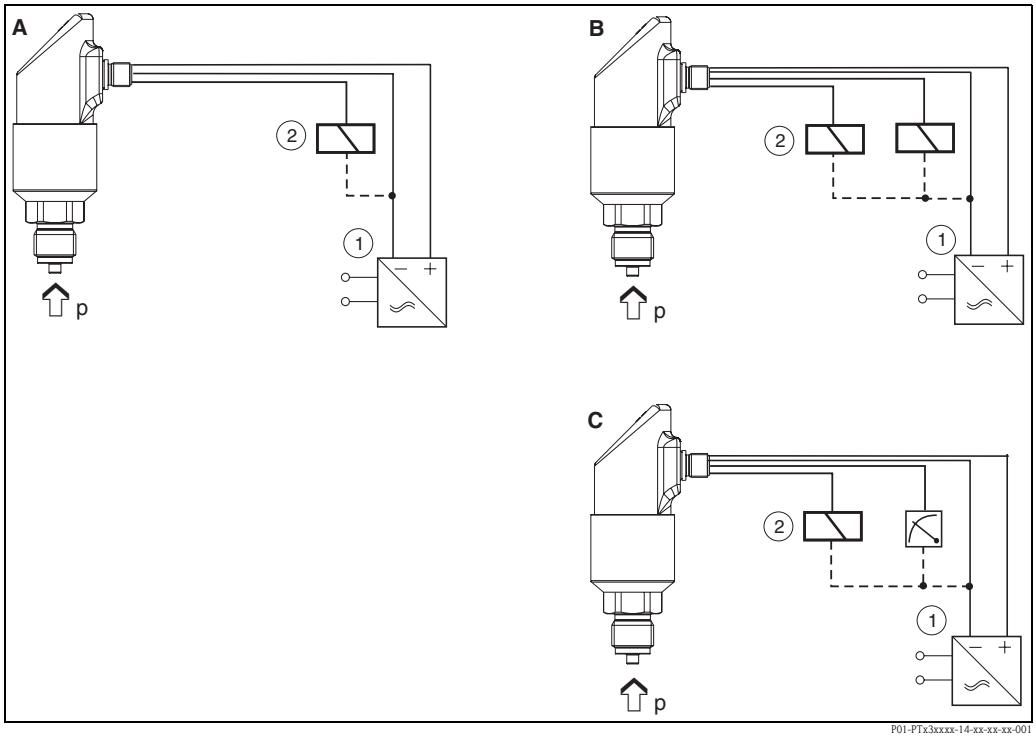
Measuring system

Synopsis

Ceraphant 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 measuring diaphragm (Ceraphire®)	With piezoresistive measuring cell and metallic measuring diaphragm	With piezoresistive measuring cell and metallic measuring 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 mm – M 12x1,5 – 7/16-20 UNF – ¼ FNPT and ½ MNPT	Thread – G ¼ female – G ¼A and G ½A – G ½A, hole 11 mm – M 12x1,5 – 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 to40 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 (104 °F to 212 °F)	–40 °C to +100 °C (104 °F to 212 °F)	–40 °C to +100 °C 135 °C max. 1 hour (104 °F to 212 °F 275 °F max. 1 hour)

DC voltage version

Positive signal at electronics switch output (PNP). Power supply, e.g. with a transmitter power supply unit. Preferred in conjunction with programmable logic controllers (PLC) or to control relays.



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.

Range of adjustment

- Switch output:
  Switch point (SP): 0.5...100 % in increments of 0.1 % (min. 1 mbar *) of the upper range limit (URL)
  Switch-back point (RSP): 0...99.5 % in increments of 0.1 % (min. 1 mbar *) 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 in increments of min. 10 mbar
- 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 ≤250 mA, switch status OFF: I_a ≤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
  ≤ 3,6 mA / last current value / ≥21,0 mA adjustable (if setting ≥21.0 mA the output is ≥21.5 mA)
- Switch outputs: In safe state (switch normally open)

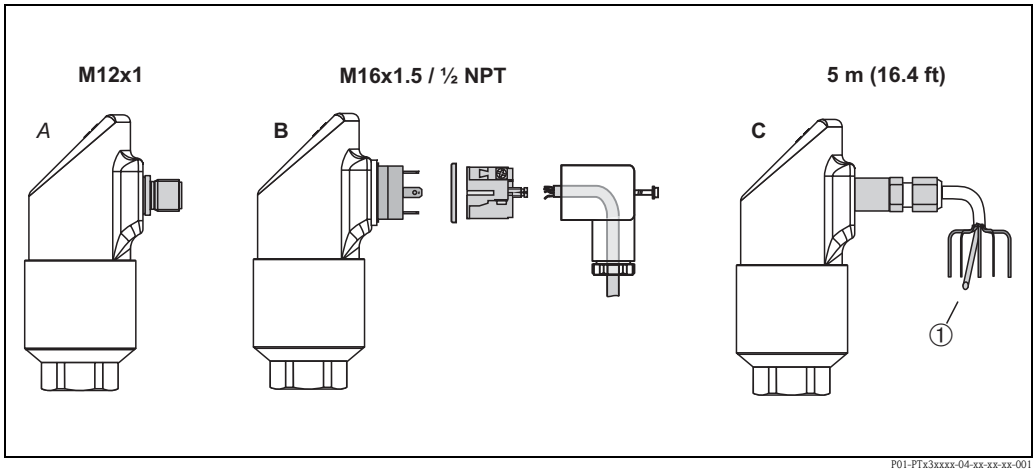
Load

Max. (V_{Supply} –6.5 V) / 0.22 A (analog output)

Power supply

Electrical connection

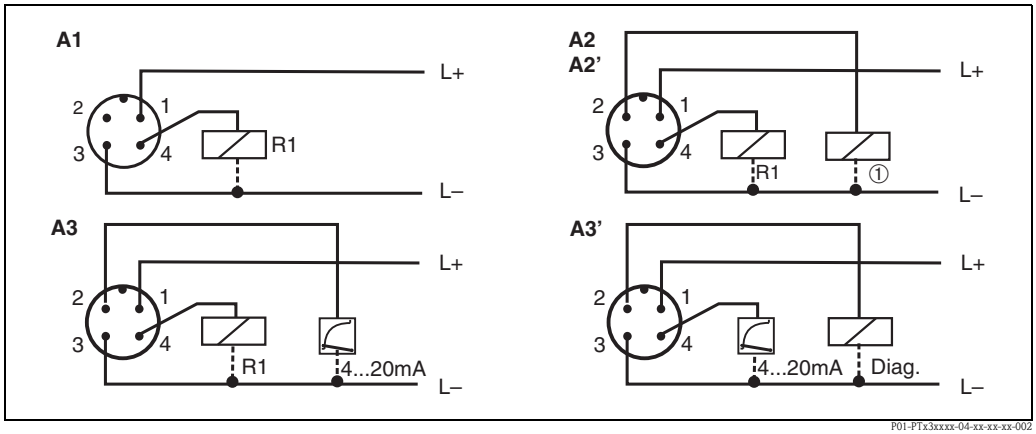
Connector and cable connection



A: M 12x1 connector;
B: M 16x1.5 or ½ NPT valve plug
C: cable, 5 m (16.4 ft) long, 5-core
① reference pressure supply

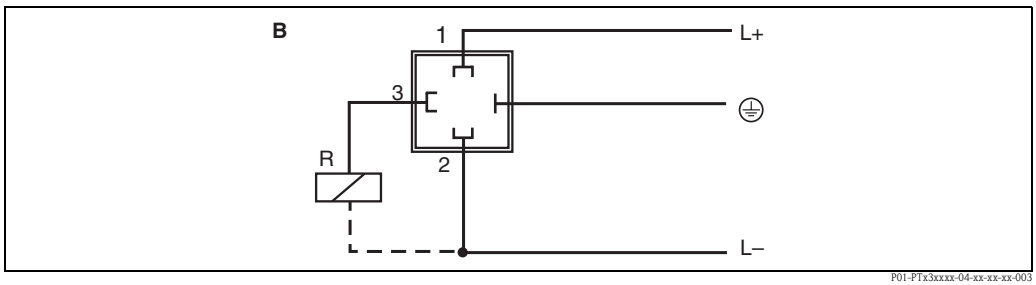
Device connection

■ DC voltage version with M 12x1 connector



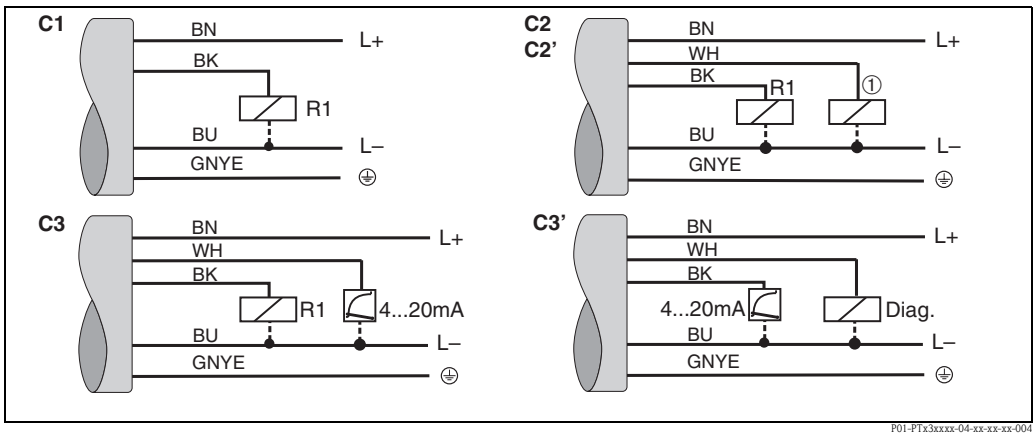
A1: 1x PNP switch output
A2: PNP switch outputs R1 and ① (R2)
A2': PNP switch outputs R1 and ① (diagnosis/break contact with adjustment "DESINA")
A3: PNP switch output with additional analog output
A3': PNP switch output with additional analog output (PIN assignment with "DESINA" setting)

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



B: 1x PNP switch output

■ DC voltage version with cable



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 T_{90}: ≤200 ms ■ Settling time T_{99}: ≤400 ms
Influences of air pressure changes	In the case of air pressure changes the following additional measuring errors might occur: 400 bar: max. 0.0275 % 100 bar: max. 0.1 % 40 bar: max. 0.275% 10 bar: max. 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 instructions

Installation instructions

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

Operating conditions: Environment

Ambient temperature range

-40 to +85 °C, briefly up to +100 °C (-40 to 185 °F, briefly up to 212 °F)

Storage temperature

-40 to +85 °C (-40 to 185 °F)

Degree of protection

- M 12x1 connector
  Gauge pressure sensors <10 bar: IP 60 / sensors for gauge pressure ≥10 bar and absolute pressure: IP 66
- M 16x1.5 or ½ NPT valve plug
  Gauge pressure sensors <10 bar: IP 60 / sensors for gauge pressure ≥10 bar and absolute pressure: 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: –40 °C...+100 °C (-40 °F to +212 °F)
- PTP31: –40 °C...+100 °C (-40 °F to +212 °F)
- PTP35: –40 °C...+100 °C, +135 °C for max. 1 hour (-40 °F to +212 °F, +275 °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 smaler 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 $mbar_{abs}$ (0 psi)
  For ceramic sensor 100 mbar (1.5 psi): 700 $mbar_{abs}$ (10.2 psi)
  For metal sensor: 10 $mbar_{abs}$ (0.1 psi)

Pressure specifications

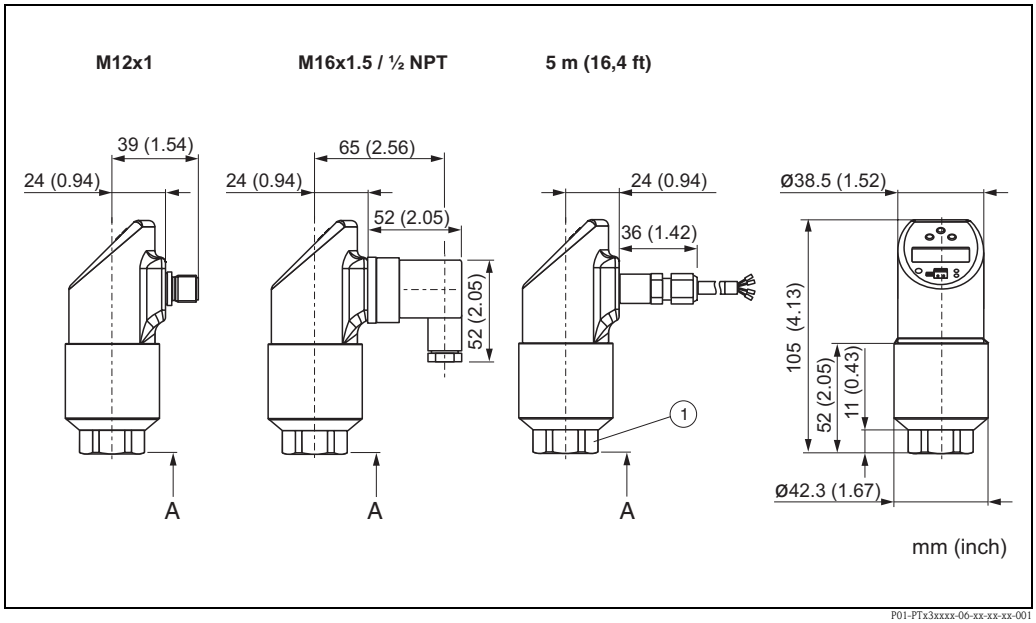
The maximum pressure for the measuring device is dependent on the weakest element with regard to pressure, see the following sections "Ordering information: Measuring range" and "Mechanical construction"

The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of +20 °C (-4 °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



P01-PTx3xxxx-06-xx-xx-xx-001

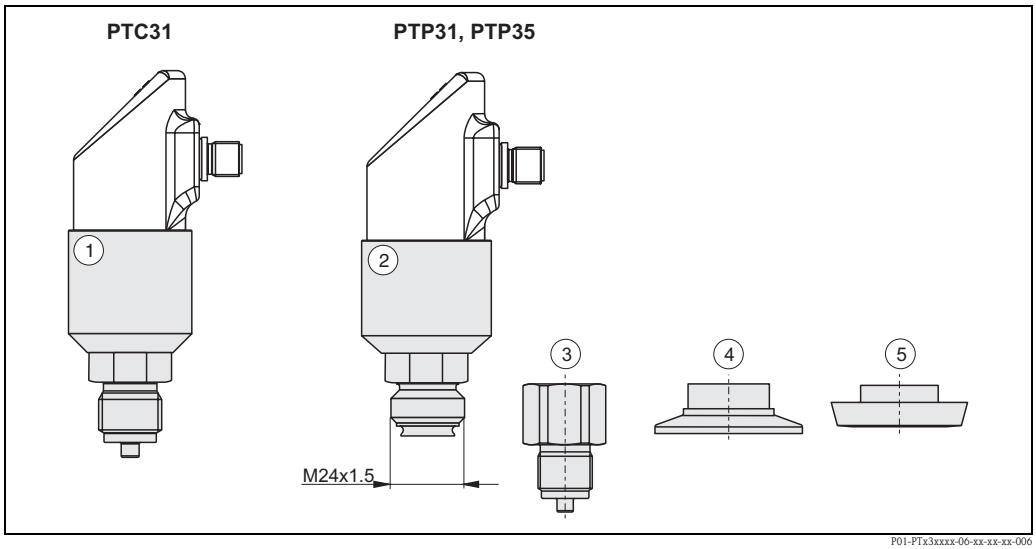
M 12x1 connector as per IEC 60947-5-2

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

Cable 5 m (16 ft) long, cable outer diameter 7.7 mm (0.3 inch); cores 4 x 0.2 mm² (AWG24), PE 0.75 mm² (AWG18) reference pressure hose with outer diameter 2.5 mm (0.1 inch)

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



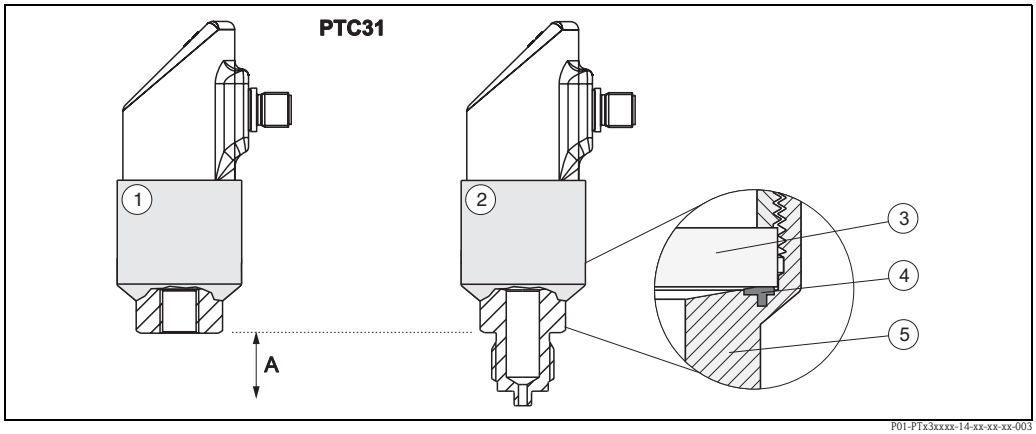
P01-PTx3xxxx-06-xx-xx-xx-006

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 thread adapter welded onto sensor module)
③ Adapter with thread connection
④ Adapter with clamp connection (except ½" clamp)
⑤ Adapter with hygienic connection (except G 1A)

Process connection PTC31 Sensor module with ceramic sensor

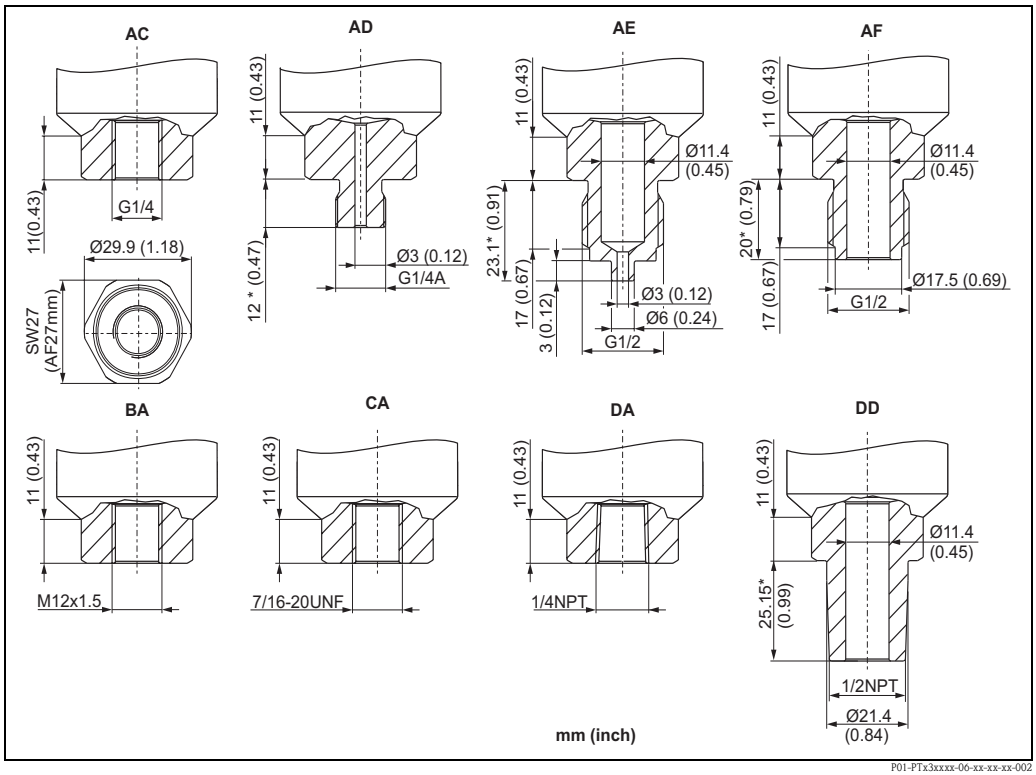


PTC31; sensor module with process connection
① with internal thread
② with external thread

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

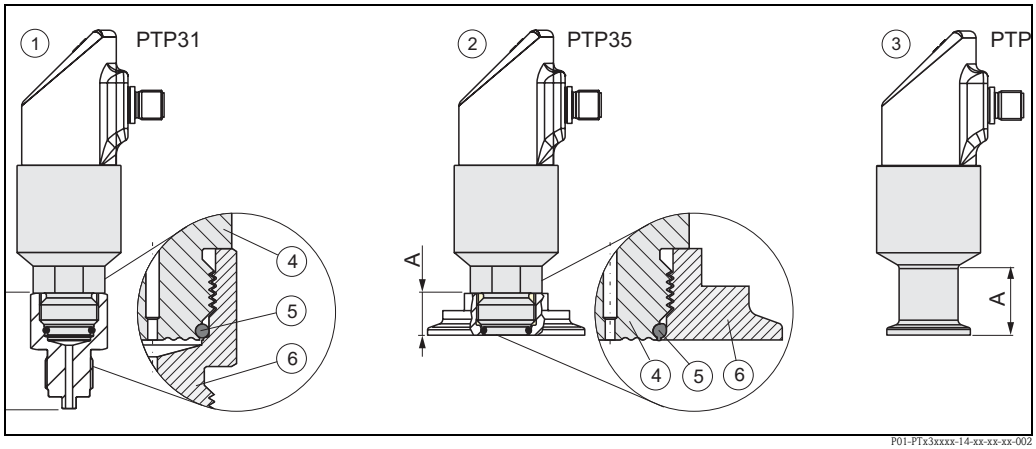
*Dimension A: see the following dimension drawings (dimension with *)*

Thread connections



Process connection versions (see also "Ordering information" section)
AC: thread ISO 288, G¼ (female)
AD: thread ISO 288, G¼A
AE: thread ISO 288, G½A
AF: thread ISO 288, G½A, bore 11 mm
BA: Thread DIN 13, M 12x1.5
CA: thread 7/16-20 UNF (SAE)
DA: thread ANSI ¼ FNPT
DD: thread ANSI ½ MNPT

Process connection PTP
Sensor module with metallic sensor diaphragm

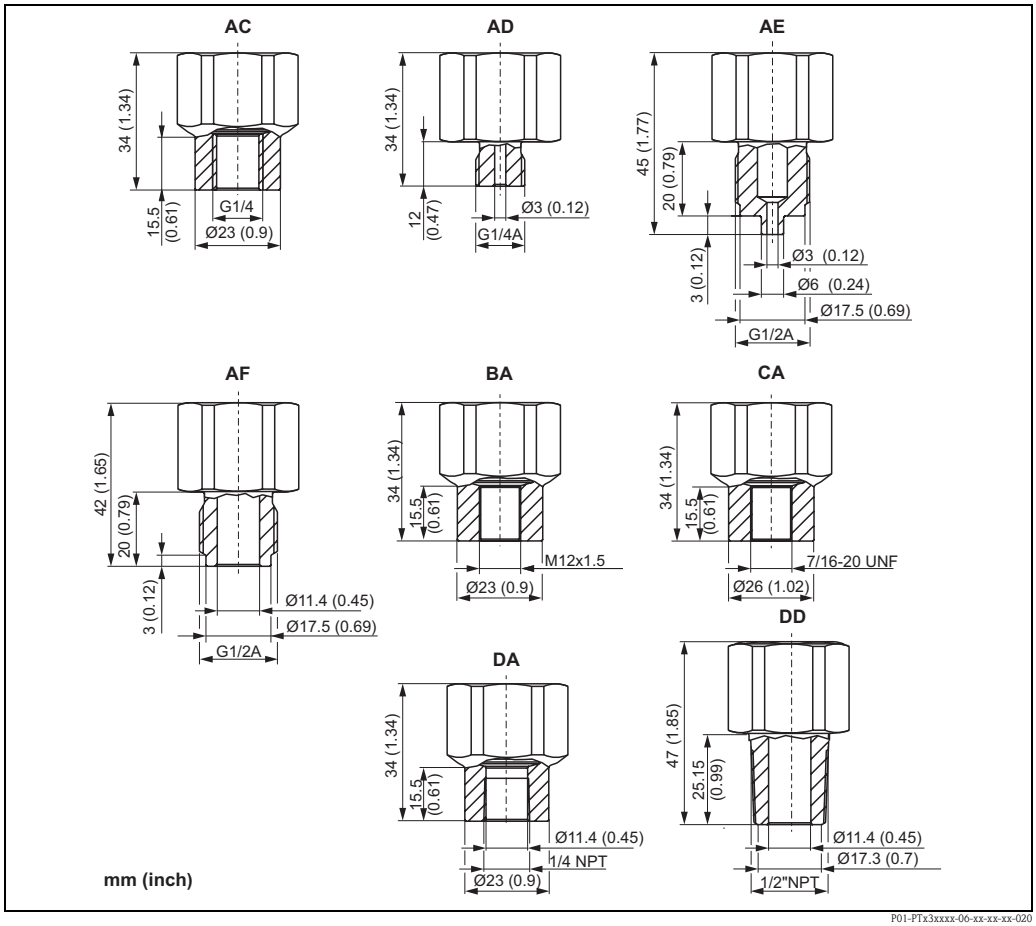


① *Sensor module with adapter thread for adapters with thread connection*
② *Sensor module with adapter thread for adapters with clamp or hygiene connection*
③ *Sensor module with clamp or hygiene connection (only versions DA, BA, BB)*

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

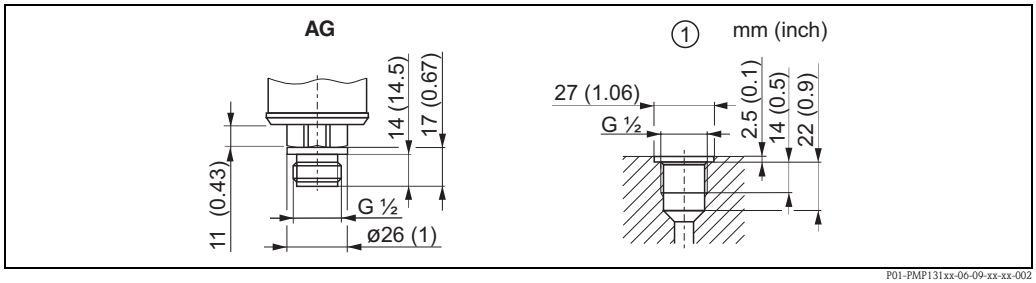
*Dimension A: see the following dimension drawing (dimension with *). For 400 bar (6000 psi) sensor see also Page 12.*

Process connection PTP31
Thread connections



Process connection versions: sensor module with adapter (see also "Ordering information" section)
AC: thread ISO 228, G¼ (female)
AD: thread ISO 228, G¼A
AE: thread ISO 228, G½A
AF: thread ISO 228, G½A, bore 11 mm (0.43 inch)
BA: Thread DIN 13, M 12x1.5
CA: thread 7/16-20 UNF (SAE)
DA: thread ANSI ¼ FNPT
DD: thread ANSI ½ MNPT

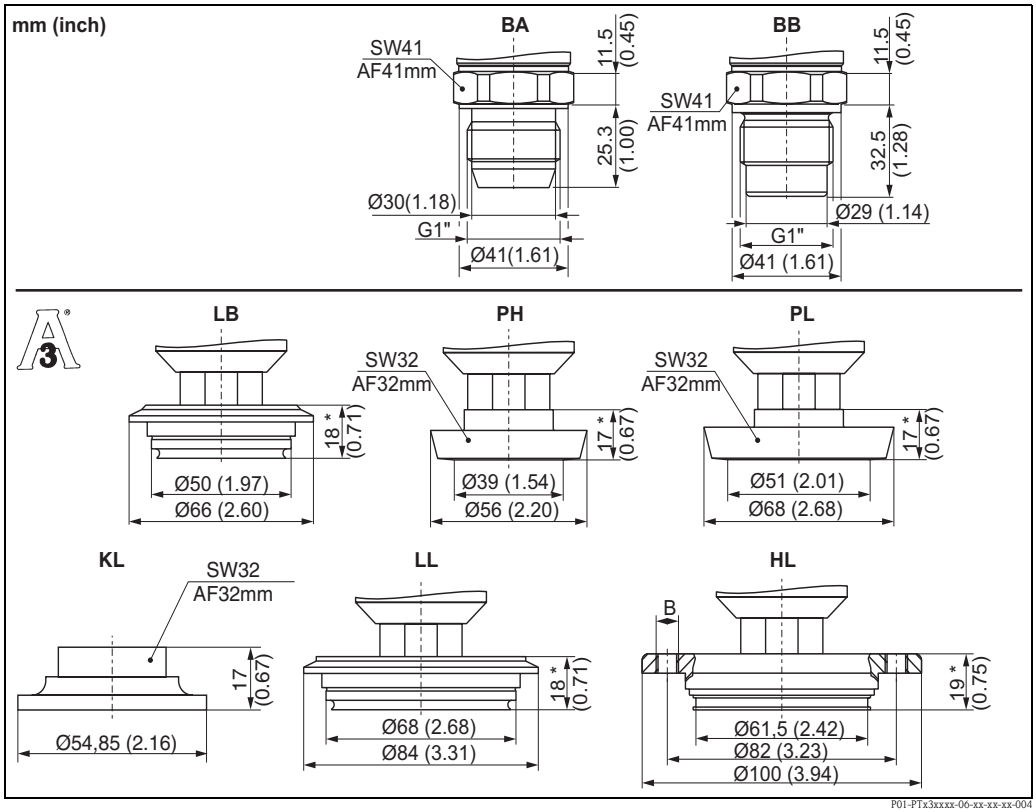
Process connection PTP31
Flush-mounted nozzle



Process connection PTP31; Version AG

AG: Thread ISO 228 G ½, seal DIN 3852 flush-mounted
①: Dimensions for tapped hole G ½ as per DIN 3852-11 form X

Process connection PTP35
Hygiene connections

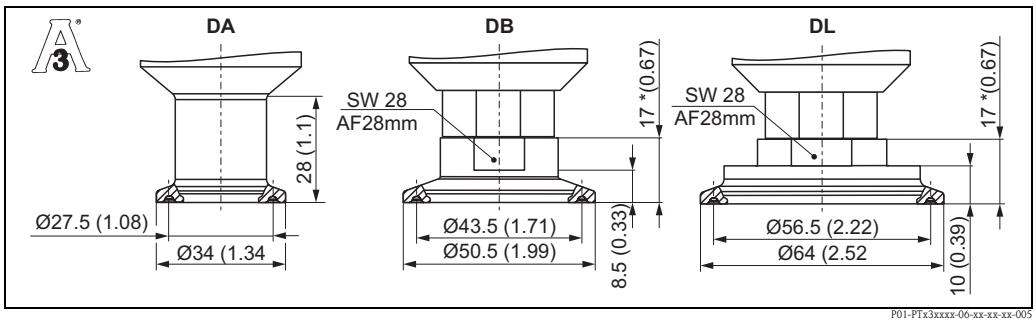


Process connection versions
BA: thread ISO 228 G1A, metal taper seal
BB: thread ISO 228 G1A, O-ring seat seal

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 coupling nut)
PL: DIN 11851, DN 50, PN 25 (including coupling nut)
HL: APV inline, DN 50, PN 40, (B = bores 6 x Ø8.6 + 2 x M8 thread)
KL: SMS 1½ 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 sensor

- Across flats on sensor module AF 32 mm
- Sensor module welded to thread adapter
- For ¼ NPT thread connections, M 12x1.5, 7/16-20UNF: dimension A 5 mm (0.2 inch) longer
  For ½ NPT thread connections, G ½A: dimension A 1 mm (0.04 inch) longer

Weight

- PTC31: approx. 0.32 kg (0.7 lb)
- PTP31: approx. 0.37 kg (0.8 lb)
- PTP35: approx. 0.58 kg (1.3 lb) with clamp process connection 1...1½"

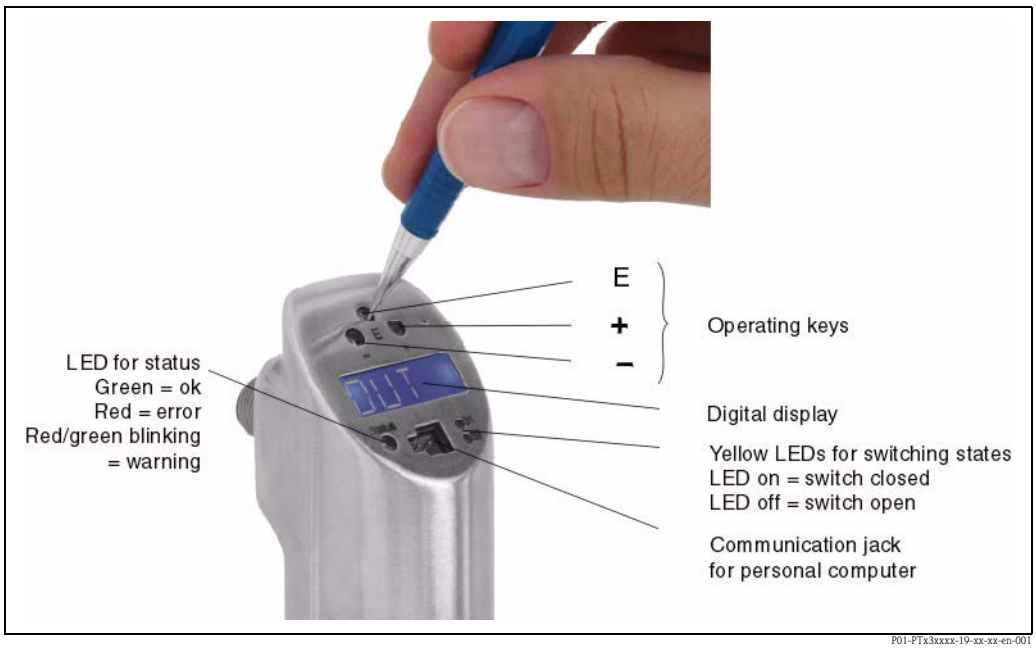
Material

- Process connection: AISI 316L
  Surfaces in contact with the process for PTP35, $R_a \leq 0.8$ µm
  Coupling nut: AISI 304
- Sensor diaphragm for PTC31: Ceraphire® (99.9 % Al_2O_3), FDA number 21-CFR 186.1256
  Sensor diaphragm for PTP31/35: AISI 316L
- Filling oil for PTP31 and PTP35: synthetic oil, FDA number 21-CFR 172.882
- Seals:
  FKM: Viton®, temperature range –20 °C to +100 °C (-4 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 to +212 °F)
  FKM: Viton® for O_2 applications (70C3 CO2-70-0041V), temperature range –10 to 60 °C (14 to 140 °F)
- Housing:
  AISI 316L, with electropolished surface $R_a \leq 0.8$ µm
  O ring between housing and sensor modul: EPDM
- Electrical connection:
  M12 connector: exterior AISI 316L, interior polyamide (PA)
  Valve plug: outer covering made of polyamide (PA)
  Cable: outer covering made of polyurethane (PUR/UL94, V0, UV-resistant)
  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 and meaning of display and operating elements.



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

On-site operation

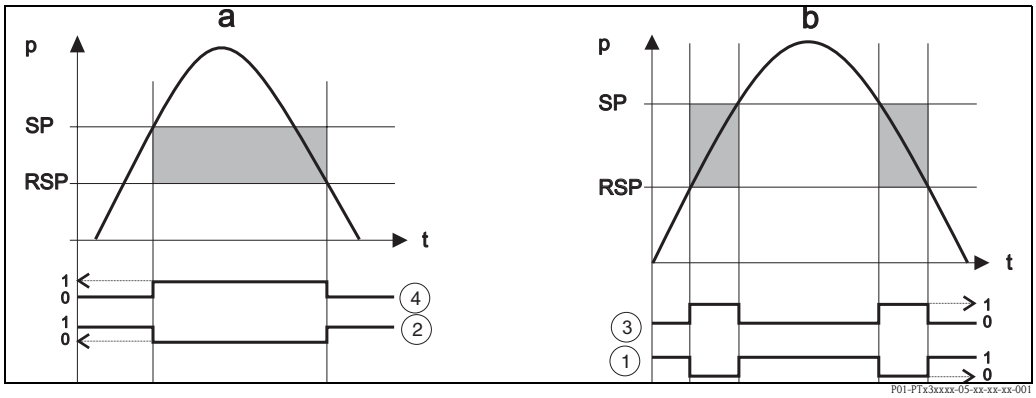
Menu-guided operation using operating keys.

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)

Function group	Operating options
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)
	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)
	Switch output delay: anywhere between 0...99 s (in increments of 0.1 s)
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)
	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)
	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 in increments of min. 0.01 mbar

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 BA137R/09/en.
The configuration kit TXU10-AA is available as an accessory (see chapter Assessories). 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

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 hygenic processes

The Ceraphant T PTP35 is suitable for the employment in hygenic processes.
An overview of permitted process connections on page 11 and 12.
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.

TSE Certificate of Suitability

Ceraphant T PTP35
The following applies to 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 wetted device components are listed in the “Mechanical construction” and “Ordering information” sections.

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 60592
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

Registered trademarks

Ceraphire®
Registered trademark of Endress+Hauser GmbH+Co.KG, Maulburg, Germany

ReadWin®
Registered trademark of Endress+Hauser Wetzer GmbH+Co.KG, Nesselwang, Germany

LEXAN®
Registered trademark of General Electric Plastics B.V., Bergen op Zoom, Netherlands

THERMOPLAST®
Registered trademark of Kraiburg TPE GmbH, Waldkraiburg, Germany

Ordering Information

Ceraphant T PTC31

10 Certificate

A	For non-hazardous areas

20 Electrical connection

1	M 12x1 connector: IP 60; with sensors for gauge pressure ≥10 bar and absolute pressure: IP 66
2	M16x1.5 valve plug, ISO 4400: IP 60, with sensors for gauge pressure ≥10 bar and absolute pressure: IP 65
3	½NPT valve plug, ISO 4400: IP 60, with sensors for gauge pressure ≥10 bar and absolute pressure: 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, G¼ (female), 316L
AD	Thread ISO 228, G¼A, 316L
AE	Thread ISO 228, G½A, 316L
AF	Thread ISO 228, G½A, bore 11 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 O_2 service

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

PTC31 -											

Ceraphant T PTP31

10	**Certificate**										
	A	For non-hazardous areas									
20		**Electrical connection**									
		1	M 12x1 connector: IP 60; with sensors for gauge pressure ≥10 bar and absolute pressure: IP 66								
		2	M16x1.5 valve plug, ISO 4400: IP 60, with sensors for gauge pressure ≥10 bar and absolute pressure: IP 65								
		3	½NPT valve plug, ISO 4400: IP 60, with sensors for gauge pressure ≥10 bar and absolute pressure: 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 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	

PTP31 -											

Ceraphant T PTP35

10 Certificate

A	For non-hazardous areas

20 Electrical connection

1	M12x1 connector: IP 60, with sensors for gauge pressure ≥10 bar and absolute pressure: IP 66
2	M16x1.5 valve plug, ISO 4400: IP 60; with sensors for gauge pressure ≥10 bar and absolute pressure: IP 65
3	½NPT valve plug, ISO 4400: IP 60; with sensors for gauge pressure ≥10 bar and absolute pressure: 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, DIN32676, DN10-20
DB	ISO 2852 DN25-38 (1...1½"), 316L, 3A, DIN32676, DN25-40
DL	ISO 2852 DN40-51 (2"), 316L, 3A, 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
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, 316L, 3A
PL	DIN 11851 DN 50 PN 25, 316L, 3A
HL	APV Inline DN 50 PN 40, 316L, 3A

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)

90 Additional equipment

A	Without additional equipment
B	Final inspection report
C	3.1.B process connection, inspection certificate to EN10204
D	Final inspection report + 3.1 (process connection), inspect. certificate to EN10204

PTP35 -

Questionnaire on customer-specific configuration

The Ceraphant T pressure switch can also be ordered with customised settings. For this purpose, please use the questionnaire below. Information on the desired switch point (SP), switch-back point (RSP), lower range value and upper range value always refer to the pressure unit selected. The possible range of adjustment is indicated in the questionnaire in % of the upper range limit (URL). The bold-printed specifications are the factory settings.

Questionnaire for Ceraphant PTC31, PTP31, PTP35 for customer-specific setup

Pressure unit **( ) bar** ( ) kPa/MPa ( ) psi

Output 1 (Application 1)
Function: ( ) 1 = Window normally closed ( ) 3 = Window normally open
( ) 2 = Hysteresis normally closed **( ) 4 = Hysteresis normally open**

SP: [ ] Range of adjustment: 0,5...100 % URL (in increments of 0.1 %, min. 1 mbar *)

RSP: [ ] Range of adjustment: 0...99,5 % URL (in increments of 0.1 %, min. 1 mbar *)

Min. difference SP – RSP: 0,5% URL * increments of min. 10 mbar with neg. gauge pressure up to 4 bar

Output 2 (Application 2) (only if available)
Function:
( ) 1 = Window normally closed ( ) 3 = Window normally open ( ) 5 = 4...20 mA (only if available)
( ) 2 = Hysteresis normally closed **( ) 4 = Hysteresis normally open**

SP: [ ] Range of adjustment: 0,5...100 % URL (in increments of 0.1 %, min. 1 mbar *)

RSP: [ ] Range of adjustment: 0...99,5 % URL (in increments of 0.1 %, min. 1 mbar *)
* increments of min. 10 mbar with neg. gauge pressure up to 4 bar

Analogue output (only if output 2 = 4...20 mA output available)

Range low scale: [ ] Range of adjustment: 0....100 % URL

Range high scale: [ ] Range of adjustment: 0....100 % URL
Turn down up to 4 : 1

Failure mode: ( ) 1 = ≤ 3.6 mA **( ) 2 = ≥ 21.0 mA** ( ) 3 = last current value

Connection conform to DESINA (only for 2 outputs): **( ) no** ( ) yes
Hint: See section "Devices Connection"

TAG (max. 2 x 18 characters) [ ]

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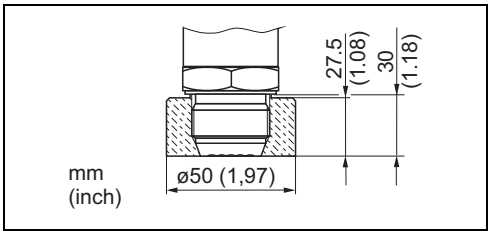
Accessories

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



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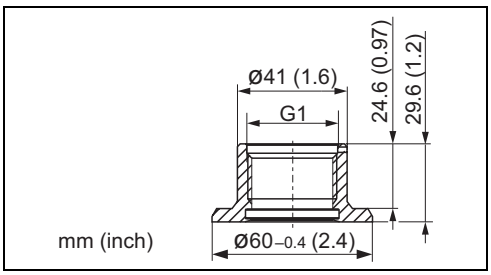
Welding boss
– with sealing surface

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



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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" → 10.

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" → 12.

Hygiene adapter

- PTP35: order numbers for hygiene adapter versions

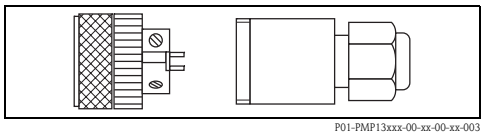
  Version KL: order no. 52026997
  Version LB: order no. 52023996
  Version LL: order no. 52023997
  Version PH: order no. 52023999
  Version PL: order no. 52023998
  Version HL: order no. 52024000

  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" → 11.

Plug-in jack

- M 12x1 plug-in jack
  Self-made connection to M 12x1 plug
  Materials: Body PA
  Coupling nut: Cu Zn, brass, nickeled
  Protection: IP 67 (fully locked)
  Order number: 52006263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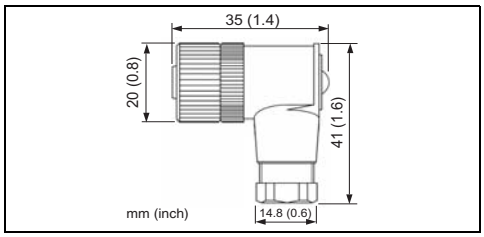
- M 12x1 plug-in jack, elbowed
  Self-made connection to M 12x1 plug
  Materials: Body PA
  Coupling mut: GD-Zn, brass, nickeled
  Protection: IP 67 (fully locked)
  Order number: 51006327

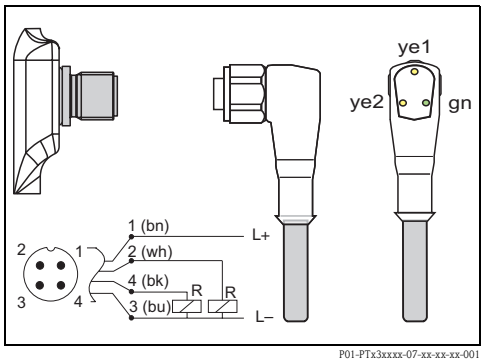


P01-Pxxxxxxx-00-xx-00-xx-002

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 with M12 socket, with LED, elbowed, sprayed cable, length 5 m, 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



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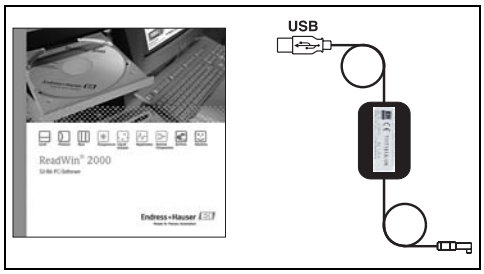
Configuration kit

- 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



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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 ouput 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

Operating instructions

Ceraphant T PTC31, PTP31, PTP35: KA225P/00/en

Operating software ReadWin 2000: BA137R/09/en
Operating software FieldCare: BA027S/o4/c4

Technical Information

Technical Information on the Thermophant T temperature switch:

Thermophant T TTR31, TTR35: TI105R/09/en

Flowphant T DTT31, DTT35: TI125R/09/en

Instruments International

Endress+Hauser
Instruments International AG
Kaegenstrasse 2
4153 Reinach
Switzerland

Tel. +41 61 715 81 00
Fax +41 61 715 25 00
www.endress.com
info@ii.endress.com

Endress+Hauser
People for Process Automation

TI384P/00/en/12.08
71086744
FM+SGML 6.0

71086744