

PRESENSE LDS 300 LEVEL DETECTION SENSOR

WITH FIELD TIME CONTROL (FTC) MEASURING PRINCIPLE



Why choose a Presense

- Reduce unscheduled downtime by unique digital filtering technique for stable measuring in rough and electrically polluted environments.
- Innovative digital cycle time conversion into FTC counts results in increased production output and reduced downtime even for extremely low dielectric products.
- Reduces maintenance costs and unscheduled downtime because the LDS 300 predicts maintenance with the “actual counts” and “percentage sensor coverage” display.
- Reduce maintenance time and costs with the coded sensor diagnostics sent to transmitter head.

Applications

- The Presense LDS 300 is suitable in a wide range of applications, but especially for industries with extremely low dielectric bulk products (solids and liquids) or rough and electrically polluted environments.

Features

- Choose from three stainless steel (AISI 316L) probe types: adaptive and/or rod probes for short and (non-)vertical mounting, and cable probes for long and suspended (vertical) mounting.
- Displays continuous level information via a bar graph and a numerical display.
- A robust construction, suitable to operate in harsh industrial conditions.
- Measuring in harsh, pressurized, abrasive, hot and corrosive environments.
- An integrated programmable controller with intuitive LCD, LED backlight, a simple two button interface and integrated self diagnostics.
- Easily programmable and intuitive set points, covering a wide range of applications and materials.

Signal output

- A failsafe high/low relay contact output, suitable for alarming and/or simple pump or motor control.

General information

Introduction

The LDS 300 Level Detection Sensor is a microprocessor controlled sensing level switch, designed to indicate the actual level, and to switch at preset levels of: liquids, powders, pallets, granulates and other bulk material inside a vessel or container. The display readout provides continuous level information via a bar graph and a numerical display. A changeover relay contact provides alarming or simple process control upon process offsets.

Operating Principle

The LDS 300 Level Detection Sensor uses the FTC measuring principle to detect changes in the dielectric constant surrounding the probe. The Probe Processor continuously generates counts, corresponding to the detected dielectric constant or permittivity: the higher the level, the higher the permittivity, the higher the count. The Control Display Unit converts this continuous stream of counts to percentages before processing.

FTC (Field Time Control)

With FTC technology a sensor's sensitivity increases considerably, making it applicable for various bulk products, even with extremely low dielectric constants. And still getting more signals with lower variation for increased reliability and thus decreasing costs, increasing revenues and clearer insight in running processes.

FTC is a new, innovative technology where an electric field is generated around the sensor. The cycle time of the FTC sensor changes as soon as solid particles intervene this electric field. Applications with a sensor with FTC technology provide a more reliable and cost effective solution.

When measuring insulating materials – such as plastic granulates, fly ash or cement powder, grounded vessel walls are recommended. To measure conductive products, such as waste water or moist bulk, insulating (polyester) vessel walls may be used.

Power supply

The LDS 300 has a universal switching power supply with reversible polarity. The ranges are from 12 - 350V DC or 15 - 250V AC.

Signal output

A failsafe high/low relay contact output, suitable for alarming and/or simple pump or motor control. If the self-diagnostics-tests detect a critical fault, the relay switches to a predefined state: On, Off or Ignore. Data processing is postponed until the error is cleared.

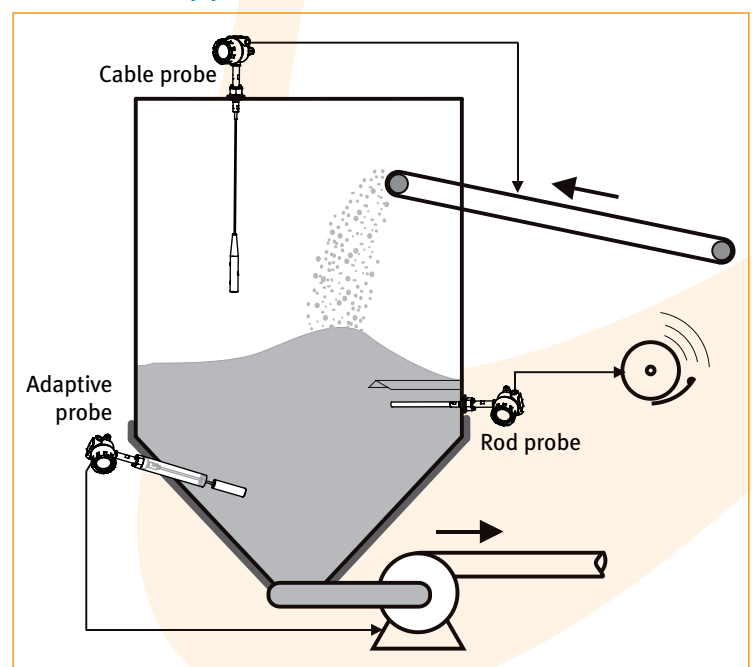
EEPROM Memory

The LDS 300 contains EEPROM (flash) memory that does not lose its data upon power loss. All configuration settings remain stored in case of a power failure or deactivation of the unit (e.g. during transport or storage).

Materials Used

All product exposed components of the LDS 300 are made of AISI 316L stainless steel with exception of the PTFE insulator in the Probe Connection. Adaptive probes may be equipped with a PEEK spacer. The LDS 300 enclosure contains of coated aluminum with a glass window and plastic or stainless steel (option) cable glands.

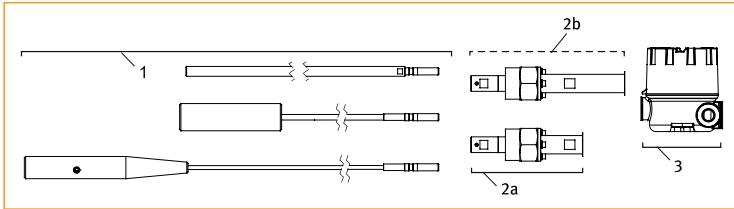
Overview application LDS 300



LDS 300 Components

Graphic overview

- 1 Probe;
- 2a Process Connection;
- 2b Thermal Part (optional);
- 3 Enclosure with Control Display Unit (CDU) and Power Interface Module (PIM).



Probe

The LDS 300 can be supplied with a wide range of probes, in design varying from standard rod probes, projected probes and length adjustable cable probes.

Physical contact with the product is not always required to trigger the switch, the sensor can also switch on proximity.

The probes used for the LDS 300 have no on-board electronics; probe temperatures can vary between -40°C / -40°F to 200°C / 392°F . The heavy duty and plain stainless steel construction of the probes make them highly resistive to pressurized, abrasive, hot, cold and corrosive bulk material.

The following probe types are currently supported by the LDS 300:

- Cable probes are recommended for point level measurement from roof or ceiling mounted locations in heavy, high friction, bulk solids. The length of the cable can be shortened to achieve the desired length.
- Rod probes are recommended for point level measurement of light, low friction, bulk solids, directly behind the vessel wall.
- Adaptive probes replace rod probes where probing must be located away from the outer wall. Adaptive probes are designed for constructions containing insulated, jacketed or double walls and/or coned surfaces.

Rod and adaptive probes excel in level detection with a relatively narrow switching hysteresis; cable probes excel in level detection with a relatively wide switching hysteresis.

Process Connection

The LDS 300 Process Connection has a 1,5" tapered BSPT thread to install the probe gas tight in a threaded boss, welded on the processing vessel. The Process Connection contains an electrostatic discharge unit to lead excessive static charges away from the probe. It also houses an FTC based Probe Processor which continuously samples –and performs diagnostics on– the probe.

The diagnostic results and a count value, representing a measure for the actual level, are continuously uploaded as data to the Control Display Unit. The Process Connection further allows rotation of the enclosure in an optimal operating position of the LDS 300.

The Process Connection is highly resistive to chemical ingress and can resist forces up to 900kg (1984 lbs) and process temperatures up to 80°C (176°F).

Thermal Part (optional)

The Thermal Parts main function is to vent process heat transferred by the probe and Probe Connection to free air, protecting the LDS 300 electronics from overheating.

The maximum process temperature at the Thermal Part is 200°C (392°F).

Enclosure with Control Display Unit (CDU) and Power Interface Module (PIM)

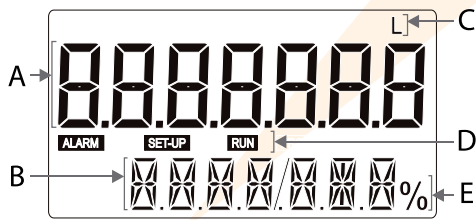
The LDS enclosure contains a Control Display Unit –a programmable micro controller unit with display and keypad, and a Power Interface Module –capable of drawing power from practically any power source. The Power Interface Module further provides a failsafe relay contact, suitable for alarming and/or simple pump or motor control. The Control Display Unit processes the digital information from the Probe Processor in the Thermal Part. It has an LCD display with highly transfective coating and an intuitive and large 7 digit numeric / bar graph display, a 7 digit alphanumeric display, various indicators and backlight. The unit is operated via a two button keypad, providing various operator functions, diagnostic information and configuration options.

Display

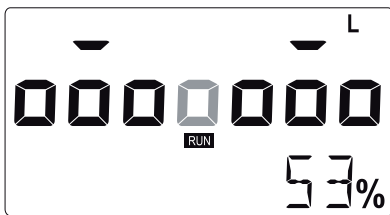
General

The LDS 300 has an intuitive LCD display with seven large numeric digits –also used as bar graph segments, seven alphanumeric digits, various indicators and backlight.

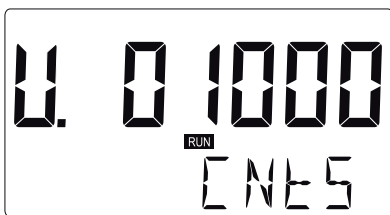
- A Combined bargraph and numerical display.
- B Alphanumerical display.
- C “Relay on” indicator.
- D Operate status indicators.
- E Units.



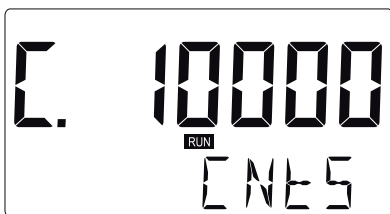
Bargraph display



Probe setpoint uncovered display



Probe setpoint covered display.

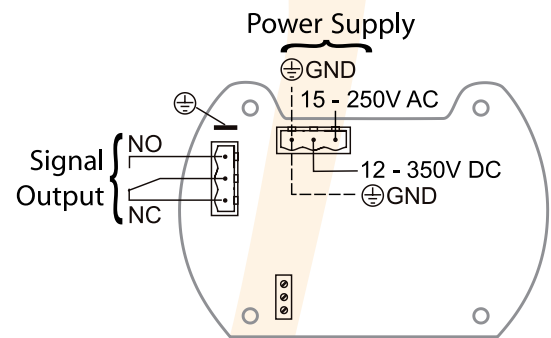


Terminal connections

General

The Power Interface Module inside the enclosure has one small 3-pin Control Display Unit connector, two large 3-pin field wiring connectors for power supply and alarm output signal and a flat bedded ground pin. The ground pin and the Control Display Unit connector are already wired. The two field wire connectors are key coded and cannot be exchanged.

Wiring details overview



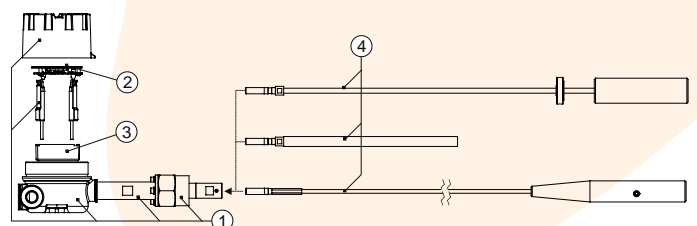
Spare parts

General

For the LDS 300 are the following spare parts available:

- 1a Assembly of LDS enclosure with retainer clips, cover gasket and Process Connection with integrated Probe Processor.
- 1b Assembly of LDS enclosure with retainer clips, cover gasket, **Thermal Part** with integrated Probe Processor.
- 2 Control Display Unit.
- 3 Power Interface Module.
- 4 Probe (various types available).
- 5 Small items: cover gasket, cable glands, cable conduit plugs, retainer clips, etc.

Spare parts overview

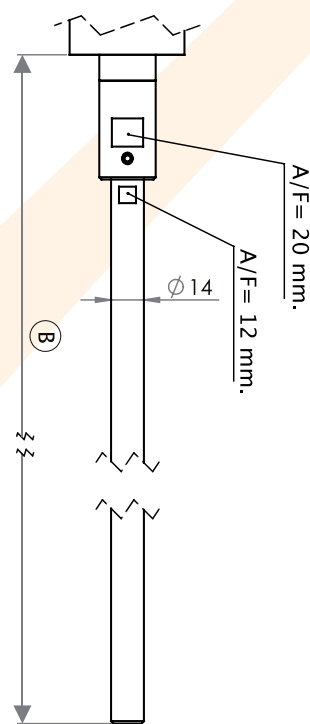
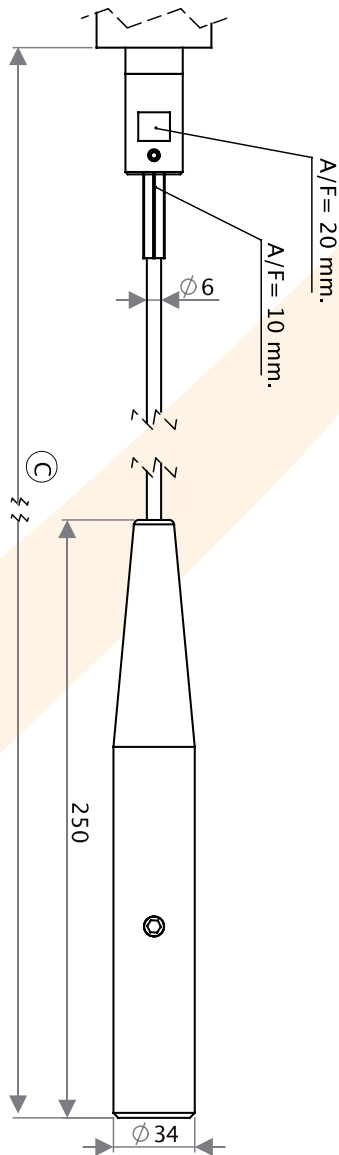
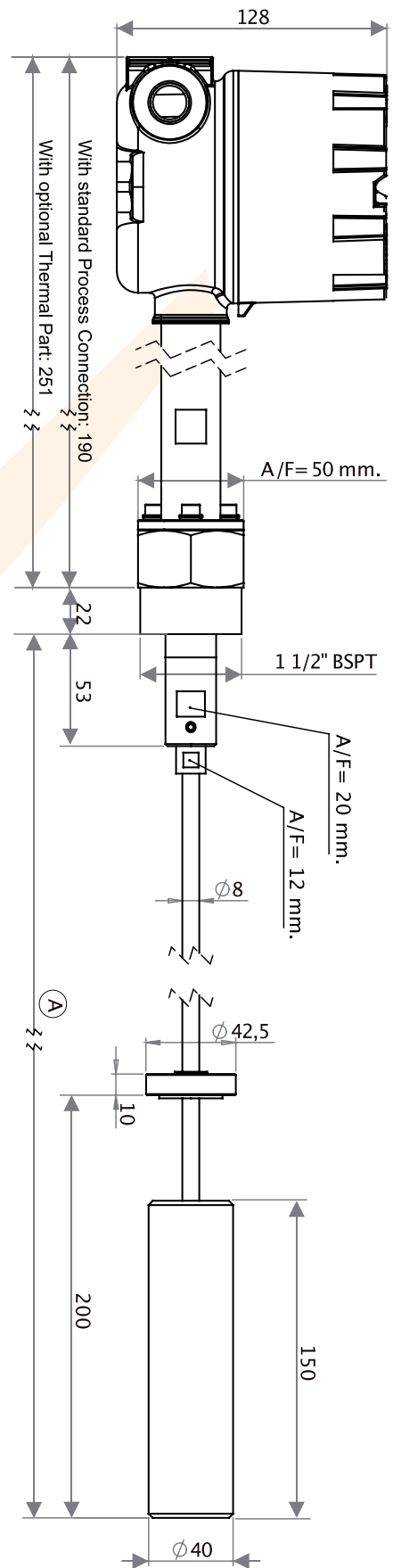
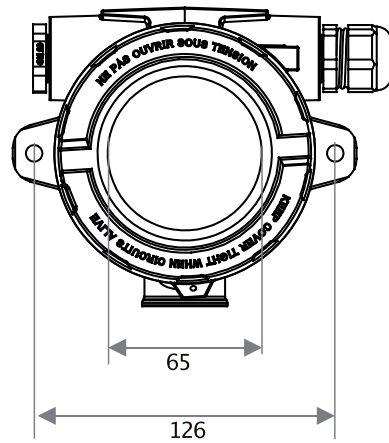


Mechanical dimensions LDS 300 (in mm)

A - Adaptive probe, length:
713mm or custom length
< 500 or > 1000mm.

B - Rod probe, length:
300mm, 600mm, 1000mm.

C - Cable probe, length:
3000mm, 6000mm.



Technical specification

Mechanical

LDS 300 enclosure

| | |
|---------------------|--|
| Cover | IP67 screw on/off cover with rubber gasket and glass window. |
| Cover locking screw | 2mm Allen screw. |
| Earth terminal | 4.0mm ² (AWG 11) stranded or 6mm ² (AWG 10) solid wire. |
| Cable glands | 2 pcs. M20 x 1.5mm IP67 cable glands and one IP67 plug. Stainless steel cable glands optionally available. |
| Connection | Fixed connection to Process Connection. |
| Weight | Approx. 2.55 kg (5.62 lbs) (incl. Process Connection). |

Process connection

| | |
|------------------------|---|
| Operating temperature. | -40°C to +80°C (-40 °F to +176°F). |
| Connection thread | 1 ¹ / ₂ inch BSPT thread with 50mm nut. |
| Wetted material | 316L stainless steel and PTFE (insulator). |
| Weight | Approx. 2.55 kg (5.62 lbs) (incl. LDS 300 enclosure). |

Thermal part (optional)

| | |
|-----------------------|---|
| Function | Venting the process heat transferred by the probe and the Probe Connection to free air. |
| Operating temperature | -40°C to +200°C (-40°F to +392°F). |
| Cooling system | Free air flow. |
| Weight | Approx. 2.7 kg (5.73 lbs) (incl. LDS 300 enclosure and Process Connection). |

Probes

Adaptive probe

| | |
|---------------------|---|
| Material | 316L Stainless steel rod with cylindrical antenna and spacer, mounted on Process Connection - for adaptive probing and installation in protective tubing. |
| Spacer material | PEEK. |
| Probe length | 713mm and custom length < 500 or > 1000mm. |
| Min. temp. | -40°C (-40°F). |
| Maximum temperature | 80°C (176°F) at Process Connection. 200°C (392°F) at Process Connection with a Thermal Part (option B). |
| Weight | Approx. 1.8 kg (3.97 lbs). |

Rod probe

| | |
|---------------------|--|
| Material | 316L Stainless steel rod, mounted on Process Connection - for vertical or horizontal installation with protective shielding. |
| Probe length | 300mm, 600mm, 1000mm. |
| Min. temp. | -40°C (-40°F). |
| Maximum temperature | 80°C (176°F) at Process Connection. 200°C (392°F) at Process Connection with a Thermal Part (option B). |
| Weight | 300mm - Approx. 0.325 kg (0.72 lbs). 600mm - Approx. 0.690 kg (1.52 lbs). 1000mm - Approx. 1.180 kg (2.60 lbs). |

Cable probe

| | |
|------------------------|---|
| Material | Weight suspending from Ø 6mm (0.236 inch) braided stainless steel cable, mounted on Process Connection - for suspended (vertical) installation. |
| Tensile load | Max. 900kg / 1984 lbs. |
| Probe length | 3000mm, 6000mm. The length of the cable can be shortened to achieve the desired length. |
| Min. temp. | -40°C (-40°F). |
| Maximum temperature | 80°C (176°F) at Process Connection. 200°C (392°F) at Process Connection with a Thermal part (option B). |
| Weight (Braided cable) | Approx. 180 gr/m (0.12 lbs/ft). |
| Weight (Cable weight) | approx. 1.4 kg (3 lbs). |

Electrical

Power supply

| | |
|-------------------|------------------------------------|
| Type | Universal switching power supply. |
| Power consumption | < 2VA. |
| Range DC | 12 - 350V DC, polarity reversible. |
| Range AC | 15 - 250V AC @40 - 400Hz |

Relay contact

| | |
|---------------------|-----------------------------------|
| Type | Single pole, double throw (SPDT). |
| Contact rating DC | 5A @ 30V DC resistive. |
| Contact rating AC | 8A @ 250V AC resistive. |
| Max switching power | 150W / 2000VA. |

Field cable connector

| | |
|-------|---|
| Type | 3 pole horizontal cable entry plug. |
| Pitch | 7.62mm. |
| Wire | Stranded: 0.2 - 3mm ² (24-12 AWG). Strip length: 6 - 7mm (0.24 - 0.27inch). |

Control Display Unit

| | |
|--------------------|--|
| Function main unit | Responsible for processing data and driving display and relay. |
| Memory type | Non volatile flash EEPROM. |
| Self diagnoses | Memory, communication to probe processor, operating temperature. |

Probe Processor

| | |
|-----------------------------|---|
| Function | Responsible for sensing probe conform FTC principle. |
| Memory type | Non volatile flash EEPROM. |
| Self diagnoses | Probe Processor memory, probe response. |
| immunity to RF interference | 80MHz - 1GHz: 10V/m; 1.4GHz - 2.0GHz: 3V/m; (EN61000-4-3 2006) 2.0GHz - 2.7GHz: 1V/m. |

Critical self diagnostic tests

| | |
|----------------|---|
| Error handling | Testing is continuous. If the diagnostics detect a critical fault, the relay switches to a predefined state, and data processing is postponed until the error is cleared. |
|----------------|---|

Interface

Display

| | |
|------------------|---|
| Type | High intensity numeric and alphanumeric LCD, UV resistant. |
| Digits | Seven numeric 12mm (0.47 inch) and seven alphanumeric 7mm (0.3 inch). Various symbols and measuring units. |
| Backlight | White LED with configurable brightness. |
| Update frequency | Once per second, eight times per second during 20 seconds when key pressed. |

Keypad

| | |
|--------|---|
| Type | Two industrial micro switches behind UV-resistant foil. |
| Access | Remove cover for keypad access. |

Environmental

Environmental

| | |
|------------------------|--|
| Operating temperature. | -40°C (-40 °F) to +80°C (+176°F). |
| Altitude | Max. 2000m (6562 ft). |
| Relative humidity | 95% non condensing with cover closed. |
| Caution | Condensation on the probe may impact the measurement. |

Approvals and Compliances

Approvals

| | |
|-------------------|------------------|
| Standard approval | CE, FCC Part 15. |
|-------------------|------------------|

Compliances

| | |
|----------------------------------|---|
| 2006/95/EC Low Voltage Directive | EN61010-1; |
| 2004/108/EC EMC Directive | EN61000 parts 3-2, 3-3, 4-2 to 4-6, 4-8, 4-11. EN61000 parts 3-2 and 3-3; EN61326-1 |

Options

Thermal part (option B)

| | |
|-----------------------|---|
| Function | Venting the process heat transferred by the probe and the Probe Connection to free air. |
| Operating temperature | -40°C to +200°C (-40°F to +392°F). |
| Cooling system | Free air flow. |
| Weight | Approx. 2.7 kg (5.73 lbs) (incl. LDS 300 enclosure and Process Connection). |

Acceptance test (option C)

| | |
|-------------|--|
| Certificate | Certificate B to DIN 50049 section 3.1 and EN 10204. Statement of compliance with the order by Fluidwell Instruments with results of 'batch tested' material inspection. |
|-------------|--|

Ordering information

| Model | Ordering Code | Description |
|--------------------|---------------|--|
| LDS 300 | | Presense LDS 300 - Level detection sensor. |
| Probe types | C30 | Weighted cable probe; length 3000mm. Cable can be shortened to achieve desired length. |
| | C60 | Weighted cable probe; length 6000mm. Cable can be shortened to achieve desired length. |
| | R03 | Rod probe; length 300mm. |
| | R06 | Rod probe; length 600mm. |
| | R10 | Rod probe; length 1000mm. |
| | A07 | Adaptive probe; length 713mm. |
| | A99 | Adaptive probe; custom length < 500 or > 1000mm. |
| Probe insulation | o | Not insulated. |
| Process connection | Bo6 | BSPT thread 1½ inch. |
| Approvals | o | General purpose. |
| Options | A | No options. |
| | B | Thermal part. |
| | C | Acceptance test certificate B to DIN 50049 section 3.1 and EN 10204. |



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