

Ultrasonic Level Measurement *prosonic T FTU 230, FTU 231*

**Compact transmitter
for non-contact limit detection
in liquids and solids**



Applications

Prosonic T is a compact ultrasonic transmitter for non-contact level detection in applications such as conveyor belt delivery point monitoring, pump control, two-point control and distance measurement. With freely adjustable switching ranges from 0.25 m (0.8 ft) upwards, Prosonic T can also measure short distances.

- FTU 230
in coarse-grained solids (grain size from 4 mm/0.16 in) up to 2 m/6.6 ft
in liquids up to 5 m/16.4 ft
- FTU 231
in coarse-grained solids (grain size from 4 mm/0.16 in) up to 3.5 m/11.5 ft
in liquids up to 8 m/26.2 ft

Features and Benefits

- Simple local pushbutton operation, with optional display
- Fully rotatable housing
- LEDs visible through housing cover allow quick monitoring of operational status
- Threaded connections from G 1¹/₂ or 1¹/₂ NPT
- Integrated temperature sensor for time-of-flight compensation
- Powered direct from mains with potential-free relay contact output

Endress + Hauser

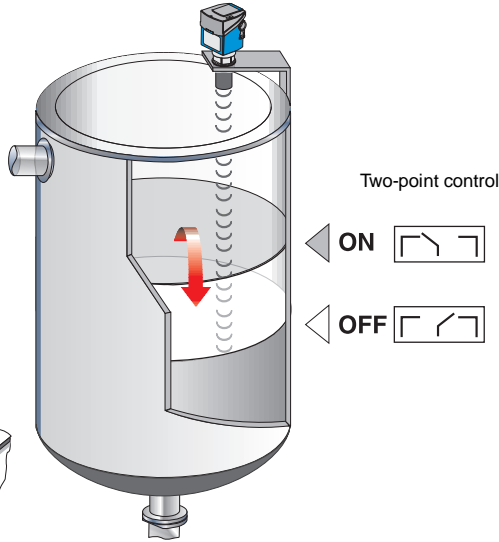
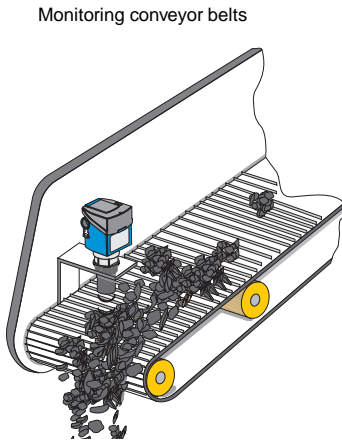
The Power of Know How



Measuring System

Application Examples:

- Monitoring conveyor belts and belt delivery points
- Distance measurement
- Two-point pump control



The compact ultrasonic transmitter Prosonic T is a complete measuring point which can be calibrated and operated on-site without the need for additional equipment.

Installation

- Always mount the sensor such that the distance between it and the maximum product level exceeds the blocking distance.
- Never mount two Prosonic T in a vessel because the instruments may not function correctly.
- Do not mount the sensor in the centre of the vessel roof.
- Position the sensor at right angles to the surface of the material.
- Do not measure through the filling curtain.

Blocking Distance

Due to the ringing time of the sensor, there is a zone immediately below the sensor in which returning echoes cannot be detected. This so-called blocking distance determines the minimum distance between the sensor and the maximum product level.

Mounting on a Nozzle

The sensor must be mounted on a nozzle when the maximum level comes within the blocking distance.

- No build-up material should form in the nozzle.
- The inner surface of the nozzle should be as smooth as possible (no edges or welding seams).

Mounting examples

Mounting on a Nozzle

The recommend nozzle dimensions are limits, within which the nozzle can vary. Check that the nozzle diameter is large enough, but keep the nozzle length to a minimum.

Mounting with welded sleeve

Mounting with counter nut

Mounting on a nozzle

Dimensions without Display
 $D_{\text{fit}} = 100 \text{ mm (3.9 in)}$
 $L_{\text{fit}} = 150 \text{ mm (5.9 in)}$

Dimensions with Display

| Sensor FTU | D mm (in) | max. L mm (in) |
|------------|-----------|----------------|
| 230 | 50 (2) | 150 (5.9) |
| 230 | 80 (3.1) | 240 (9.4) |
| 230 | 100 (3.9) | 380 (15) |
| 231 | 80 (3.1) | 240 (9.4) |
| 231 | 100 (3.9) | 380 (15) |

Operation

Operation via Display

The plug-in display allows access to the Endress+Hauser operating matrix. With only a few settings

- selection of application parameter
- assignment of relay switch points the device is ready to measure.

Operation without Display

The basic functions of the Prosonic T can be set by using just the four pushbuttons $-$, $+$, V , H on the front panel of the instrument.

- Setting relay switch points,
- Parameter protection by entry locking.

The device is operated by means of the four pushbuttons on the front panel of the instrument.

$-$ $+$ V H

Matrix operation via display

| | | | | | |
|----|----|----|----|----|----|
| | H0 | H1 | H2 | H3 | H4 |
| V0 | | | | | |
| V1 | | | | | |
| V2 | | | | | |
| V3 | | | | | |
| V4 | | | | | |

V H

H \rightarrow

OR

1 Matrix operation via display

2 Calibration without display

Status indication also visible with closed housing cover

$-$ $+$ V H

Reset:

Switch-on point:

Switch-off point:

Lock parameters:

Unlock parameters:

Technical Data

General Information

Function

Operation and System Design

Input Variables

Output Variables

Relay

Measuring Accuracy

Application Conditions

¹⁾ Please check with Endress+Hauser before using transmitters at higher temperatures and pressures.

When transmitters are subjected to high temperatures and pressures (with limiting conditions), it is recommended that the coupling (process connection) be tightened.

Mechanical Construction

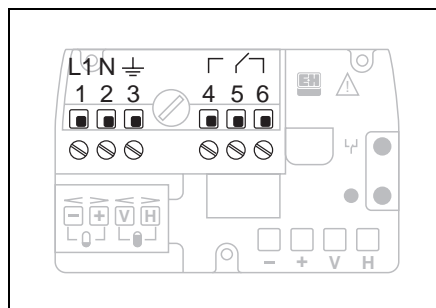
Display and Operating Elements

Power Supply

Supplementary Documentation

Electrical Connection

| | |
|--|--|
| Manufacturer | Endress+Hauser |
| Instrument designation | Prosonic T |
| Others | CE mark |
| Non-contact limit detection in liquids and coarse-grained bulk solids | |
| Measuring principle | Ultrasonic level measurement, time-of-flight measurement |
| Modularity | Compact ultrasonic sensor, with optional display |
| Signal transmission | Relay |
| Measured variable | Limit, determined from distance between the transmitter and material |
| Measuring range | FTU 230: 0.25...5 m (0.8...16.4 ft) FTU 231: 0.4...8 m (1.3...26.2 ft) |
| Blocking distance | FTU 230: 0.25 m (0.8 ft) FTU 231: 0.4 m (1.3 ft) |
| Frequency | FTU 230: approx. 70 kHz FTU 231: approx. 50 kHz |
| Pulse frequency | 0.5...3 Hz, depending on sensor |
| Delay time | approx. 1 s |
| Version | Single-pole changeover contact, potential-free for limit detection |
| Switching capacity | 5 A; 250 V _{AC} ; 100 V _{DC} ; 600 VA at cos φ=1, 300 VA at cos φ=0.7 |
| Fail-safe mode | Min., max. and hold; Default: The relay is de-energised, when the echo is lost |
| Switching time | 1...255 s |
| Hysteresis | Adjustable 0...100% |
| Reference conditions | Ideal reflection from calm, flat surface at 20°C (68°F) |
| Measuring uncertainty | 0.25% for maximum measuring span |
| Resolution | 2 mm (0.08 in) |
| Orientation | Vertical to the surface of the product, not mounted centrally in the vessel |
| Medium temperature range ¹⁾ | -40...+80°C (-40...+176°F) (built-in temperature sensor) |
| Operating temperature range (electronics) | -20...+60°C (-4...+140°F) |
| Storage temperature range | -40...+80 °C (-40...+176°F) |
| Operating pressure p _{abs.} ¹⁾ | 3 bar (43.5 psi) |
| Climatic class | DIN / IEC 68 T2-30 Db |
| Type of protection (EN 60529) | IP 67(NEMA 6), with housing cover open IP 20 |
| Vibration resistance | DIN IEC 68 T2-6 Tab.2.C (10...55 Hz) |
| Electromagnetic compatibility | Interference emission to EN 61326, Electrical Equipment Class B Interference immunity to EN 61326, Annex A (Industrial) and NAMUR Recommendation NE 21 (EMC) |
| Certificates | Standard |
| Design | Compact instrument, installed with box spanner 60 AF max. torque: 15...20 Nm (11.1...14.8 ft lbs) |
| Dimensions | See »Dimensions« page 4 |
| Material | Housing: PBT (fibre-glass reinforced, flame-retarded) Threaded boss and sensor: PVDF |
| Seals | Internal between threaded boss and sensor: EPDM seal External on the threaded boss: EPDM seal |
| Process connection | FTU 230: Thread G 1 ¹ / ₂ or 1 ¹ / ₂ - 11.5 NPT FTU 231: Thread G 2 or 2 - 11.5 NPT |
| Cable entry | Pg 16, cable diameter 5...9 mm (0.2...0.35 in) Sleeves for connection thread G ¹ / ₂ and ¹ / ₂ NPT M 20x1.5 available |
| Cable | Standard installation cable |
| Display (LCD) | 4 character display Dimensions: L x B x H: 40 x 20 x 10 mm (1.6 x 0.8 x 0.4 in) |
| LEDs (visible from outside) | Red: indicates fault and switching status of relay Green: Indicates power on and entry acknowledgement |
| AC voltage | 180...250 V _{AC} ; 90...127 V _{AC} |
| Power consumption | < 4 VA |
| Switch-on current | 100 mA, pulse width half life time 70 ms |
| Electrical isolation | Isolation between evaluation electronics and power supply terminals |
| - Prosonic T System Information SI 021F/00/en - Prosonic T Compact transmitter for continuous, non-contact level measurement Technical Information TI 246F/00/en | |



- FTU 230, FTU 231
- 4-wire
 - Separate power supply
230 V_{AC} and 115 V_{AC}

Dimensions

Dimensions Prosonic T

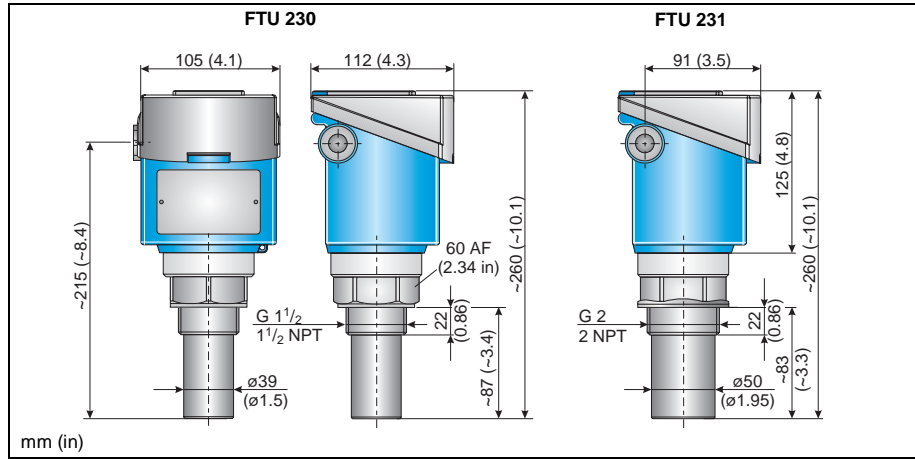
Threaded versions

- left: FTU 230: G 1 1/2 or 1 1/2 NPT
- right: FTU 231: G 2 or 2 NPT

Cable entry:

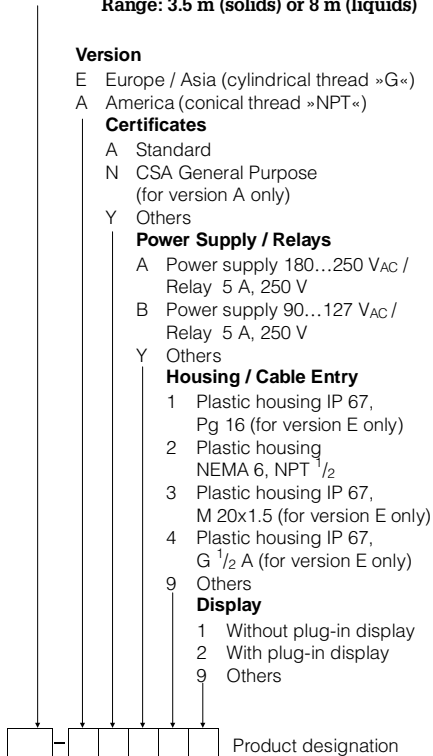
- Pg 16, cable diameter 5... 9 mm sleeves for connecting threads G 1/2; 1/2 NPT; M 20x1.5 supplied

When mounting in tapped holes to DIN 3852 Part 2, check that the recess diameter d_4 is »wide«.



Product Structure

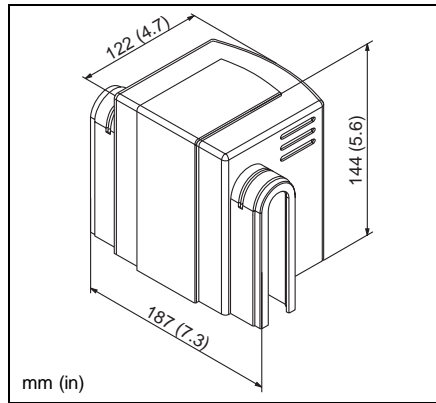
- FTU 230: Thread (G 1 1/2 or 1 1/2 NPT)**
Range: 2 m (solids) or 5 m (liquids)
- FTU 231: Thread (G 2 or 2 NPT)**
Range: 3.5 m (solids) or 8 m (liquids)



Accessories

Protective Hood for Electronic Housing

- Order No.: 942665-0000



Display

- Order No.: 942663-0000

Adapter Flange FAU 70 E

- Order No.: 942636-XXXX

Process Connection

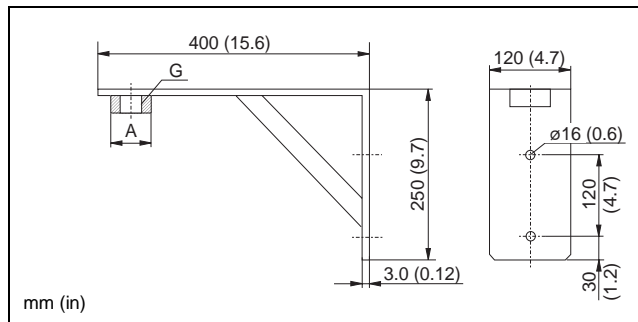
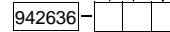
- 12 DN 50 PN 16
- 14 DN 80 PN 16
- 15 DN 100 PN 16

Sensor Connection

- 3 G 1 1/2 ISO 228
- 4 G 2 ISO 228

Material

- 2 1.4435 (AISI 316L)
- 7 PPs (Polypropylene)



Mounting Bracket

- G 1 1/2:
A=55 mm (2.2 in)
Order No.: 942669-0000
- G 2:
A=66 mm (2.6 in)
Order No.: 942669-0001
- Material: 1.4301 (AISI 304)

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The Power of Know How

