

# 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 1<sup>1</sup>/<sub>2</sub> or 1<sup>1</sup>/<sub>2</sub> NPT
- Integrated temperature sensor for time-of-flight compensation
- Powered direct from mains with potential-free relay contact output

**Endress + Hauser**

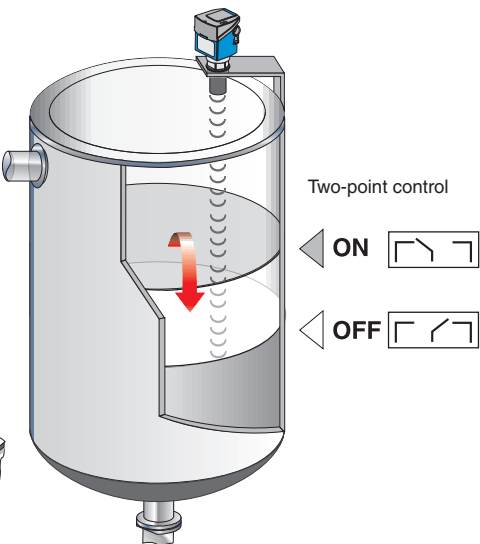
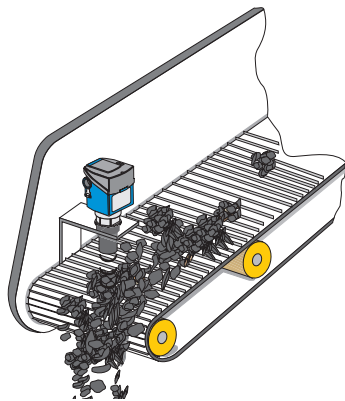
The Power of Know How



# Measuring System

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

Monitoring conveyor belts



## 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.

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.

## 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<sub>min</sub> = 100 mm (3.9 in)  
L<sub>max</sub> = 150 mm (5.9 in)

**Dimensions with Display**

| Sensor | D<br>mm (in) | max. L<br>mm (in) |
|--------|--------------|-------------------|
| FTU    |              |                   |
| 230    | 50 (2)       | 80 (3.1)          |
| 230    | 80 (3.1)     | 240 (9.4)         |
| 230    | 100 (3.9)    | 300 (11.8)        |
| 231    | 80 (3.1)     | 240 (9.4)         |
| 231    | 100 (3.9)    | 300 (11.8)        |

# 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. Functions:

- 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.

1 Matrix operation via display

OR

2 Calibration without display

Status indication also visible with closed housing cover

# Technical Data

## General Information

### Function

### Operation and System Design

### Input Variables

### Output Variables

Relay

### Measuring Accuracy

### Application Conditions

<sup>1)</sup> 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.

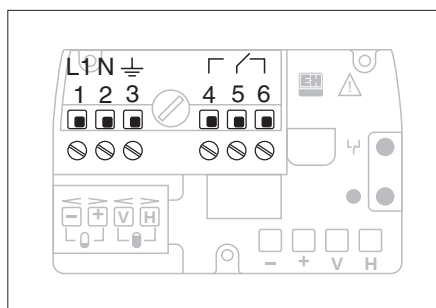
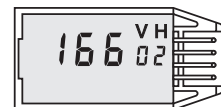
### Mechanical Construction

### Display and Operating Elements

### Power Supply

### Supplementary Documentation

|                                                                                                                                                                        |                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 <sub>AC</sub> , 100 V <sub>DC</sub> ; 600 VA at cos φ=1, 300 VA at cos φ=0.7                                                                            |
| Fail-safe mode                                                                                                                                                         | Min., max. and hold;<br>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 <sup>1)</sup>                                                                                                                                 | -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 <sub>abs.</sub> <sup>1)</sup>                                                                                                                     | 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<br>Interference immunity to EN 61326, Annex A (Industrial)<br>and NAMUR Recommendation NE 21 (EMC) |
| Certificates                                                                                                                                                           | Standard                                                                                                                                                           |
| Design                                                                                                                                                                 | Compact instrument, installed with box spanner 60 AF<br>max. torque: 15...20 Nm (11.1...14.8 ft lbs)                                                               |
| Dimensions                                                                                                                                                             | See »Dimensions« page 4                                                                                                                                            |
| Material                                                                                                                                                               | Housing: PBT (fibre-glass reinforced, flame-retarded)<br>Threaded boss and sensor: PVDF                                                                            |
| Seals                                                                                                                                                                  | Internal between threaded boss and sensor: EPDM seal<br>External on the threaded boss: EPDM seal                                                                   |
| Process connection                                                                                                                                                     | FTU 230: Thread G 1 1/2 or 1 1/2 - 11.5 NPT<br>FTU 231: Thread G 2 or 2 - 11.5 NPT                                                                                 |
| Cable entry                                                                                                                                                            | Pg 16, cable diameter 5...9 mm (0.2...0.35 in)<br>Sleeves for connection thread G 1/2 and 1 1/2 NPT M 20x1.5 available                                             |
| Cable                                                                                                                                                                  | Standard installation cable                                                                                                                                        |
| Display (LCD)                                                                                                                                                          | 4 character display<br>Dimensions: L x B x H:<br>40 x 20 x 10 mm<br>(1.6 x 0.8 x 0.4 in)                                                                           |
| LEDs<br>(visible from outside)                                                                                                                                         | Red: indicates fault and switching status of relay<br>Green: Indicates power on and entry acknowledgement                                                          |
| AC voltage                                                                                                                                                             | 180...250 V <sub>AC</sub> ; 90...127 V <sub>AC</sub>                                                                                                               |
| 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<br>- Prosonic T Compact transmitter for continuous, non-contact level measurement<br>Technical Information TI 246F/00/en |                                                                                                                                                                    |



- FTU 230, FTU 231
- 4-wire
  - Separate power supply  
230 V<sub>AC</sub> and 115 V<sub>AC</sub>

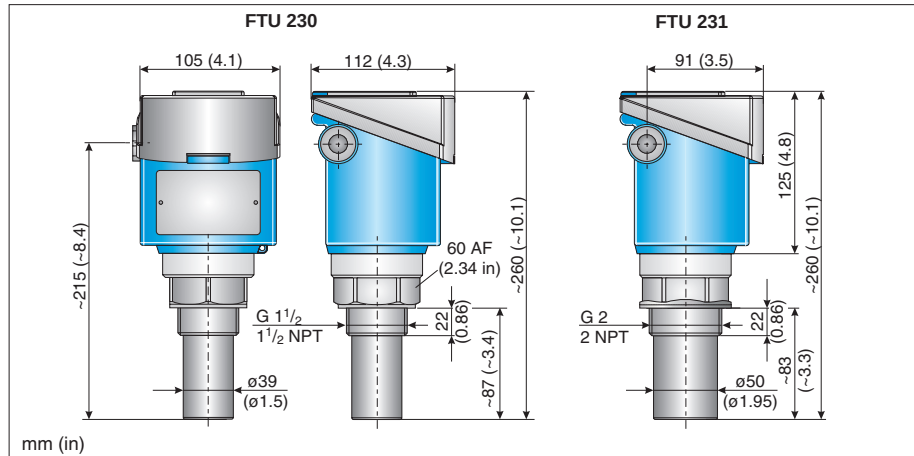
# Dimensions

## 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 1/2 NPT;  
M 20x1.5 supplied

When mounting in tapped holes to DIN 3852 Part 2, check that the recess diameter d<sub>4</sub> 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)**

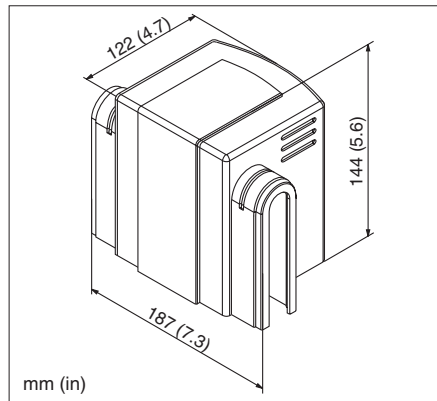
| Version               |                                                           |
|-----------------------|-----------------------------------------------------------|
| E                     | Europe / Asia (cylindrical thread »G«)                    |
| A                     | America (conical thread »NPT«)                            |
| Certificates          |                                                           |
| A                     | Standard                                                  |
| N                     | CSA General Purpose (for version A only)                  |
| Y                     | Others                                                    |
| Power Supply / Relays |                                                           |
| A                     | Power supply 180...250 V <sub>AC</sub> / Relay 5 A, 250 V |
| B                     | Power supply 90...127 V <sub>AC</sub> / Relay 5 A, 250 V  |
| Y                     | Others                                                    |
| Housing / Cable Entry |                                                           |
| 1                     | Plastic housing IP 67, Pg 16 (for version E only)         |
| 2                     | Plastic housing NEMA 6, NPT 1 1/2                         |
| 3                     | Plastic housing IP 67, M 20x1.5 (for version E only)      |
| 4                     | Plastic housing IP 67, G 1 1/2 A (for version E only)     |
| 9                     | Others                                                    |
| Display               |                                                           |
| 1                     | Without plug-in display                                   |
| 2                     | With plug-in display                                      |
| 9                     | Others                                                    |

Product designation

# Accessories

## Protective Hood for Electronic Housing

- Order No.: 942665-0000



## Display

- Order No.: 942663-0000

## Adapter Flange FAU 70 E/A

- Order No.: 942636-XXXX

### Process connection

#### FAU 70 E

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

#### FAU 70 A

- 22 ANSI 2" 150psi
- 24 ANSI 3" 150 psi
- 25 ANSI 4" 150 psi

### Sensor connection

#### FAU 70 E

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

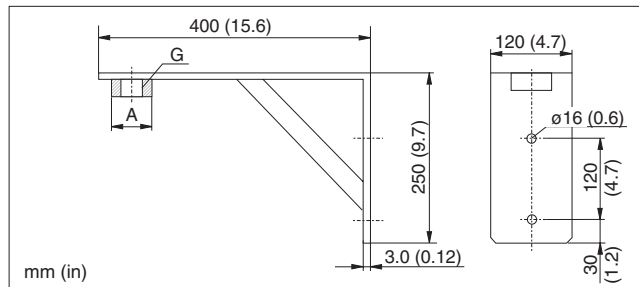
#### FAU 70 A

- 5 NPT 1 1/2 - 11,5
- 6 NPT 2 - 11,5

### Material

- 2 1.4435 (ANSI 3164)
- 7 PPs (Polypropylene)

|           |  |  |
|-----------|--|--|
| FAU 70 E- |  |  |
| FAU 70 A- |  |  |



## 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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