Technical
Information
TI 247F/00/en

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

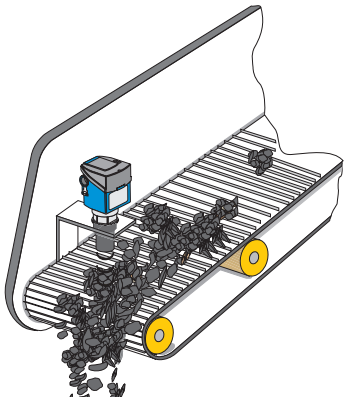
- Simple local pushbutton operation, with optional display
- Fully rotatable housing
- LEDs visible through housing cover allow quick monitoring of operational status
- Threaded connections from G $1^1/_2$ or $1^1/_2$ NPT
- Integrated temperature sensor for time-of-flight compensation
- Powered direct from mains with potential-free relay contact output

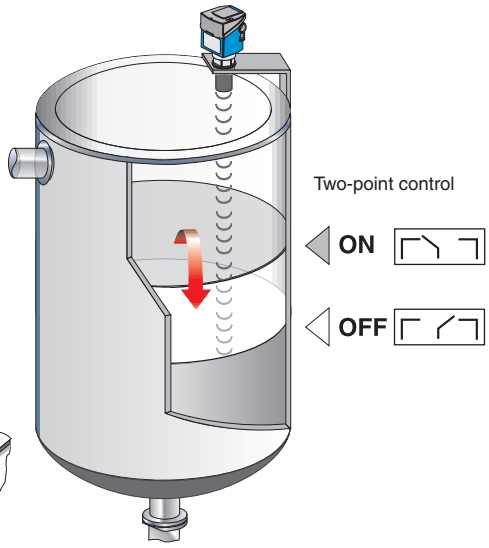
Endress+Hauser
The Power of Know How

Measuring System

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

Monitoring conveyor belts





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.

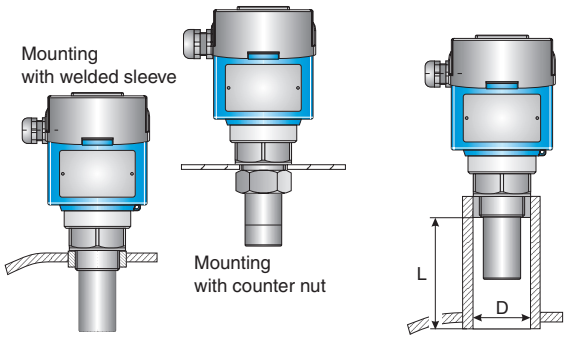
Installation
- Always mount the sensor such that the distance between it and the maximum product level exceeds the blocking distance.
- Never mount two Prosonic T in a vessel because the instruments may not function correctly.
- Do not mount the sensor in the centre of the vessel roof.
- Position the 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 on a nozzle

Dimensions without Display
D_{min} = 100 mm (3.9 in)
L_{max} = 150 mm (5.9 in)

Dimensions with Display

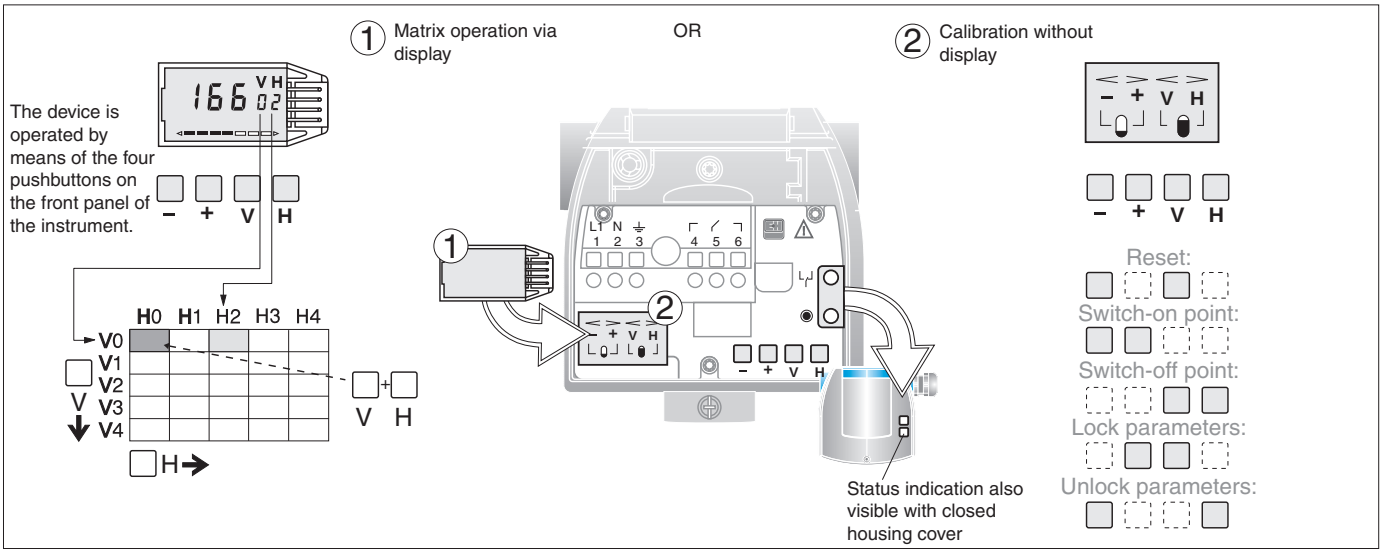
Sensor FTU	D mm (in)	max. L mm (in)
230	50 (2)	80 (3.1)
230	80 (3.1)	240 (9.4)
230	100 (3.9)	300 (11.8)
231	80 (3.1)	240 (9.4)
231	100 (3.9)	300 (11.8)

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.



Technical Data

General Information

Manufacturer	Endress+Hauser
Instrument designation	Prosonic T
Others	CE mark

Function

Non-contact limit detection in liquids and coarse-grained bulk solids

Operation and System Design

Measuring principle	Ultrasonic level measurement, time-of-flight measurement
Modularity	Compact ultrasonic sensor, with optional display
Signal transmission	Relay

Input Variables

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	

Output Variables

Relay

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%

Measuring Accuracy

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)

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.

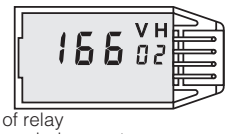
Orientation	Vertical to the surface of the product, not mounted centrally in the vessel
Medium temperature range [1]	–40…+80°C (–40…+176°F) (built-in temperature sensor)
Operating temperature range (electronics)	–20…+60°C (–4…+140°F)
Storage temperature range	–40…+80 °C (–40…+176°F)
Operating pressure $p_{abs.}$ [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

Mechanical Construction

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 and Operating Elements

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



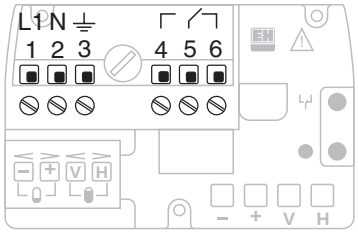
Power Supply

AC voltage Power consumption Switch-on current	180…250 V_{AC}; 90…127 V_{AC} < 4 VA 100 mA, pulse width half life time 70 ms
Electrical isolation	Isolation between evaluation electronics and power supply terminals

Supplementary Documentation

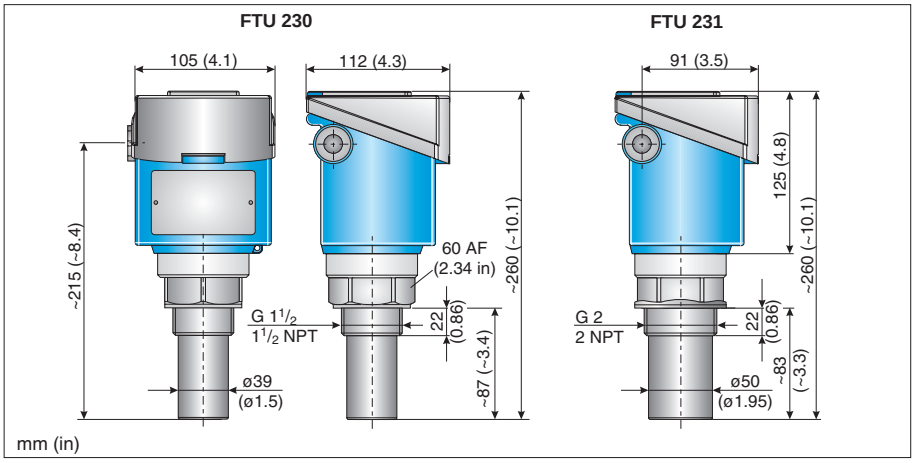
– Prosonic T System Information SI 021F/00/en
– Prosonic T Compact transmitter for continuous, non-contact level measurement Technical Information TI 246F/00/en

Electrical Connection



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 recese diameter d_4 is »wide«.

Product Structure

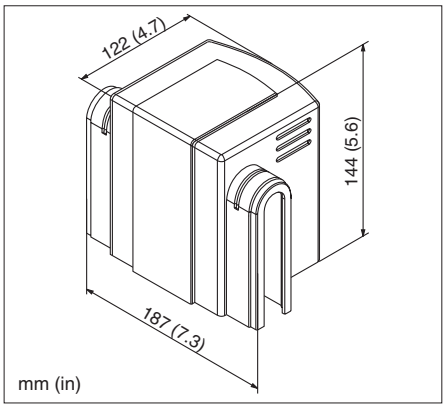
FTU 230: Thread (G $1^1/_2$ or $1^1/_2$ NPT)
Range: 2 m (solids) or 5 m (liquids)
FTU 231: Thread (G 2 or 2 NPT)
Range: 3.5 m (solids) or 8 m (liquids)

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_{AC} / Relay 5 A, 250 V
B Power supply 90…127 V_{AC} / 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 $^1/_2$
3 Plastic housing IP 67, M 20x1.5 (for version E only)
4 Plastic housing IP 67, G $^1/_2$ 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

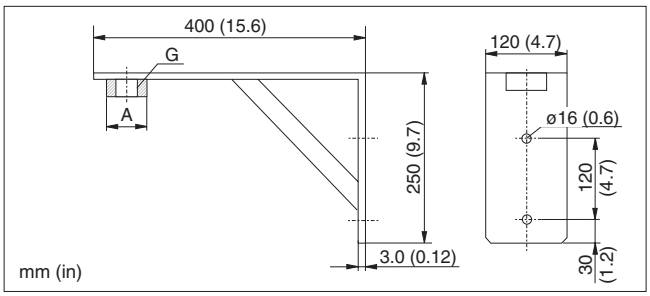
FAU 70 E	FAU 70 A
12 DN 50 PN 16	22 ANSI 2" 150psi
14 DN 80 PN 16	24 ANSI 3" 150 psi
15 DN 100 PN 16	25 ANSI 4" 150 psi

Sensor connection

FAU 70 E	FAU 70 A
3 G $1^1/_2$ ISO 228	5 NPT $1^1/_2$ - 11,5
4 G 2 ISO 228	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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