PAQUIN SENSORS
A Division of The Paquin Company™

Ultrasonic Level Sensor

- Non-contact ultrasonic measurement up to 65.6 ft (20 m) with selectable models
- Compatible with both HART® and Modbus RTU communication protocols
- Explosion-proof variants available for hazardous gas/vapor zones
- Built-in display with OLED or LCD options and push-button setup interface
- Effective false echo suppression and temperature compensation for stable readings

About

The P103 is a non-contact ultrasonic level meter designed for continuous monitoring of liquids, pastes, and certain solid materials in a variety of industrial settings. It combines an electroacoustic sensor, processor, and display module into a compact, intelligent device capable of filtering false echoes and compensating for temperature zones. It supports both HART® (4–20 mA) and RS-485 Modbus outputs, and it is available in multiple range configurations to measure distances from 0.15 meters up to 20 meters. With explosion-proof variants and easy setup capabilities, the P103 is engineered for reliability in both standard and hazardous environments.

Applications

- ✓ Food & Beverage
- ✓ Chemical Refining & Manufacturing
- ✓ Pharmaceuticals
- ✓ Water Treatment & Wastewater
- ✓ Agriculture
- ✓ More

PAQUIN SENSORS
A Division of The Paquin Company™

Build Your Part Number

Series P103

Example: 103SM3CSB

Series
P103

Performance Type - *select one*	
S	Standard Atmosphere (non-explosive)
E	Explosion Proof (Can only be selected with Output C)

Measuring Distance and Process Connection- *select one; see diagrams page 6 & 7*	
M1	0.15 ... 2 meters; G 1" male thread connection
M2	0.25 ... 6 meters; G 1 ½" male threaded connection
M3	0.40 ... 10 meters; G 2 ¼" male threaded connection
M4	0.50 ... 20 meters; DIN 2527, PN10, DN100 flange

Output - *select one*	
C	4 ... 20 mA with HART
R	RS-485 Modbus RTU (Only for electrical connection P and H; Only for visual display N)

Electrical Connection - *select one; see diagrams page 6 & 7*	
S	Plastic cable gland M16
E	Plastic cable gland M20
P	Plastic cable gland M20 for 2 cables
H	Outlet for protective conductor

Visual Display Options - *select one*	
B	Basic version with OLED display
M	Basic version with LCD display
N	No display, metal lid

Accessories – *optional; will be quoted as a separate line item*	
L	Lock nut nuts G 1", G 1 ½"
H	Horn adapter

Note: Product Includes 1 seal; Version with Modbus includes Basic Scada Level software

PAQUIN SENSORS
A Division of The Paquin Company™

Technical Parameters

Technical Parameters			
Electrical	Supply Voltage	Standard Atmosphere: 18 ... 36 VDC Explosion Proof: 18 ... 30 VDC	
	Output	Output C Output R	4 ... 20 mA (Limit values 3.9 ... 20.5 mA), HART® RS-485 with protocol Modbus RTU
	Current Consumption	Output C Output R	4 ... 20 mA / Max. 22 mA Max. 20 mA
	Maximal resistance of current output load	U = 24 VDC	R_{max} = 270 Ω [2]
		U = 22 VDC	R_{max} = 180 Ω
		U = 20 VDC	R_{max} = 90 Ω
		U = 19 VDC	R_{max} = 45 Ω
	Max. Internal Values (Explosion Proof)	U_i = 30 VDC I_i = 132 mA P_i = 0.99 W C_i = 370 nF L_i = 0.9 mH	
	Failure Indication	Echo Loss Level in dead zone Internal Failure	3.75 mA 22 mA Last Measure Value
	Recommended Cable	Output C Output R	PVC 2 x 0,75 mm2 PVC 2 x 2 x 0,25 mm2 (twisted pair, shielded)
	Display (if selected)	Matrix OLED, LCD [3]	
	Resolution	128 x 64 pixels	
	Height of digits / Number of display digits of measured values	9mm / 5 digits	
	Color of display	OLED LCD	Yellow Black with white background
	Type of buttons	Membrane	
Measuring	Measuring Range [1]	Measuring Distance M1 Measuring Distance M2 Measuring Distance M3 Measuring Distance M4	0.15 ... 2 meters 0.25 ... 6 meters 0.4 ... 10 meters 0.5 ... 20 meters
	Adjustable Measuring Range (SPAN)	Minimum 200mm	
	Resolution	Measuring Distance M1 and M2 Measuring Distance M3 Measuring Distance M4	< 1 mm < 2 mm < 2.5 mm
	Accuracy (within total range)	0.15%	
	Temperature Error	Maximum 0.04% / K	
	Operating Frequency	Measuring Distance M1 Measuring Distance M2 Measuring Distance M3 Measuring Distance M4	120kHz 75kHz 50kHz 20kHz
	Beam Width (-3 dB)	Measuring Distance M1 and M3 Measuring Distance M2 Measuring Distance M4	10° 14° 12°
	Sensitivity	3 degrees (low – medium – high)	
	Damping	0 ... 99 seconds	
	Measuring Period	1 ... 4 seconds	
	Rise Time	cca. 30 seconds	
Environmental	Ambient Temperature Range	Measuring Distance M1 and M2 Measuring Distance M3 and M4	-22°F ... 158°F (-30°C ... +70°C) -22°F ... 140°F (-30°C ... +60°C)
	Ambient Temperature Range of Display Module	OLED LCD	-22°F ... 158°F (-30°C ... +70°C) -4°F ... 158°F (-20°C ... +70°C)
	Short Time Temperature Stress Resistance	+194°F / 1 hour (+90°C / 1 hour)	
	Maximum Operation Overpressure (On Transmission Surface)	14.5 PSI (0.1 Mpa)	

1) In case the level of bulk-solid materials is measured, the measurement range is reduced.
2) Including 250R resistor in case of HART connection
3) OLED- suitable for indoor and low-light applications. LCD – suitable for outdoor applications particularly with direct sunlight.

PAQUiN SENSORS
A Division of The Paquin Company™

Technical Parameters Con.

Technical Parameters

Materials	Lid	Aluminum alloy with powder coating	
	Glass	Polycarbonate	
	Body	Aluminum alloy with powder coating	
	Housing with Thread	Plastic PP	
	Electroacoustic converter	Plastic PVDF	
	Display module (if selected)	Plastic POM	
	Cable gland	Plastic PA	
	Flange	Aluminum alloy with powder coating	
Mechanical	Mechanical Connection	Measuring Distance M1 Measuring Distance M2 Measuring Distance M3 Measuring Distance M4	Screwing with thread G 1” Screwing with thread G 1½” Screwing with thread G 2¼” Aluminum alloy flange
	Weight	Measuring Distance M1 Measuring Distance M2 Measuring Distance M3 Measuring Distance M4	0.3 kg 0.4 kg 0.7 kg 3.1 kg
	Weight of Display Module	46g	
Safety	Area Classification		EN 60079-10 EN 60079-14 EN 60079-0 : 2007 EN 60079-11 : 2007 EN 60079-26 : 2007 ATEX 0277X
	Explosion Proof Hazard Performance with M1 or M2 Range Explosive proof – suitable for explosive areas (combustible gases or vapors) **EX II 1/2G Ex ia IIB T5 Ga/Gb** with Isolating repeater (IRU–420), the whole level meter – zone 1, front head part – zone 0 **Explosion Proof Hazard Performance with M3 Range** Explosive proof – suitable for explosive areas (combustible gases or vapors) **EX II 1/2G Ex ia IIA T5 Ga/Gb** with Isolating repeater (IRU–420), the whole level meter – zone 1, front head part – zone 0 **Explosion Proof Hazard Performance with M4 Range** Explosive proof – suitable for explosive areas (combustible gases or vapors) **EX II 2G Ex ia IIA T5 Gb** with Isolating repeater (IRU–420), the whole level meter – zone 1		
	Low Safety Voltage		EN 33 2000-4-41
	Electromagnetic Compatibility		EN 55022/B EN 61326/Z1 EN 61000-4-2 to 6
	Water Protection Class	IP67	

Settings

Set the level meter using 3 buttons placed on the display module. All settings are accessible in the P103 set-up mode access.

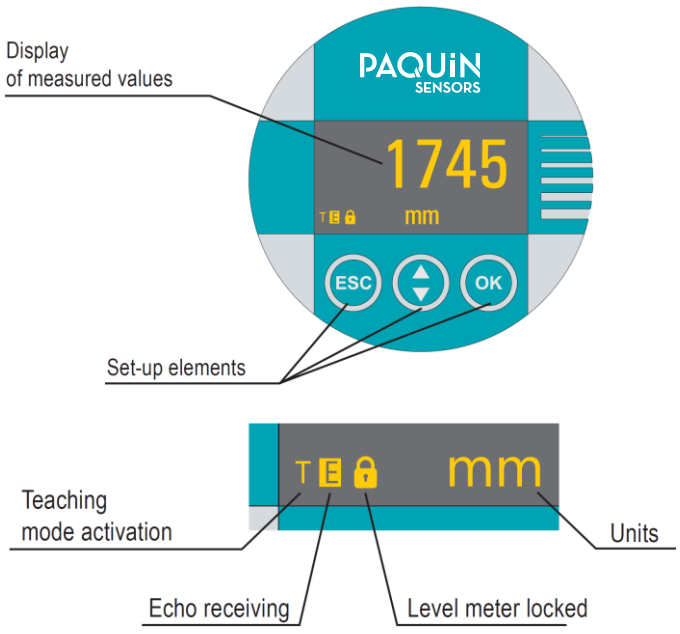
For detailed information please read at the instruction manual.

Button OK
- Set-up mode access
- Confirmation of selected item in the menu
- Move the cursor in the line
- Saving of set-up data

Button
- Move in the menu
- Change of values

Button ESC
- Cancelling of carried out changes
- Shift one level up

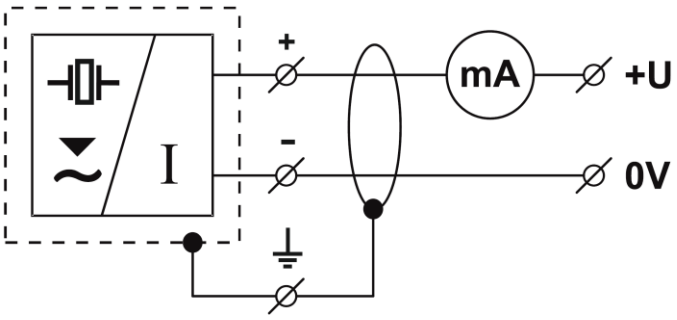
* Slow flashing while the reflected signal (echo) is received from the measured level.



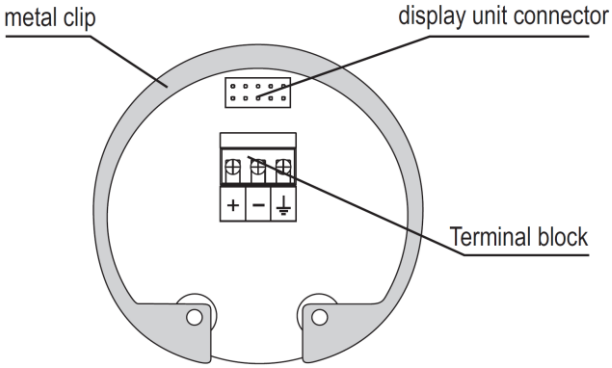
Electrical Connection

Electrical Connection

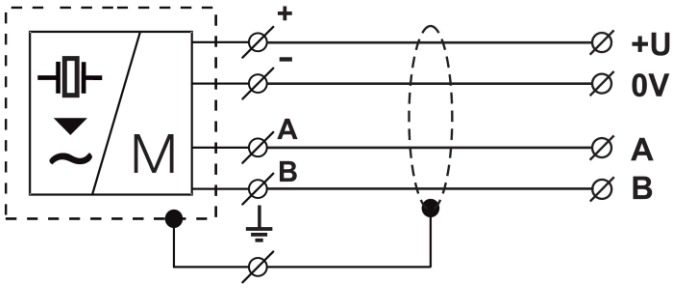
The level meter is connected to consequential (evaluating) device with a suitable cable with the outer diameter of 6 to 8 mm using screw terminals located under the display module. The recommended cross section of cores for the current version 2 x 0.5 ÷ 0.75 mm² and for the version with Modbus communication 2 x 2 x 0.25 mm² (twisted pair, shielded). Plus pole (+U) is connected to the terminal (+), minus pole (0 V) to the terminal (-) and the shielding (only for shielded cables) to the terminal ( ). Communication wires A and B of the line RS-485 (for version "M" - Modbus) are connected to the terminals A and B.



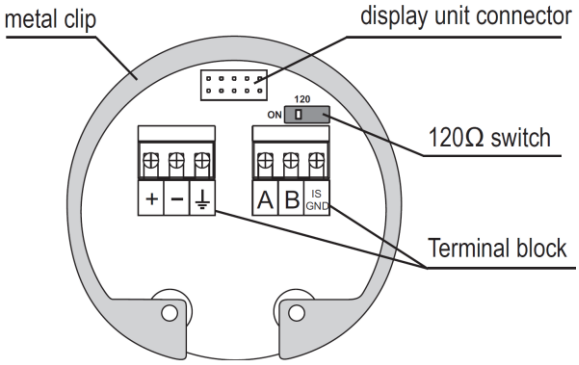
Wiring diagram of the P103 level meter with current output C



Inside view of screw terminals of the level meter with current output C



Wiring diagram of the P103 level meter with Modbus output R



Inside view of screw terminals of the level meter with Modbus output R

⚠ Electrical connection must be done in de-energized state!

⚠ The supply voltage source should be preferably realized as a stabilized power supply unit with safe voltage from 18 to 36 V DC (18 to 30 VDC for explosion proof version), which can be a part of the evaluation or display device. Regarding the possible occurrence of electrostatic charge on non-conductive parts of the level meter, all level meters for explosive spaces must be grounded. It will be done using a screw placed on the head of the level meter under the cable outlet. In case of strong electromagnetic interferences (EMI), parallel cable ducting with power lines, or when cable length exceeds 30 m, we recommended to use shielded cable.

Safety, Protections, Compatibility and Explosion Proof

The level meter P103 is equipped with protection against reverse polarity and output current overload. Protection against dangerous contact is secured by low safety voltage that complies with EN 33 2000-4-41.

Electromagnetic compatibility according to EN 55022/B, EN 61326/Z1 and EN 61000-4-2 to 6.

Explosion proof of P103 complies with the following standards: EN 60079-0 : 2007; EN 60079-11 : 2007 ; EN 60079-26 : 2007 and examined by FTZÚ-AO 210 Ostrava - Radvanice certificate No.: FTZÚ 09 ATEX 0277X.

<u>Special conditions for safe use of explosion proof variants</u>

The device is designed for connection to an isolating repeater. When the other approved supply unit is used, whose output parameters satisfy above mentioned output parameters, it is necessary to have a galvanic separation or, if supply unit without galvanic separation is used (Zener barriers), it is necessary provide potential equalization between sensor and point of barrier earthing. Please ask Paquin for the isolating repeater.

For application in zone 0 the present explosive atmospheres - mixture of air with flammable gases, vapor or mists must comply: 0,8 bar < p < 1.1 bar. The device must be installed in such a way, to prevent mechanical damage of sensor face. It is necessary carried out earthing by screw which is placed on head of level meter.

Installation & Mounting

Installation

Level meter is installed into the upper lid of the tank (vessel), using a fixing nut or a flange.

If installed in an open channel (sumps, reservoirs, etc.), install the level meter as closest as you can to the maximum level expected.

The front of the level meter must be vertically to the measured level.

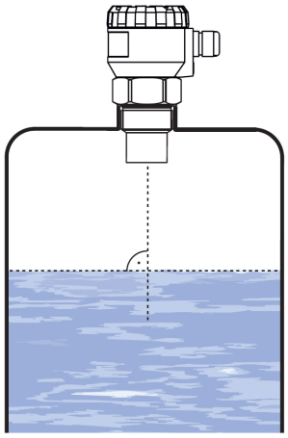
Foam on the level absorbs the acoustic wave reflection which might cause malfunction of the level meter. If possible, select the location where the foaming is as low as possible.

Protect the level meter against direct sunlight.

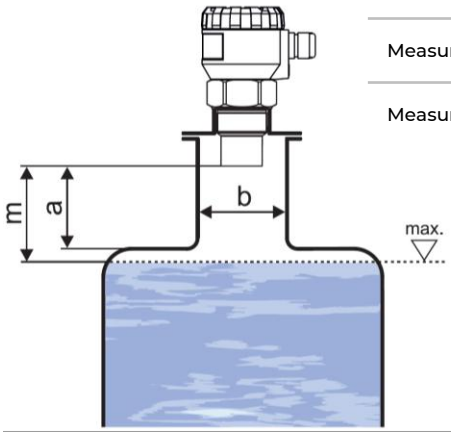
P103 is for continuous non-contact level measurement of liquids (water solutions, sewerage water, etc.), mash and paste materials (sediments, sticks, resins etc.) in closed or open vessels, sumps, reservoirs and open channels. In case the level of bulk-solid materials is measured, the measurement range is reduced.

In a case of uncertainty, we recommend consulting with the manufacturer about the application.

Mounting Recommendations

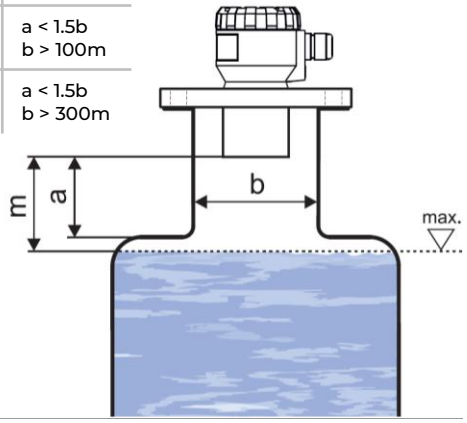


Recommended installation

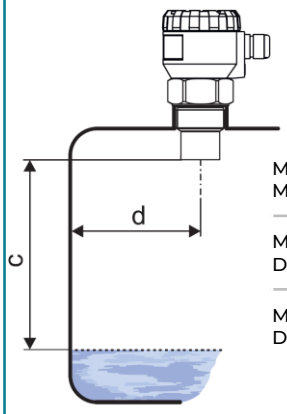


Measuring Distance M1 and M2	a < 3b b > 100m
Measuring Distance M3	a < 1.5b b > 100m
Measuring Distance M4	a < 1.5b b > 300m

a - neck height
b - neck width
m - dead zone



Possible installation through the neck

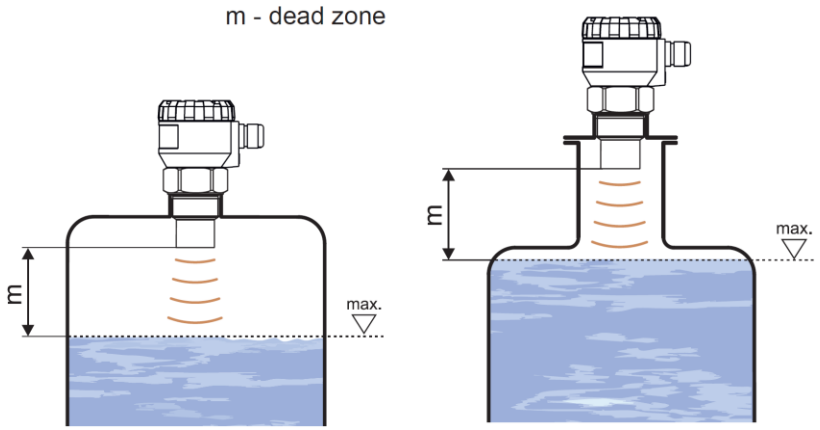


c - measuring range
d - min. distance from tank wall

M1 and M3 Measuring Distance	d > 1/12c (minimum 200mm)
M2 Measuring Distance	d > 1/8c (minimum 200mm)
M4 Measuring Distance	d > 1/10c (minimum 200mm)

Installation distance from the tank wall

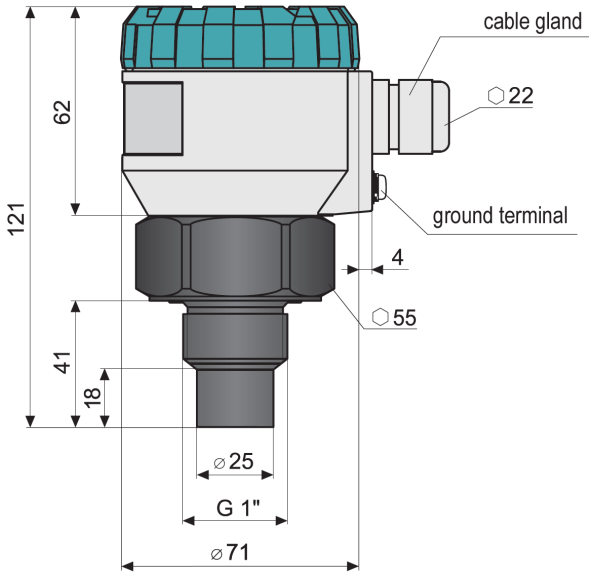
m - dead zone



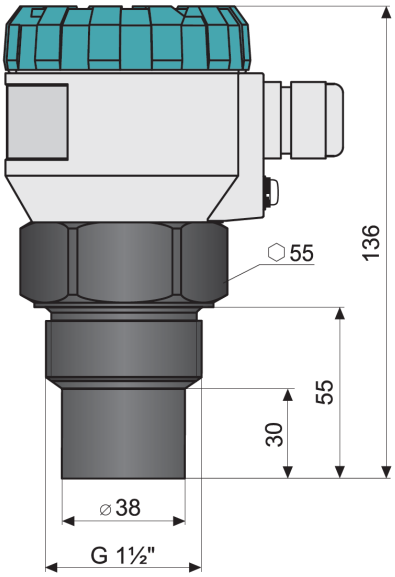
Maximum level distance from P103

PAQUIN SENSORS
A Division of The Paquin Company™

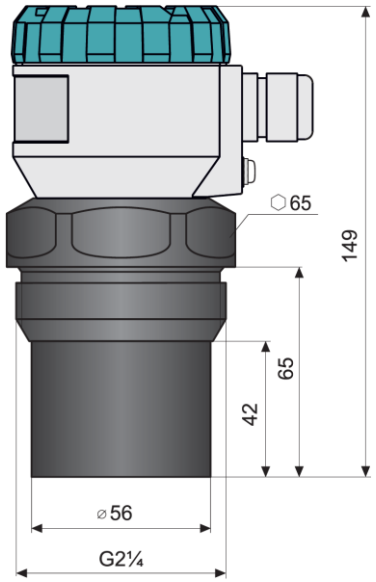
Dimensions



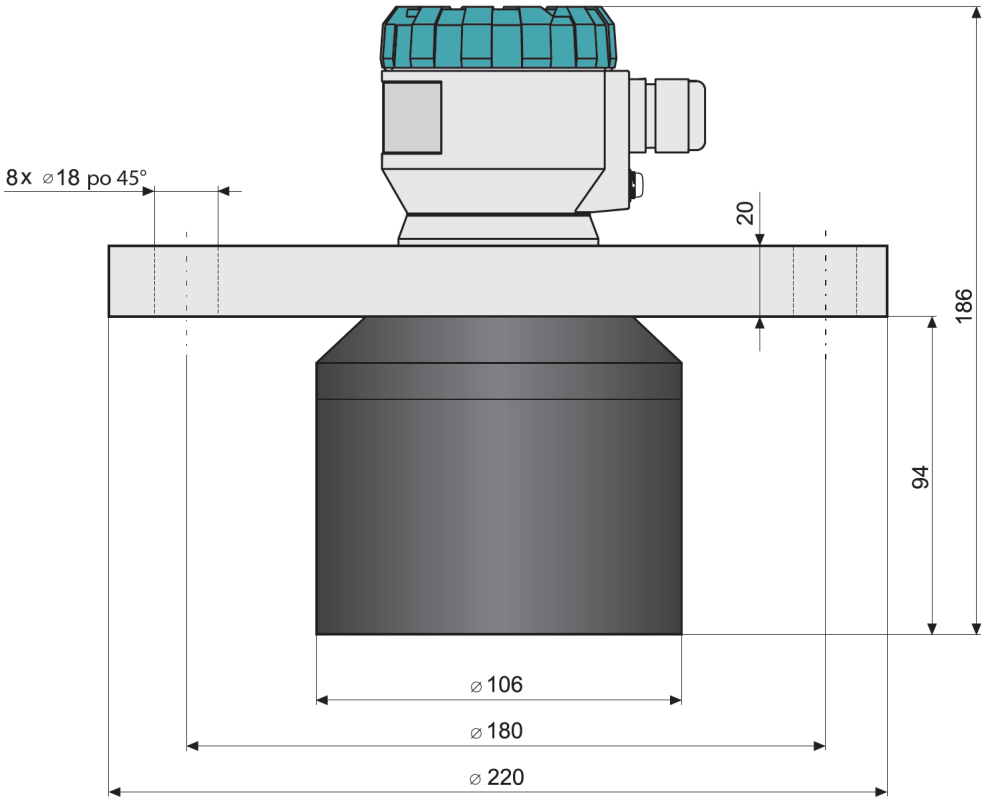
Measuring Distance M1
(0.10 ... 1.0 meters)



Measuring Distance M2
(0.20 ... 2.0 meters)

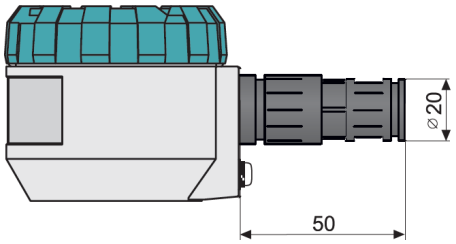


Measuring Distance M3
(0.20 ... 6.0 meters)



Measuring Distance M4
(0.40 ... 10 meters)

Standard Flanges: DIN 2527, PN10, DN100



P103 with protective connector

Additional Images

Paquin Sensors' product portfolio is designed to provide options to fit the most diverse range of specifications.

We collaborate with our customers to match the best product technologies with your unique application requirements.

Please contact us or call +1 (800) 831-8217 anytime to discuss your needs!