



# GWR Series Guided Wave Radar Level Sensors



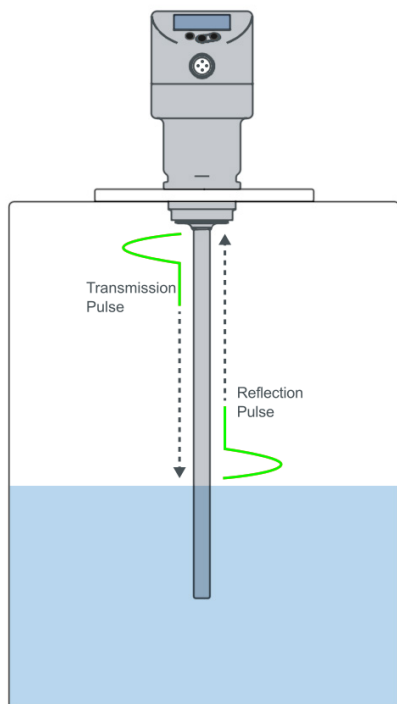
## Guided Wave Radar Level Measuring Principle

The GWR uses electromagnetic pulses in the nanosecond (microwave) range. The sensor head transmits the pulses and the pulses travel down the metal probe (guide). When the wave hits the medium, it is reflected back, collected by the metal probe, and guided to the sensor head. The time difference between the transmitting and receiving pulse (time-of-flight) is directly proportional to the distance measurement. To prevent signal attenuation, a coaxial tube configuration can be used for low dielectric process fluids. For applications with build up, the probe only configuration should be used to prevent false signals from bridging between the tube and probe. Probes and coaxial tubes can be cut in the field to adapt to different level applications.

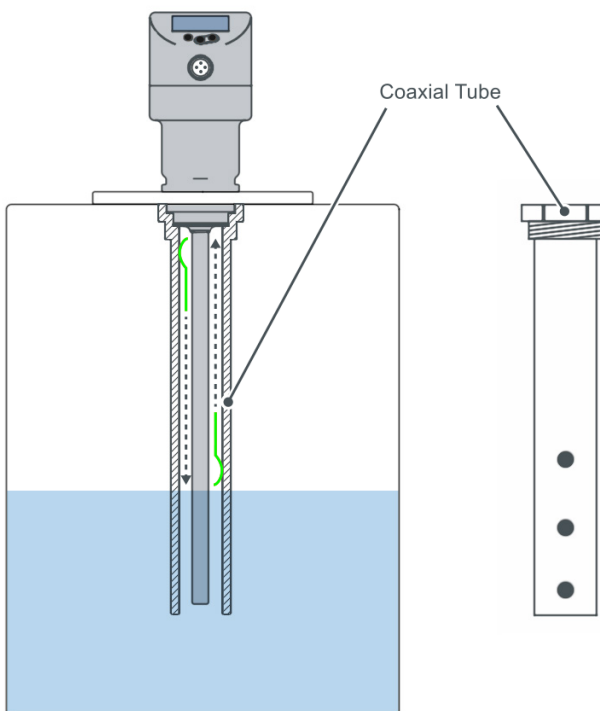
## Application Examples

- Detection of cleaning liquid in a parts cleaning system
- Monitoring of hydraulic oil in a hydraulic power unit (with coaxial assembly)
- Detection of cooling water in an industrial cooling system
- Detection of hot glue in corrugated cardboard manufacture

### Probe Only Configuration



### Probe and Coaxial Tube Configuration



## ProSense Guided Wave Radar Level Sensors Selection Guide

| Model                             | Price    | Weight (lb) | Drawing Link               | Process Connection     | Radar Guide               | Probe Length   | Media                                            | Medium Temperature             | Display                                                                                                                                      | Output 1 | Output 2                    |
|-----------------------------------|----------|-------------|----------------------------|------------------------|---------------------------|----------------|--------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------------------|
| <a href="#"><u>GWR-1600-P</u></a> | \$363.00 | 0.99        | <a href="#"><u>PDF</u></a> | 3/4" male NPT thread   | Probe                     | 150 to 1600 mm | Water / Water Based Media                        | -4°F to 212°F (-20°C to 100°C) | Unit of Measure: 3 x LED, green<br>Switching status: 2 x LED, yellow<br>Measured values and parameter setting: alphanumeric display, 4-digit | Switch   | Switch or Analog Selectable |
| <a href="#"><u>GWR-1600-C</u></a> | \$363.00 | 0.99        | <a href="#"><u>PDF</u></a> | G 3/4 BSPP male thread | Coaxial Tube and/or Probe |                | Oil / Oil Based Media; Water / Water Based Media |                                |                                                                                                                                              |          |                             |

Purchase probes, coaxial tubes, and mounting accessories separately.



# GWR Series Guided Wave Radar Level Sensors

## Overview

Part No. [GWR-1600-P](#)Part No. [GWR-1600-C](#)

AutomationDirect's ProSense GWR series guided wave radar level sensors provide reliable, low cost liquid level measurement for industrial applications. With one switch output and a second output that can be configured as a switch or analog output signal, the GWR series can provide both continuous as well as point level measurements. The [GWR-1600-P](#) probe model is best suited for use with water or water-based media and is ideal for challenging applications with liquid that is soiled, viscous, or prone to formation of deposits. The unit has 3/4" NPT male process connection threads. The [GWR-1600-C](#) coaxial tube and probe model is optimized for use with oil or oil-based media or clean water or water-based media without particulates or deposits that might bridge the gap between the probe and coaxial tube. The unit is mounted to the process using 3/4" NPT male threads on the coaxial tube. The [GWR-1600-C](#) can also be used as a probe only unit without the coaxial tube for water or water-based applications that may be soiled, viscous, or prone to formation of deposits. When used as a probe only unit without the coaxial tube, the [GWR-1600-C](#) has G3/4 male process connection threads. A variety of probe and coaxial tube accessories are available in lengths from 240mm to 1600mm and can be cut in the field to adapt to different level applications. Using the pushbuttons and display, the GWR series can be easily set up to measure and display liquid level in millimeters, inches, or percent. The 4-digit alphanumeric display and LEDs are used during configuration and provide clear indication of the measured variable and output status during operation. The rugged 316 stainless steel housing is IP68/IP69K rated providing uncompromising protection and long life in difficult industrial environments. The GWR series is backed by a five-year warranty.

## Output Function Selections

Output 1:

- Switching signal for level limit values

Output 2:

- Switching signal for level limit values
- Analog signal for continuous level measurement

## Features

- Switch and analog outputs for both continuous and point level measurement
- Probe unit is best suited for use with water or water-based media and is ideal for challenging applications with liquid that is soiled, viscous, or prone to formation of deposits
- Coaxial tube and probe model is optimized for use with oil or oil-based media or clean water or water-based media without particulates or deposits that might bridge the gap between the probe and coaxial tube
- Variety of probe and coaxial tube accessories are available in lengths from 240mm to 1600mm and can be cut in the field to adapt to different level applications
- Measure and display liquid level in millimeters, inches, or percent
- 4-digit alphanumeric display and LEDs with easy pushbutton setup
- Rugged 316 stainless steel IP68/IP69K rated housing
- 4-pin M12 quick disconnect electrical connection
- 5-year warranty



For a variety of cable options see our website [www.AutomationDirect.com](http://www.AutomationDirect.com)

| ProSense GWR Series Sensors Specifications |                                                                                                                                                    |                                                    |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Model                                      | <a href="#">GWR-1600-P</a>                                                                                                                         | <a href="#">GWR-1600-C</a>                         |
|                                            | <b>Application</b>                                                                                                                                 |                                                    |
| <b>Media</b>                               | Water / Water Based Media                                                                                                                          | Oil / Oil Based Media or Water / Water Based Media |
| <b>Radar Guide</b>                         | Probe                                                                                                                                              | Coaxial tube* and/or probe                         |
| <b>Medium Dielectric Constant</b>          | > 5                                                                                                                                                | ≥ 1.8 (Coaxial tube required from 1.8 to 5)        |
| <b>Medium Temperature</b>                  | -4°F to 212°F (-20°C to 100°C)                                                                                                                     |                                                    |
| <b>Pressure Rating</b>                     | -1 to 16 bar (-14.5 to 232 psi)                                                                                                                    |                                                    |
|                                            | <b>Electrical Data</b>                                                                                                                             |                                                    |
| <b>Operating Voltage</b>                   | 18 to 30 VDC                                                                                                                                       |                                                    |
| <b>Current Consumption</b>                 | < 50mA                                                                                                                                             |                                                    |
| <b>Protection Class</b>                    | III                                                                                                                                                |                                                    |
| <b>Reverse Polarity Protection</b>         | Yes                                                                                                                                                |                                                    |
| <b>Power-on Delay Time</b>                 | 3s                                                                                                                                                 |                                                    |
|                                            | <b>Electrical Connection</b>                                                                                                                       |                                                    |
| <b>Connector</b>                           | 1 x M12                                                                                                                                            |                                                    |
| <b>Contacts</b>                            | Gold plated                                                                                                                                        |                                                    |
|                                            | <b>Outputs</b>                                                                                                                                     |                                                    |
| <b>Outputs</b>                             | OUT1: Switch<br>OUT2: Switch or Analog Selectable                                                                                                  |                                                    |
| <b>Switch Outputs</b>                      | PNP / NPN Selectable<br>N.O. / N.C. Selectable<br>Hysteresis or Window Functions Selectable<br>Max. voltage drop: 2.5 VDC<br>Current rating: 150mA |                                                    |

\*For media with a viscosity greater than 500 cSt the probe only configuration should be used.



# GWR Series Guided Wave Radar Level Sensors

| Specifications Continued     |                                                                                                                                                                                                                                                                           |                                                              |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Model                        | GWR-1600-P                                                                                                                                                                                                                                                                | GWR-1600-C                                                   |
|                              | <b>Outputs Continued</b>                                                                                                                                                                                                                                                  |                                                              |
| Analog Output                | 4 to 20 mA (scalable/invertable)<br>Max. load: 500Ω                                                                                                                                                                                                                       |                                                              |
| Short-Circuit Protection     | Yes                                                                                                                                                                                                                                                                       |                                                              |
| Overload Protection          | Yes                                                                                                                                                                                                                                                                       |                                                              |
|                              | <b>Measuring Range</b>                                                                                                                                                                                                                                                    |                                                              |
| Probe Length L* (mm)         | 150 to 1600 mm                                                                                                                                                                                                                                                            |                                                              |
| Active Range A* (mm)         | L-40 (L-60 when GWR-1600-C set to oil and oil based media)                                                                                                                                                                                                                |                                                              |
| Inactive Range I1 / I2* (mm) | 30 / 10 (30 when GWR-1600-C set to oil and oil based media)                                                                                                                                                                                                               |                                                              |
| Sampling Rate                | 4Hz                                                                                                                                                                                                                                                                       |                                                              |
|                              | <b>Setting Range</b>                                                                                                                                                                                                                                                      |                                                              |
| Set Point SP (mm)            | ≥ 15 (35 when GWR-1600-C set to oil and oil based media) to ≤ L-30                                                                                                                                                                                                        |                                                              |
| Reset Point RP (mm)          | ≥ 10 (30 when GWR-1600-C set to oil and oil based media) to ≤ L-35                                                                                                                                                                                                        |                                                              |
| In Steps of (mm)             | 1                                                                                                                                                                                                                                                                         |                                                              |
| Hysteresis (mm)              | > 5                                                                                                                                                                                                                                                                       |                                                              |
|                              | <b>Accuracy / Deviations</b>                                                                                                                                                                                                                                              |                                                              |
| Measuring Error*             | ± 7mm                                                                                                                                                                                                                                                                     |                                                              |
| Offset Error                 | 5mm                                                                                                                                                                                                                                                                       |                                                              |
| Resolution                   | 1mm                                                                                                                                                                                                                                                                       |                                                              |
| Temperature Drift [per 10 K] | ± 0.2%                                                                                                                                                                                                                                                                    |                                                              |
|                              | <b>Operating Conditions</b>                                                                                                                                                                                                                                               |                                                              |
| Ambient temperature          | -40 to 176°F (-40 to 80°C)                                                                                                                                                                                                                                                |                                                              |
| Process temperature          | -4 to 212°F (-20 to 100°C)                                                                                                                                                                                                                                                |                                                              |
| Storage temperature          | -40 to 212°F (-40 to 100°C)                                                                                                                                                                                                                                               |                                                              |
| Protection                   | IP 68; IP 69K                                                                                                                                                                                                                                                             |                                                              |
|                              | <b>Mechanical Data</b>                                                                                                                                                                                                                                                    |                                                              |
| Weight                       | 0.99 lb (447.5 g)                                                                                                                                                                                                                                                         |                                                              |
| Material                     | Stainless steel (1.4404 / 316L); PEI; PFA; PBT; FKM                                                                                                                                                                                                                       |                                                              |
| Materials (wetted parts)     | Sensing Head: Stainless steel (1.4404 / 316L); Stainless steel (1.4435 / 316L); PTFE; FKM<br>Probes: Stainless steel (1.4404 / 316L)<br>Coaxial Tubes: Stainless steel (1.4301 / 304); centering piece: PPS fibre-reinforced; fixing clip: stainless steel (1.4310 / 301) |                                                              |
| Process Connection           | 3/4" NPT male                                                                                                                                                                                                                                                             | G 3/4 BSPP male or 3/4" NPT male with coaxial tube installed |
|                              | <b>Displays / Operating Elements</b>                                                                                                                                                                                                                                      |                                                              |
| Display                      | Unit of Measure: 3 x LED, green                                                                                                                                                                                                                                           |                                                              |
|                              | Switching status: 2 x LED, yellow                                                                                                                                                                                                                                         |                                                              |
|                              | Measured values and parameter setting: alphanumeric display, 4-digit                                                                                                                                                                                                      |                                                              |
|                              | <b>Tests / Approvals</b>                                                                                                                                                                                                                                                  |                                                              |
| EMC                          | DIN EN 61000-6-2<br>DIN EN 61000-6-3 : in a metal tank<br>DIN EN 61000-6-4 : in a plastic tank                                                                                                                                                                            |                                                              |
| Shock resistance             | DIN EN 60068-2-27 50g (11ms) / 20g (6ms) with reference rod 0.5 m                                                                                                                                                                                                         |                                                              |
| Vibration resistance         | DIN EN 60068-2-6 20g (10...2000 Hz) / 1g (5...200 Hz) with reference rod 0.5 m                                                                                                                                                                                            |                                                              |
| UL approval                  | E328811                                                                                                                                                                                                                                                                   |                                                              |
| CE                           | EMC; RoHS II                                                                                                                                                                                                                                                              |                                                              |

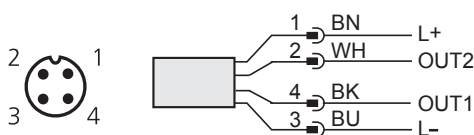
\*Reference Measurement Deviation Graph for L, A, I1, and I2 positions



Note: Check the chemical compatibility of the sensor's wetted parts with the medium to be measured.

# prosense® GWR Series Guided Wave Radar Level Sensors

## Wiring Diagram



### Cable Assembly Wiring Colors:

Pin 1 - Brown  
Pin 2 - White  
Pin 3 - Blue  
Pin 4 - Black

Colors to DIN EN 60947-5-2

For additional wiring details see individual product manuals.

*Note: Wiring colors are based on AutomationDirect CD12L and CD12M 4-pole cable assemblies.*

## Output Function Selections

Output 1:  
Switching output for level limit values  
Output 2:  
Switching output for level limit values or  
Analog output for continuous level measurement



Click or scan the above QR code to be taken to the operating instructions for the [GWR-1600-P](#) unit.

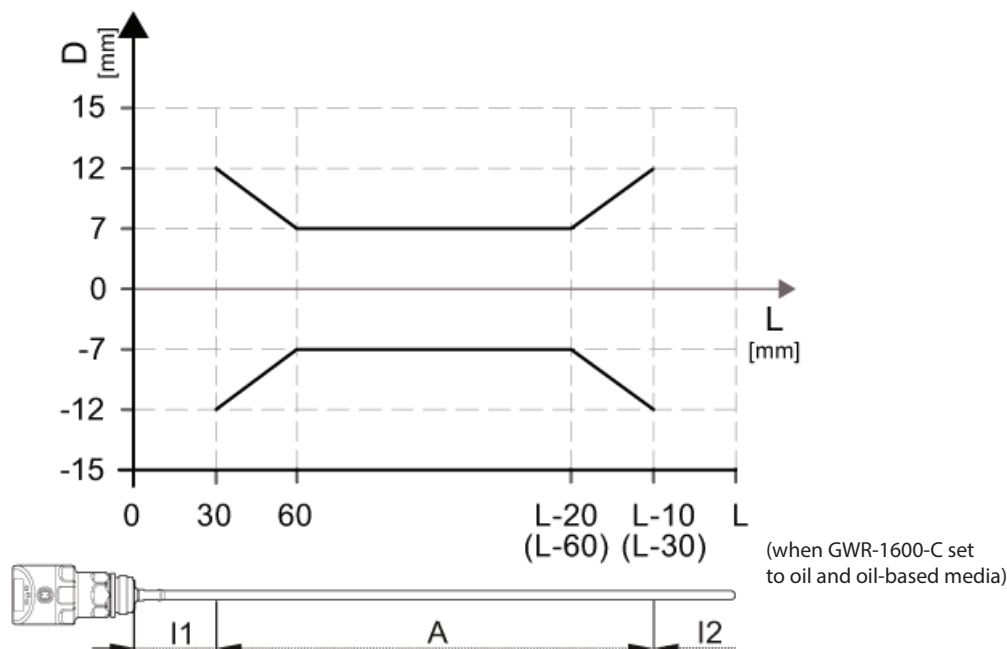


Click or scan the above QR code to be taken to the operating instructions for the [GWR-1600-C](#) unit.

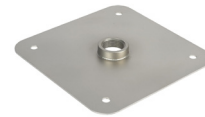
## Measurement Deviation D at the Limits of the Active Probe Range



Click or scan the above QR code to be taken to the installation instructions for the [GWR-CC](#) unit.



# prosense® GWR Series Guided Wave Radar Level Sensor Accessories

Part No. [GWR-P700](#)Part No. [GWR-C700](#)Part No. [GWR-CC](#)Part No. [GWR-FPLT](#)Part No. [GWR-LPLT](#)

## GWR Series Guided Wave Radar Level Sensor Accessories

| Part No.                  | Description                                                                                                                                                                       | Pcs/Pkg | Weight (lbs) | Price   | Drawing Links       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|---------|---------------------|
| <a href="#">GWR-P240</a>  | ProSense level sensing probe, 240mm length, stainless steel. For use with GWR-1600-C and GWR-1600-P guided wave radar level sensors and CLC series conductive level controllers.  | 1       | 0.7          | \$15.50 | <a href="#">PDF</a> |
| <a href="#">GWR-P450</a>  | ProSense level sensing probe, 450mm length, stainless steel. For use with GWR-1600-C and GWR-1600-P guided wave radar level sensors and CLC series conductive level controllers.  | 1       | 0.9          | \$17.00 | <a href="#">PDF</a> |
| <a href="#">GWR-P700</a>  | ProSense level sensing probe, 700mm length, stainless steel. For use with GWR-1600-C and GWR-1600-P guided wave radar level sensors and CLC series conductive level controllers.  | 1       | 1.3          | \$21.50 | <a href="#">PDF</a> |
| <a href="#">GWR-P1000</a> | ProSense level sensing probe, 1000mm length, stainless steel. For use with GWR-1600-C and GWR-1600-P guided wave radar level sensors and CLC series conductive level controllers. | 1       | 1.5          | \$31.00 | <a href="#">PDF</a> |
| <a href="#">GWR-P1200</a> | ProSense level sensing probe, 1200mm length, stainless steel. For use with GWR-1600-C and GWR-1600-P guided wave radar level sensors and CLC series conductive level controllers. | 1       | 1.9          | \$40.00 | <a href="#">PDF</a> |
| <a href="#">GWR-P1600</a> | ProSense level sensing probe, 1600mm length, stainless steel. For use with GWR-1600-C and GWR-1600-P guided wave radar level sensors and CLC series conductive level controllers. | 1       | 2.3          | \$46.50 | <a href="#">PDF</a> |
| <a href="#">GWR-C240</a>  | ProSense coaxial tube, 240mm length, 3/4in male NPT process connection, stainless steel. For use with GWR-1600-C guided wave radar level sensors. (1) centering piece included.   | 1       | 0.5          | \$51.00 | <a href="#">PDF</a> |
| <a href="#">GWR-C450</a>  | ProSense coaxial tube, 450mm length, 3/4in male NPT process connection, stainless steel. For use with GWR-1600-C guided wave radar level sensors. (1) centering piece included.   | 1       | 0.7          | \$57.00 | <a href="#">PDF</a> |
| <a href="#">GWR-C700</a>  | ProSense coaxial tube, 700mm length, 3/4in male NPT process connection, stainless steel. For use with GWR-1600-C guided wave radar level sensors. (1) centering piece included.   | 1       | 1.5          | \$65.00 | <a href="#">PDF</a> |
| <a href="#">GWR-C1000</a> | ProSense coaxial tube, 1000mm length, 3/4in male NPT process connection, stainless steel. For use with GWR-1600-C guided wave radar level sensors. (1) centering piece included.  | 1       | 1.8          | \$71.00 | <a href="#">PDF</a> |
| <a href="#">GWR-C1200</a> | ProSense coaxial tube, 1200mm length, 3/4in male NPT process connection, stainless steel. For use with GWR-1600-C guided wave radar level sensors. (1) centering piece included.  | 1       | 2.3          | \$85.00 | <a href="#">PDF</a> |
| <a href="#">GWR-C1600</a> | ProSense coaxial tube, 1600mm length, 3/4in male NPT process connection, stainless steel. For use with GWR-1600-C guided wave radar level sensors. (2) centering pieces included. | 1       | 2.7          | \$92.00 | <a href="#">PDF</a> |
| <a href="#">GWR-CC</a>    | ProSense centering pieces, replacement. For use with GWR-C series coaxial tubes. Hardware and seals included.                                                                     | 1       | 0.02         | \$14.00 | N/A                 |
| <a href="#">GWR-FPLT</a>  | ProSense flange plate, stainless steel, 3/4in female NPT. For use with GWR-1600-C with GWR-C series coaxial tubes or GWR-1600-P guided wave radar level sensor.                   | 1       | 0.6          | \$38.50 | <a href="#">PDF</a> |
| <a href="#">GWR-LPLT</a>  | ProSense launching plate, stainless steel, 3/4in female NPT. For use with GWR-1600-C with GWR-C series coaxial tubes or GWR-1600-P guided wave radar level sensor.                | 1       | 1.4          | \$38.00 | <a href="#">PDF</a> |

# prosense® GWR Series Guided Wave Radar Level Sensors

## Using GWR Series Guided Wave Radar Level Sensor Accessories

**GWR-1600-C**  
(Coax and probe unit)

**GWR-1600-P**  
(Probe only unit)

Most water, oil, or coolant based applications. Dielectric of 1.8 or greater when using coax; 5 or greater for probe only.



G 3/4"

Choose probe length  
(240 to 1600 mm)  
Can be cut in the field  
to adapt to different  
level applications

G 3/4"

Choose coax  
of same length  
(240 to 1600 mm)  
Can be cut in the field  
to adapt to different  
level applications

3/4" NPT

Mount directly to NPT metal tank fitting or use  
flange plate (GWR-FPLT) or launching plate (GWR-LPLT).  
Plastic tanks require using a launching plate.

Water applications only or  
a dielectric of 5 or greater  
Soiled or viscous media  
containing solid particles  
and media prone to formation  
of deposit or viscosity greater  
than 500cSt

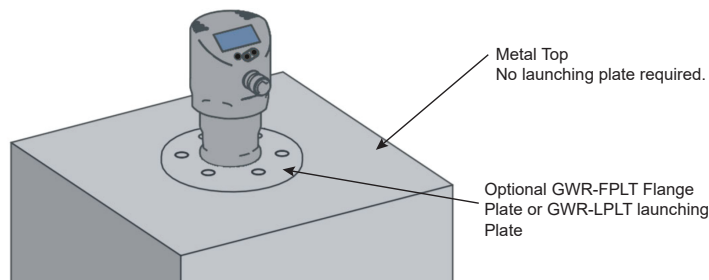
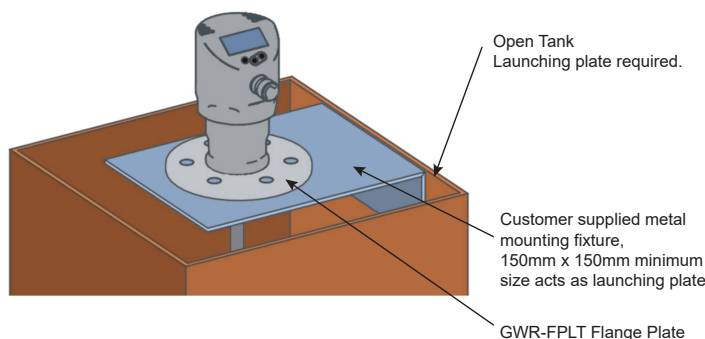
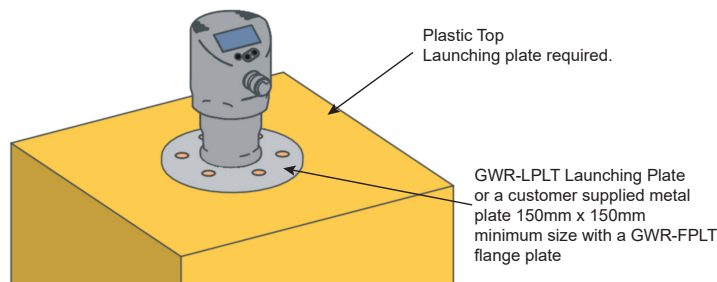


3/4" NPT

Choose probe length  
(240 to 1600 mm)  
Can be cut in the field  
to adapt to different  
level applications

## Launching Plate Requirements

For proper decoupling of the radar pulse, a metal launching plate at least 150mm square or 150mm diameter is required.



Note: When using the coaxial tube, the launching plate as described above is not necessary. This makes mounting easier. However, bridging between the probe and coaxial tube due to solids, emulsions, etc. can cause false level indication. Incorrect measurements may be caused by highly absorbing surfaces such as foam, intensely bubbling surfaces, or inhomogeneous materials such as oil and water layers. See product Operating Instructions for settings and methods to mitigate signal loss or degradation.