ProSense® GWR Series Guided Wave Radar Level Sensors

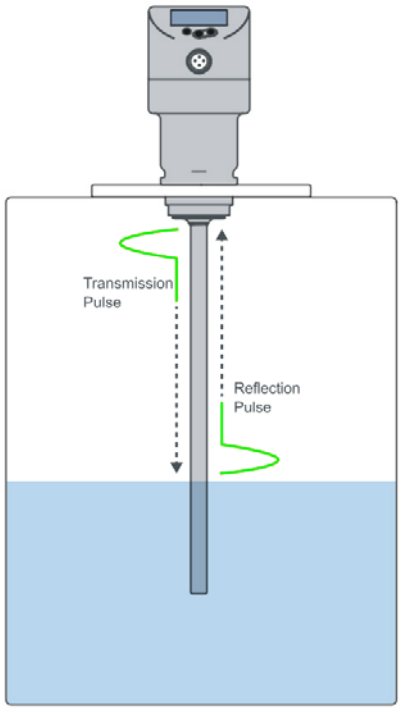
Guided Wave Radar Level Measuring Principle

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.

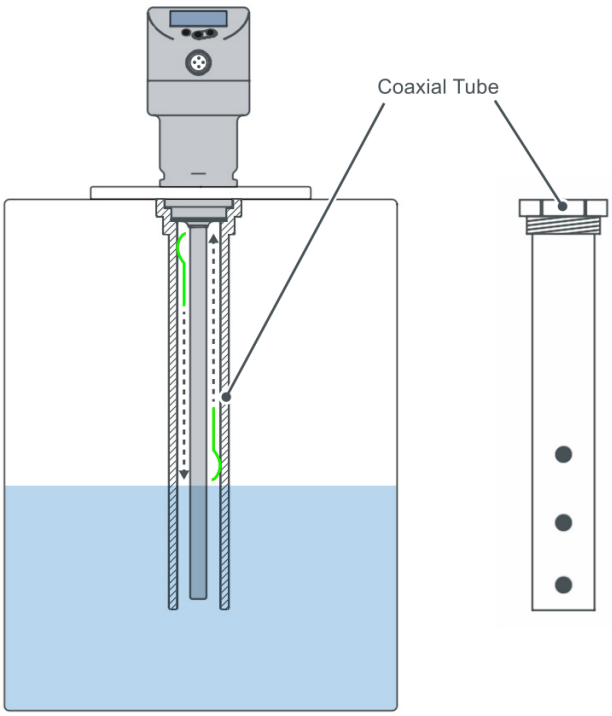
Application Examples

- 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
GWR-1600-P	$-04ovl:	0.99	PDF	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 Switching status: 2 x LED, yellow Measured values and parameter setting: alphanumeric display, 4-digit	Switch	Switch or Analog Selectable
GWR-1600-C	$04ovn:	0.99	PDF	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.

ProSense® GWR Series Guided Wave Radar Level Sensors

Part No. GWR-1600-P

Part No. GWR-1600-C

Overview

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

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

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

For a variety of cable options see our website www.AutomationDirect.com

ProSense® GWR Series Guided Wave Radar Level Sensors

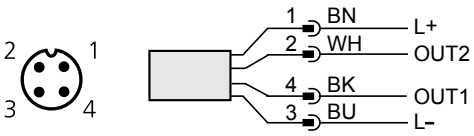
Specifications Continued		
Model	***GWR-1600-P***	***GWR-1600-C***
	Outputs Continued	
Analog Output	4 to 20 mA (scalable/invertable) Max. load: 500Ω	
Short-Circuit Protection	Yes	
Overload Protection	Yes	
	Measuring Range	
Probe Length L* (mm)	150 to 1600 mm	
Active Range A* (mm)	L-40 (L-60 when GWR-1600-C 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	
	Setting Range	
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	
	Accuracy / Deviations	
Measuring Error*	± 7mm	
Offset Error	5mm	
Resolution	1mm	
Temperature Drift [per 10 K]	± 0.2%	
	Operating Conditions	
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	
	Mechanical Data	
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 Probes: Stainless steel (1.4404 / 316L) 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
	Displays / Operating Elements	
Display	Unit of Measure: 3 x LED, green	
	Switching status: 2 x LED, yellow	
	Measured values and parameter setting: alphanumeric display, 4-digit	
	Tests / Approvals	
EMC	DIN EN 61000-6-2 DIN EN 61000-6-3 : in a metal tank 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

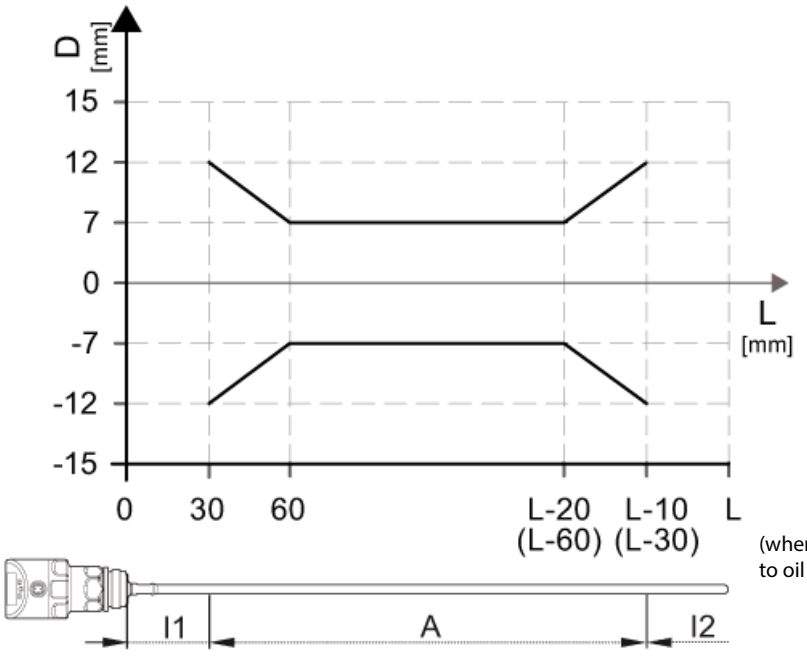
Output 1:
Switching output for level limit values
Output 2:
Switching output for level limit values or
Analog output for continuous level measurement

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.

Click or scan the above QR code to be taken to the installation instructions for the GWR-CC

Measurement Deviation D at the Limits of the Active Probe Range



(when GWR-1600-C set to oil and oil-based media)

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

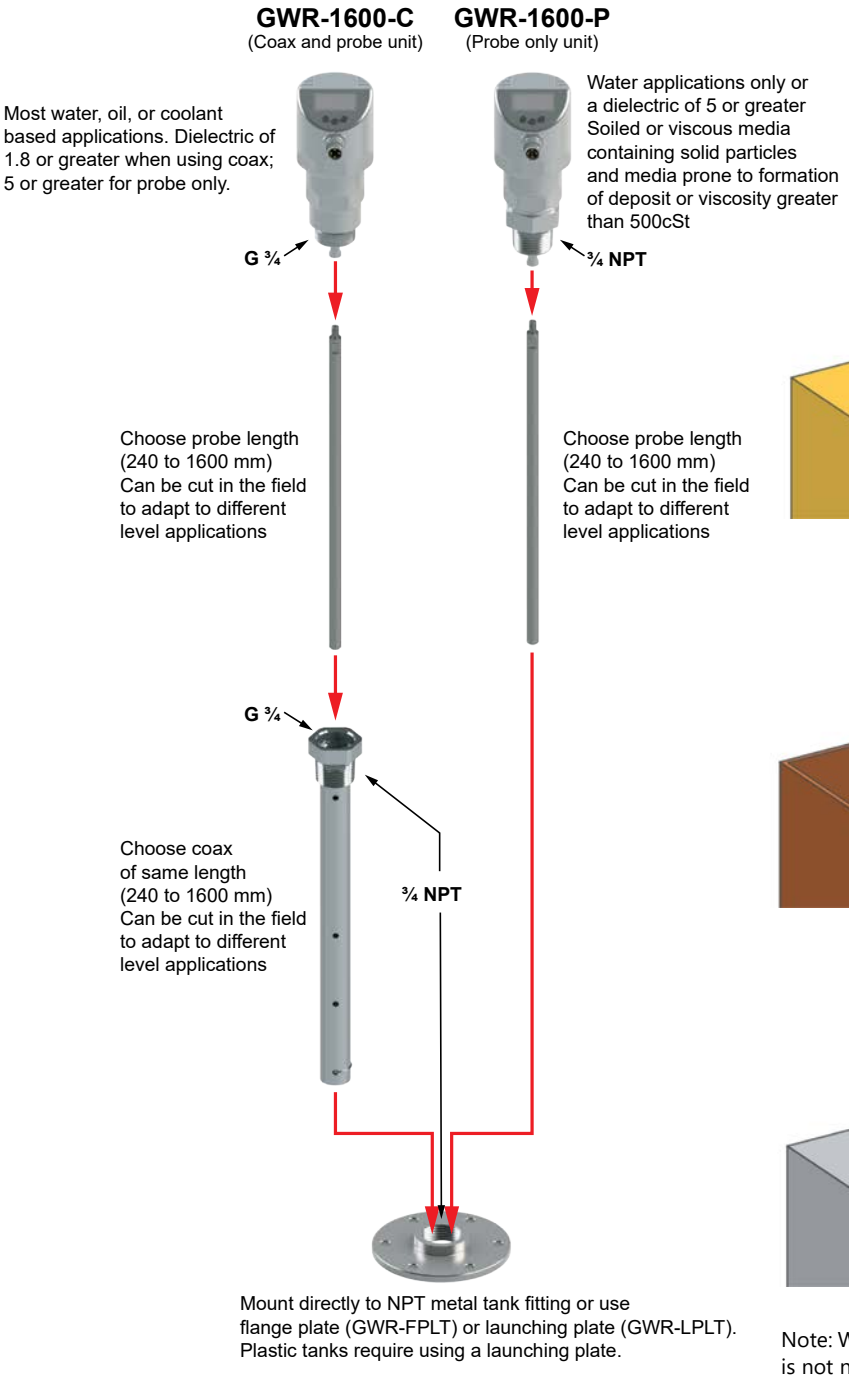
Part No. GWR-LPLT

GWR Series Guided Wave Radar Level Sensor Accessories

Part No.	Description	Pcs/Pkg	Weight (lbs)	Price	Drawing Links
GWR-P240	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	$4ovo:	PDF
GWR-P450	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	$4ovp:	PDF
GWR-P700	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	$4ovq:	PDF
GWR-P1000	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	$4ovg:	PDF
GWR-P1200	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	$4ovh:	PDF
GWR-P1600	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	$-4ovi:	PDF
GWR-C240	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	$-4ovj:	PDF
GWR-C450	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	$4ovk:	PDF
GWR-C700	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	$4ovs:	PDF
GWR-C1000	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	$;4ovt:	PDF
GWR-C1200	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	$4ovu:	PDF
GWR-C1600	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	$04ovv:	PDF
GWR-CC	ProSense centering pieces, replacement. For use with GWR-C series coaxial tubes. Hardware and seals included.	1	0.02	$4ovx:	N/A
GWR-FPLT	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	$4ovy:	PDF
GWR-LPLT	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	$4ovz:	PDF

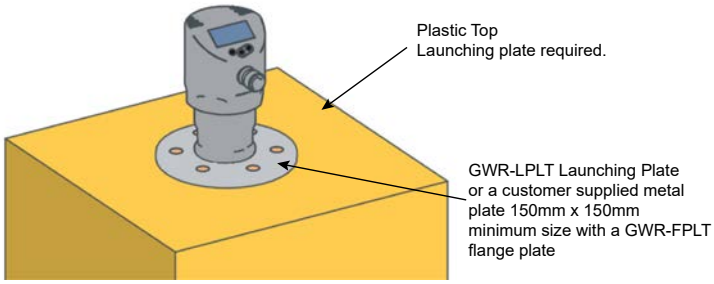
ProSense® GWR Series Guided Wave Radar Level Sensors

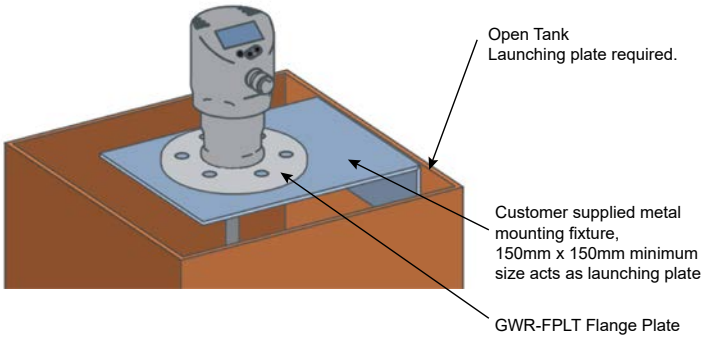
Using GWR Series Guided Wave Radar Level Sensor Accessories

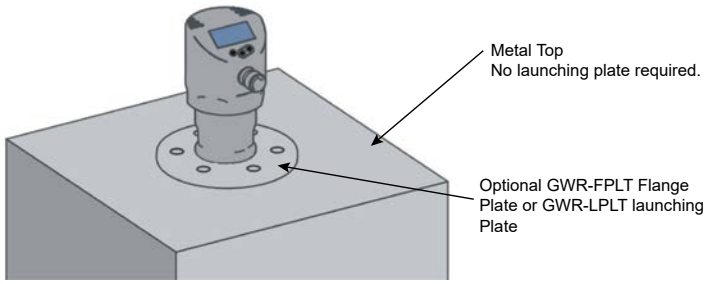


Launching Plate Requirements

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.