Honeywell

SLG 700 Quick Start Guide, SmartLine Level Guided Wave Radar

34- SL-25-04, Revision 2.0, April 2015

This document provides descriptions and procedures for the Quick Installation of Honeywell's SmartLine Guided Wave Radar Level Transmitters.

The SmartLine Level Guided Wave Radar is available as a family of SLG72x models for liquid applications and SLG75x models for solids (powder, granulate) level applications.

Note: The SLG75x is a future release. Various other documents are available on the CD supplied with your shipment.

Documents in hardcopy can also be ordered.

Revision History
Rev. 1.0 - 1st release
Rev. 2.0 – Updated display menus

References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title	Document #
SLG 700 SmartLine Guided Wave Radar Level Transmitter User's Guide	34-SL-25-11
SLG 700 SmartLine Level Guided Wave Radar, HART option Manual	34-SL-25-06
SLG Pocket Configuration Guide, SmartLine Level Guided Wave Radar	34-SL-00-01
SLG Safety Manual	34-SL-25-05
SLG 700 Foundation Fieldbus Manual	34-SL-25-07
SLG 700 Specifications	34-SL-03-03

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Prior to installation, if the transmitter is required to be in storage, do not keep the device in a vertical position. Doing so will damage the probe and the device will not measure correctly.

- Store the device in a dry and dust-free location.
- Keep the housing out of the sunlight.
- Store the device in its original packing.

INSTALLATION

Evaluate the site selected for the SmartLine Level Guided Wave Radar (GWR) installation with respect to the process system design specifications and Honeywell's published performance characteristics.

Required tools

Note: The following tools are **not** supplied with the Transmitter.

Table 1: Tools required

Mounting hardware (nuts and bolts for flanged unit) and tools	
Allen keys:	
• Coaxial coupler (SCA, SCC, SCD)	AF 1.5mm
• Rook, Electronics housing	AF 2.0mm
• End weight (SWA, SWB)	AF 2.5mm
Wrenches:	
• Rod probe (8mm) (SRA, SRH, SRJ)	AF 7mm
• Mounting thread ¾" and 1"	AF 40mm
• Mounting thread 1½"	AF 50mm
• Mounting thread 2"	AF 60mm
Probe nut (8mm)	AF 8mm
To shorten rod probes	Saw
To shorten rope probes	Saw or bolt cutter
Wire cutter / stripper	
M20 conduit entry plugs	10 mm hex wrench
½" NPT conduit entry	1¼" wrench
½" to ¾" NPT adapter	1¼" wrench

See Table 3- Conduit Entry Plugs

See Table 2 - Conduit Adapters

Operating conditions

Table 2: Operating Conditions

Parameter	Operative Limits		Transportation and Storage	
	℃	℉	℃	℉
Ambient Temperature[1]	-40 to 85	-40 to 185	-55 to 120	-67 to 248
Meter Body Temperatur e	-40 to 125	-40 to 257	-55 to 125	-67 to 257
Humidity %RH	0 to 100		0 to 100	

[1] LCD Display operating temperature -20℃ to +70℃. Storage temperature -30℃ to 80℃.
[2] Silicone 704 minimum temperature rating is 0℃ (32℉).

Process connector

Throughout this Quick Start Guide, there are references to the process connector on the transmitter. See Step 5 of the probe assembly steps for equipment specifications.

The process connector has three functions:

- Separates the process environment from the external environment.
- Attaches the transmitter to a tank with a threaded or flanged connection. Brackets are not required.
- Provides electrical feed-through to the probe.

  Note: This Quick Start Guide uses the term “threaded”, which refers to milling that allows a segment to be screwed into another segment.

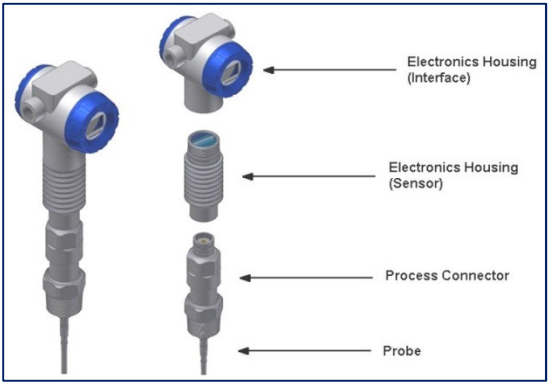


Figure 1: Transmitter components

Rod probe assembly

Rod probes are shipped in segments. The segments are attached with a stud and a lock washer.

Step	Action
1	At the process connector, the rod probe is attached to the central conductor. Place the lock washer on the central conductor and fully thread on the starter rod segment onto the threaded central conductor. Lock the rods by tightening the nut against the rod using machined flats. **Note:** Depending on rod requirements, rod probes can have three or more segments.
2	Attach the succeeding segments in the same manner.
3	Thread on the next segment and use the nut to apply torque to secure the connection. **Note:** For the SLG720 tighten each rod connection point to 6.0Nm (4.4ft-lbs).

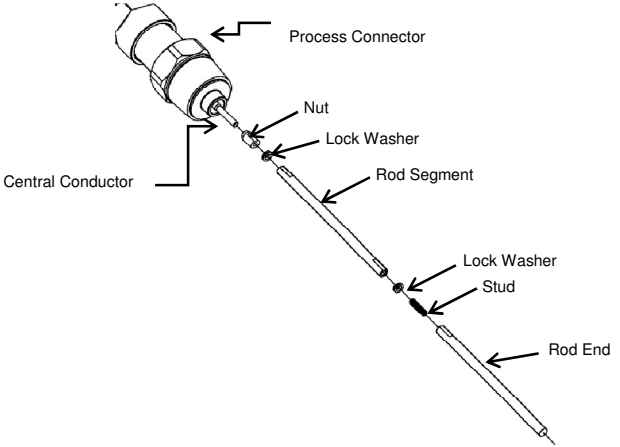


Figure 2: Rod probe assembly

Rope probe assembly

Rope probes are supplied with the end weight attached. Ensure the Electronic Housing is grounded before lowering a rope probe into a tank by using the internal terminal to connect the transmitter to earth ground.

See the WIRING section for more information on grounding.

Step	Action
1	The rope probe is attached to the central conductor at the process connector using a nut and lock washer. Fully thread the nut onto the central conductor and then place the lock washer over the thread.
2	Thread on the rope probe stud and use the nut to apply torque to secure the connection. **Note:** For the SLG720, tighten the rope stud and nut to 6.0Nm (4.4ft-lbs).

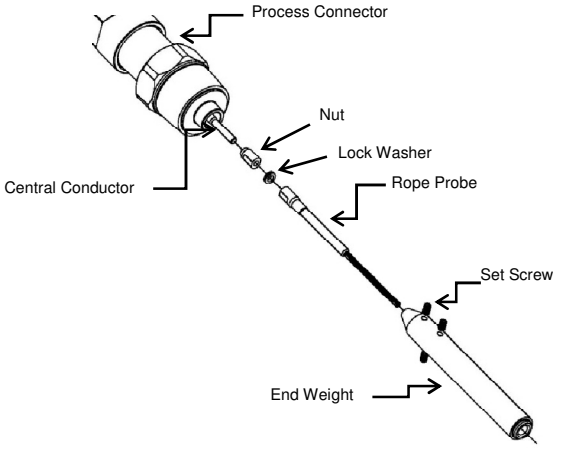


Figure 3: Rope probe assembly

Coaxial probe assembly

Coaxial probes are supplied in segments. Coaxial probes can be assembled in sections to be used in applications with limited headroom.

There are two aspects to assembly:

1. Assemble the inner conductor, and
2. Assemble the outer conductor.

Step	Action
1	Attach the inner conductor rod segments with a stud and lock washer.
2	Attach the rod probe at the process connector to the central conductor with a nut and lock washer.
3	Fully thread the nut onto the central conductor and then use the nut to apply torque to secure the connection. **Note:** For the SLG720, tighten each rod connection point to 6.0Nm (4.4ft-lbs).
4	When the inner rod is assembled, insert the PTFE spacers into the machined notches along the length of the inner conductor.
5	Assemble the coaxial outer conductor. The outer conductor is comprised of three types of segments: a starter segment, intermediate segment(s) and an end segment. **Note:** Depending coaxial probe requirements, there could be more than one intermediate segment. The starter segment has an internal M20x1 thread at one end and an external M22x1.5 thread at the other end. The intermediate segment(s) have two external M22x1.5 threads at both ends. The end segment has an external M22x1.5 thread on one end and an unthreaded end.
6	Attach the starter segment to the nipple on the process connector. Each segment is coupled together with coaxial couplers. Use the threaded end to screw the starter segment into the coupler. **Note:** Tighten the couplers to 30 Nm (22ft-lbs).
7	Insert two M3 set screws into the coupler and tighten to 1.0Nm (8.8in-lb).
8	When the outer conductor is assembled, slip the outer conductor over the inner rod and spacers. Thread the assembly onto the process connector.
9	Attach the outer conductor to the process connector and tighten to 30Nm (22ft-lbs).

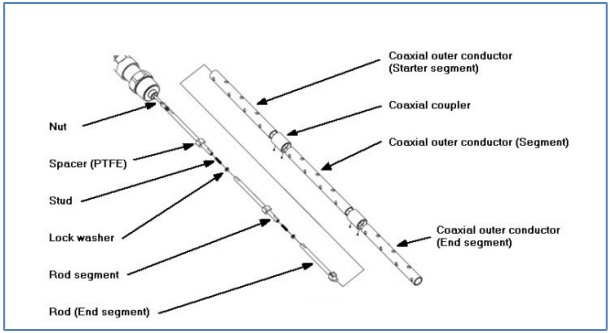


Figure 4: Coaxial Probe Assembly

Trimming the probe

Device	Action	
Rod probe	Where clearance to the bottom of the tank is less than 0.4" (10mm), the rod must be shortened. Rod probes are supplied in segments. Cut on the terminating rod segment (the one with the unthreaded end).	
Rope probe (Supplied with an end weight attached)	**1**	Loosen the three set screws holding the end weight to the rope.
	2	Remove the end weight from the rope.
	3	Measure the required rope length and apply adhesive tape around the rope at the intended cut location. **Note:** The tape helps hold the rope strands together when cutting.
	4	Make the cut using a bolt cutter or saw.
	5	Insert the rope back into the end weight and tighten the three set screws.
Coaxial probe	Due to the numerous spacers along the length of a coaxial probe, Honeywell does not recommend trimming a coaxial probe.	

MOUNTING THE TRANSMITTER

Flange mount

Step	Action
1	To mount a flange mounted transmitter, bolt the transmitter's flange to the flange on the roof of the tank.
2	On insulated tanks, remove enough insulation to accommodate the flange extension. **Note:** It is the End User's responsibility to provide a flange gasket and mounting hardware that are suitable for the transmitter's service condition.
3	Use unpainted, metal bolts to ensure a reliable electrical contact between the tank and transmitter.

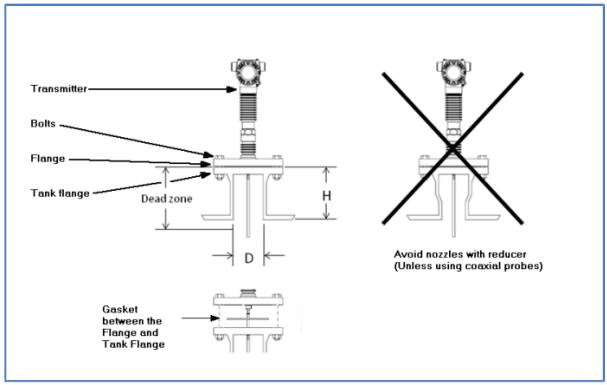


Figure 5: Flange mounting

Threaded mount

Step	Action
1	Weld the 1-inch mounting sleeve to the wall of the tank or to the hole cut on the pipe. Insert the meter body of the transmitter into the mounting sleeve and secure with the locking bolt.
2	Tighten the bolt to a torque of 6.4Nm ±0.30Nm [4.7ft.-lbs. ±0.2ft.-lbs.]

Figure 6: Tank roof mounting using a Treaded Mounting

The transmitter must be tightened to the appropriate torque setting. After this is complete, the part between the process connector and the sensor electronics housing can be rotated to the relevant position.

Product damage can occur if the joint between the sensor and the interface electronics housing is rotated. See Figure 1 for details.

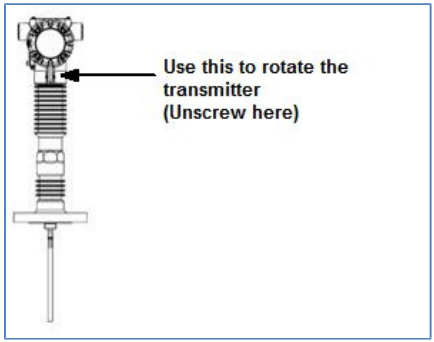


Figure 7: Rotate the transmitter

Mounting on a bypass / bridle

The SLG 700 transmitter can be mounted in a new or existing bypass pipe, bridle or a side pipe, see Figure 8.

- Bypass chambers and stilling wells are recommended to be 3 to 4" (75 to 100mm) in diameter.
- Chambers with smaller diameter can lead to problems with build-up.
- Chambers larger than 6" (150mm) can be used, but offer little advantage for radar measurement.
- The probe must extend the full length of the chamber, not contact the bottom of the chamber, or make contact with the chamber wall. Clearance from the bottom of the chamber is recommended to be 1in. (25mm). Probe selection is dependent on length.
- Use of a centering disk is advised for probes over 1m in length.

Centering discs are available where required to prevent a rigid probe from excessive movement where there are strong currents in the pipe.

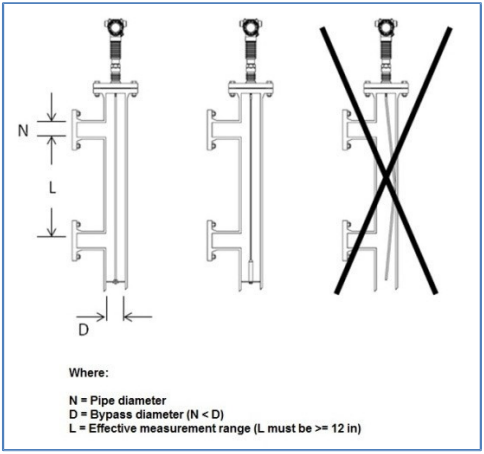


Figure 8: Bypass Installation

- Bypass chambers and stilling wells are recommended to be 3 to 4” (75mm to 100mm) in diameter.
- Chambers with smaller diameter can lead to problems with build-up.
- Chambers larger than 6”. (150mm) can be used, but offer little advantage for radar measurement.
- The probe must extend the full length of the chamber, not contact the bottom of the chamber, or make contact with the chamber wall. Clearance from the bottom of the chamber is recommended to be 1in. (25mm). Probe selection is dependent on length.
- Use of a centering disk is advised for probes over 1m in length.

Table 3: Bypass / Still Pipe Recommended Diameters

Probe type	Recommended diameter	Minimum diameter
Rod	3 or 4” (75 or 100mm)	2” (50mm)
Rope	4” (100mm)	2” (50mm)
Coaxial	N/A	1.5” (37.5mm)

Probe selection recommendations

- **Probes less than 20.6' (6.3m):** Rope probes with weight and centering disks are recommended.
- **Probes greater than 20.6' (6.3m):** Rod probes are recommended.
- **Probes over 3.3' (1m):** Use of centering disk is recommended.
- Bypass chambers and stilling wells need to be 3" to 4" (75mm to 100mm) in diameter.
- The probe must extend the full length of the chamber.
- The probe must not have any contact with the bottom of the chamber or the chamber wall.
- Clearance from the bottom should be 1" (25mm).

Remote mount

A remote mount allows the Electronic Housing to be mounted 3 m away from the process connector.

On insulated tanks, remove enough insulation to accommodate the mounting sleeve.

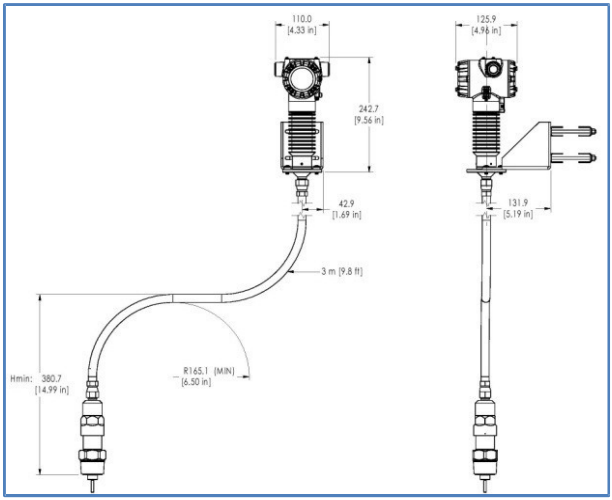


Figure 9: Remote Seal mounting

Non-metallic container mount

To install a single lead probe into a non-metallic (plastic) container, the probe must be mounted using a metal flange (> 2in / DN50) or screwed onto a metal sheet with a diameter > 8 in (200 mm), where threaded process connections are used.

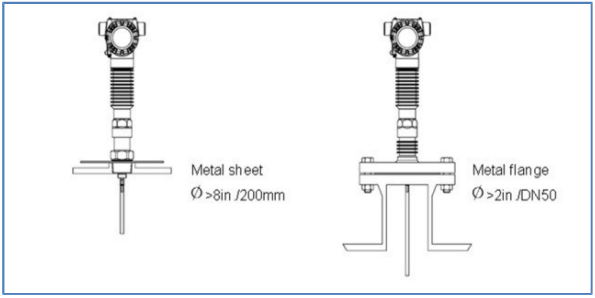


Figure 10: Non-metallic container mounting

Concrete silo mount

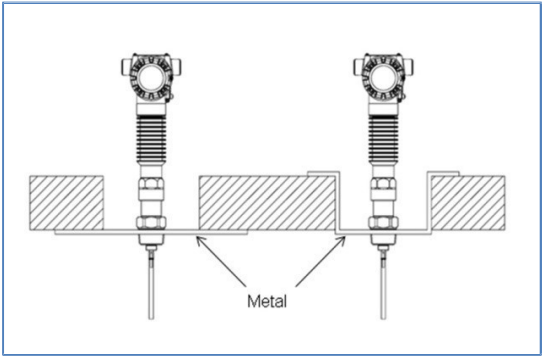


Figure 11: Concrete Silo Mount

No probe option

The guided wave radar transmitter is available with a no probe option where the transmitter is supplied with a nut and lock washer without a probe.

Table 4 provides recommendations for probe diameters and materials of construction.

Table 4: Probe Diameters

Model	Thread	Probe type	Recommended probe diameter	Recommended probe material
SLG720	M5x0.8	Rod	8mm	ASTM A-276, Type 316L, condition A
		Rope	4mm	ANSI T316

Conduit Entry Plugs and Adaptors

Procedures

It is the User/Installer's responsibility to install the Transmitters in accordance with national and local code requirements. Conduit entry plugs and adapters shall be suitable for the environment, shall be certified for the hazardous location when required and acceptable to the authority having jurisdiction for the plant.

CONDUIT ENTRY PRECAUTIONARY NOTICE

THE CONDUIT/CABLE GLAND ENTRIES OF THIS PRODUCT ARE SUPPLIED WITH PLASTIC DUST CAPS WHICH ARE NOT TO BE USED IN SERVICE. IT IS THE USER'S RESPONSIBILITY TO REPLACE THE DUST CAPS WITH CABLE GLANDS, ADAPTORS AND/OR BLANKING PLUGS WHICH ARE SUITABLE FOR THE ENVIRONMENT INTO WHICH THIS PRODUCT WILL BE INSTALLED. THIS INCLUDES ENSURING COMPLIANCE WITH HAZARDOUS LOCATION REQUIREMENTS AND REQUIREMENTS OF OTHER GOVERNING AUTHORITIES AS APPLICABLE

Use the following procedures for installation.

Conduit Entry Plugs

Step	Action
1	Remove the protective plastic cap from the threaded conduit entry.
2	To ensure the environmental ingress protection rating on tapered thread (NPT), a non-hardening thread sealant may be used.
3	Thread the appropriate size conduit plug (M20 or ½" NPT) into the conduit entry opening. Do not install conduit entry plugs in conduit entry openings if adapters or reducers will be used.
4	Tighten adapters according to the following torque: **Torque:** 32Nm to 24lb-ft

Conduit Adapters

Step	Action
1	Remove the protective plastic cap from the threaded conduit entry.
2	To ensure the environmental ingress rating on tapered threads (NPT), a non-hardening thread sealant may be used.
3	Thread the appropriate size adapter (M20 or ½" NPT) into the conduit entry opening
4	Tighten adapters according to the following torque: **Torque:** 32Nm to 24lb-ft

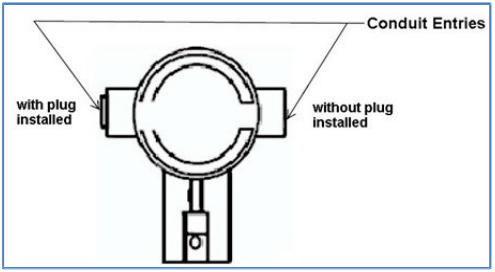


Figure 12: Electronic Housing Conduit Entries

Note: Plugs do not come installed in the housings. All housings come with temporary plastic dust protectors (red) installed and are not certified for use in any installation.

WIRING

The transmitter is designed to operate in a two-wire / current loop with loop resistance and power supply voltage within the operating range for HART installations as described in Figure 13.

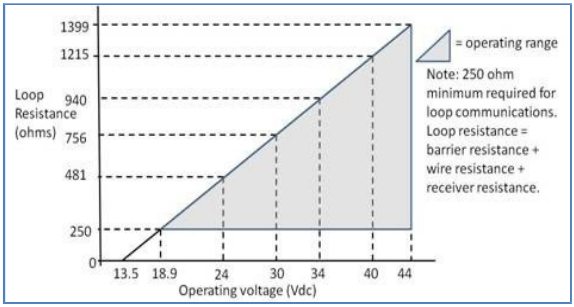


Figure 13: HART Operating Voltage (Vdc)

Loop wiring is connected to the Transmitter by attaching the positive (+) and negative (–) loop wires to the Loop positive (+) and negative (–) signal screws respectively on the terminal block in the electronic housing of the transmitter. See Figure 14.

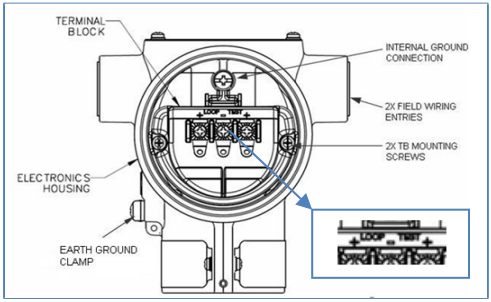


Figure 14: HART Terminal Block and Grounding Screw Location

Note: The rightmost terminal as shown in Figure 14 is for a loop test and is not available in the Fieldbus option.

HART Installations

For all HART installations, Honeywell recommends the HART resistor to be placed on the positive side.

Fieldbus Foundation Installations

The Level transmitter will operate from 9Vdc to 32Vdc.

The transmitter has an internal terminal to connect to the ground (earth).

An external ground wiring is supplied. While it is not necessary to ground the transmitter for proper operation, grounding the terminal can minimize the possible effects of noise on the output signal and protects the housing from lightning and static discharge.

An optional terminal block with lightening protection can be installed in place of the non-lightning protection terminal block for Transmitters that will be installed in areas susceptible to lightning strikes.

Wiring must comply with local codes, regulations and ordinances. Grounding may be required to meet various approval body certification, for example CE conformity. Refer to the SmartLine Level Guided Wave Radar User's Manual 34-SL-25-11

Note: The terminal block is polarity-insensitive.

See the SLG 700 User Manual (34-SL-25-11) for details on the voltage calculation.

HART wiring procedure

Step	Action
1	Ensure the loop power supply is off.
2	Remove the end cap cover from the terminal block end of the Electronics Housing
3	Insert the power leads through each conduit entrance. The transmitter accepts wire thicknesses up to 16AWG.
4	Plug the unused conduit entrance.
5	Connect the positive loop power lead to the positive (+) terminal and the negative loop power lead to the negative (-) terminal. The Transmitter is polarity-insensitive.
6	Replace the end cap, and secure it in place.
7	**Optional:** Transmitters that comply with the ATEX 4 directive for self-declared approval per 94/9EC, the power supply must indicate a voltage limiting device. Voltage should not exceed 42Vdc. See the process design system documentation for specifics.

Explosion-proof conduit seal

When installed as explosion-proof in a hazardous location, keep covers tight while the transmitter is energized. Disconnect power to the transmitter in the non-hazardous area prior to removing end caps for service.

When installed as non-incendive or non-sparking equipment in a hazardous location, disconnect power to the transmitter in the non-hazardous area, or determine that the location is non-hazardous before disconnecting or connecting the transmitter wires.

US Installations

Transmitters installed as explosion proof in Class I, Division 1, Group A Hazardous (classified) locations in accordance with ANSI/NFPA 70, the US National Electrical Code, with ½"conduits, do not require an explosion-proof seal for installation.

Conduits with a ¾" conduit, require a LISTED explosion-proof seal installed in the conduit. The seal must be installed within 18" (457.2mm) of the transmitter.

SET THE JUMPERS FOR HART

The SmartLine Level Transmitter (HART) provides two jumpers to set the desired failsafe action and Write Protect option. See Figure 15.

Table 5: Jumpers for HART

Top Jumper - HART	Bottom Jumper - FF
Default: Up-Scale Failsafe	**Default:** OFF (Un-protected)
Sets the Failsafe direction.	Sets the Write Protect
Up-Scale drives the loop to a value greater than 21mA. Down-Scale drives the loop to a value less than 3.8mA.	**ON (Protected) position:** Changed configuration parameters cannot be written to the transmitter. **OFF (Un-protected) position:** Changed configuration parameters can be written to the transmitter.

	**ATTENTION**: Electrostatic Discharge (ESD) hazards. Observe precautions for handling electrostatic sensitive devices
Step	**Action**
1	Turn OFF Transmitter power.
2	Loosen the end-cap lock, and unscrew the end cap from the Electronics side of the Transmitter housing.
3	If applicable, carefully depress the tabs on the sides of the Display Module and pull it off. If necessary, move the interface connector from the Communication Module to the display module to provide the preferred orientation of the display module in the window.
4	Set the Failsafe Jumper (top jumper) to the desired action (UP or DOWN). And the Write Protect jumper (Bottom jumper) to the desired behavior (Protected or Unprotected) See Table 6 for jumper positioning.
5	Screw on the end-cap and tighten the end-cap lock.
6	Turn ON Transmitter power.

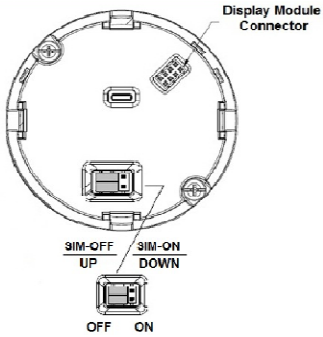


Figure 15: HART Jumper Location

Table 6: Jumper Settings

Image	Description
	*Failsafe = UP (High)* *Write Protect = OFF (Not Protected)*
	*Failsafe = DOWN (Low)* *Write Protect = OFF (Not Protected)*
	*Failsafe = UP (High)* *Write Protect = ON (Protected)*
	*Failsafe = DOWN (Low)* *Write Protect = ON (Protected)*

Write protect jumpers on Foundation Fieldbus (FF)

There is no Failsafe jumper on the Foundation Fieldbus transmitters, but there is a Write Protect jumper.

	**ATTENTION:** Electrostatic Discharge (ESD) hazards. Observe precautions for handling electrostatic sensitive devices.
	**WARNING!** PERSONAL INJURY: Risk of electrical shock. Disconnect power before proceeding. HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible. Failure to comply with these instructions could result in death or serious injury.

Step	Action
1	Turn OFF Transmitter power.
2	Loosen the end-cap lock, and unscrew the end cap from the Electronics side of the Transmitter housing.
3	If applicable, carefully depress the tabs on the sides of the Display Module and pull it off. If necessary, move the interface connector from the Communication Module to the display module to provide the preferred orientation of the display module in the window.
4	Set the Write Protect jumper (Bottom jumper) to the desired behavior (Protected or Unprotected). See Table 4 for jumper positioning.
5	Screw on the end cap and tighten the end-cap lock.
6	Turn ON Transmitter power.

Table 7: Fieldbus Write Protect

Image	Description
	*Fieldbus SIM Mode = OFF* *Write Protect = OFF (Not Protected)*
	*Fieldbus SIM Mode = OFF* *Write Protect = ON (Protected)*
	*Fieldbus SIM Mode = ON* *Write Protect = OFF (Not Protected)*

CONFIGURATION GUIDE

The SLG 700 transmitters have three display options:

- Basic LED Display: 2 lines, 16 character (H = 4.13mm, W = 1.83mm)
- Advanced LED Display: Multi-line display.
- No Display: Configuration is not available.

Use Table 8 to configure Basic Display transmitters and Table 9 to configure Advanced Display transmitters. See the SLG 700 SmartLine Level User's Manual (34-SL-25-11) for more information.

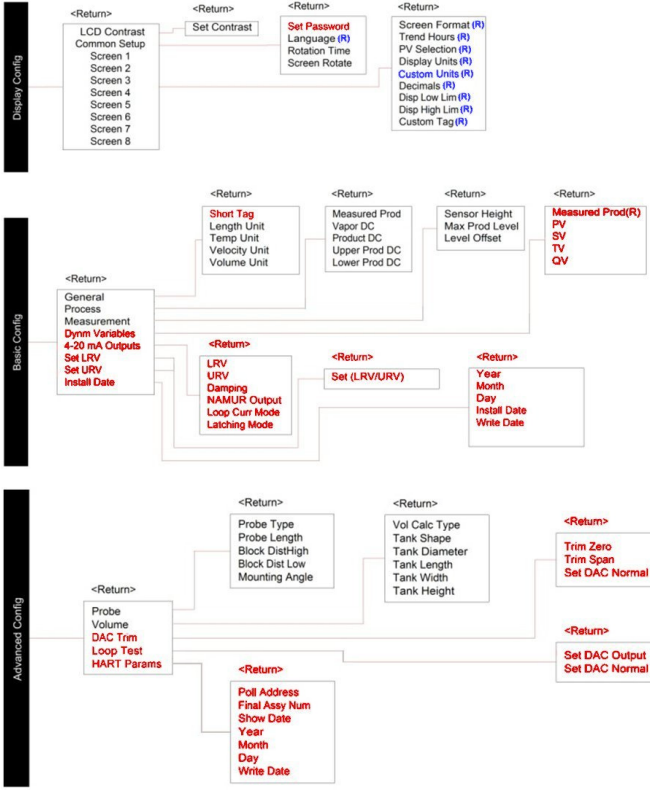
Table 8: Basic Display Configuration

Parameter	Applicability	Locally Writable
LCD Contrast	Always	Yes
Rotation Time		
Screen Rotate		
Select Screen	HART	
Screen #		
Screen # PV		
Screen # Decimal		
Screen # Units		
Short Tag		
Length Unit	Always	
Volume Unit		
NAMUR Output	HART	
Damping		
Measure Prod	Always	
Vapor DC		
Product DC[1]		
UP DC[2]		
LP DC[2]		
Sensor Height		
Max Prod Level		
Level Offset		
DAC Zero Trim	HART	
DAC Span Trim		
Loop Test		
LRV	Always	
URV		
Set LRV	HART	
Set URV		
Install Date		
Probe Type	Always	
Probe Length		
Mounting Angle		
Block Dist High		
Block Dist Low		
Device ID	HART	No
Firmware	Always	
Protocol		
Model Key		

[1] Visible for Single measured product
[2] Visible for 2 liquid measured products

Table 9: Advanced Display Configuration

See the SLG 700 SmartLine Level User Guide (34-SL-25-11) for more information.
Items in **red** are for HART only, items in **blue** are for Fieldbus only. (R) = Read only




Monitor
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Critical Diag
Non Crit Diag
Device Vars
Display Info
Comm Info
Sensor Info
Echo Stem Plot
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Active Diags (R)
Sensor Module (R)
Comm Module (R)
Sensor Comm (R)
Detailed Diag
Sensor Int RAM (R)
Sensor Ext RAM (R)
Sensor Flash CRC (R)
Sensor Pwr Vosc (R)
Sensor Power 2.5V (R)
Sensor Power 3.3V (R)
Probe Missing (R)
Sensor Pwr Accum (R)
Sensor Execution (R)
Sensor Oscilator (R)
Factory Mode (R)
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Elec Module Temp (R)
DAC Temp Comp (R)
Sensor Comm (R)
Display Setup (R)
Characterized (R)
Charact. Status (R)
PV Range (R)
Sensor Over Temp (R)
Prod Sgnl Str (R)
UP Sgnl Strength (R)
Prod Sgnl Qlty (R)
UP Sgnl Quality (R)
LP Sgnl Strength (R)
LP Sgnl Quality (R)
Sensing Section (R)
Blk Dist Hi Zone (R)
Blk Dist Lo Zone (R)
Snsr Calibrated (R)
Calibration Type (R)
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Measurd Prod Lvl (R)
Prod Sgnl Str (R)
UP Sgnl Strength (R)
Prod Sgnl Qlty (R)
UP Sgnl Quality (R)
LP Sgnl Strength (R)
LP Sgnl Quality (R)
Int Elec Temp (R)
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Firmware Version (R)
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Protocol (R)
Universal Rev (R)
Field Device Rev (R)
Software Rev (R)
Burnout Status (R)
Phy Sgnl Type (R)
LRL (R)
URL (R)
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Firmware Version (R)
Model Key (R)
Device Id (R)
Sensor Tech (R)
Process Connect (R)
LRL (R)
URL (R)
<Return>
Show True Dist
Duration
Show Stem Plot

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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