Honeywell

SLG 700 Quick Start Guide, SmartLine Level Guided Wave Radar

34-SL-25-04, Revision 7.0, December 2017

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.

Revision History
1.0 – 1st release
2.0 – Updated display menus
3.0 – R101 release.
4.0 – R101 Fieldbus updates.
5.0 – R102 Updated display menus
6.0 – R102 Fieldbus updates.
7.0 – R200 Saturated Steam

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 700 Safety Manual	34-SL-25-05
SLG 700 SmartLine Level Guided Wave Radar, 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 1.5 mm
· Rook, Electronics housing	AF 2.0mm
· End weight (SWA, SWB)	AF 2.5 mm
Wrenches:	
· Rod probe (8mm) (SRA, SRH, SRJ)	AF 7 mm
· Rod probe (16mm) (SRC, SRK, SRL)	AF 14 mm
· Saturated Steam reference reflector	AF 20 mm
· Mounting thread ¾" and 1" (SLG 720)	AF 40 mm
· Mounting thread 1½" (SLG 720)	AF 50 mm
· Mounting thread 2" (SLG 720)	AF 60 mm
• Mounting thread 1½", 2" (SLG 726)	AF 60 mm
• Coaxial probe outer process connector (SCA, SCB)	Process compatible thread locking compound (i.e. Loctite 242)
• Coaxial probe outer process connector (SLG 720, SCA, SCB)	Retaining ring pliers for internal diameter 20 mm
• Coaxial probe outer process connector (SLG 720, SCA, SCB)	Retaining ring pliers for internal diameter 40mm
• Probe nut (8mm)	AF 8 mm
• Probe nut (16mm)	AF 14 mm
• Probe nut (saturated steam)	AF 20 mm
To shorten rod and coaxial probes	Saw
To shorten wire probes	Saw or bolt cutter
To drill hole in coaxial outer tube (SLG 720)	Drill and 6.0 mm drill bit
Wire cutter / stripper	
M20 conduit entry plugs	10 mm hex wrench
½" NPT conduit entry	1¼" wrench
½" to ¾" NPT adapter	1¼" wrench

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
Humidity %RH	0 to 100		0 to 100	

[1] LCD Display operating temperature -20℃ to +70℃. Storage temperature -30℃ to 80℃.

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.

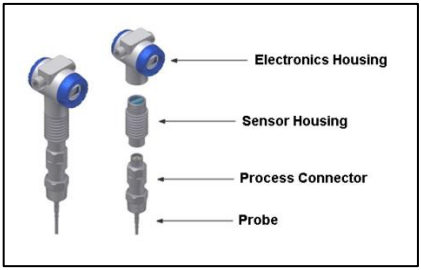


Figure 1: Transmitter components

CAUTION: Ensure the Electronic Housing is grounded before lowering a probe into a tank by using the internal terminal or external terminal to connect the transmitter to earth ground.

See the WIRING section for more information on grounding.

Rod probe assembly

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

Step	Action
1	Fully thread the nut onto the central conductor. Using a lock washer, thread the first rod segment on to the central conductor. Torque the nut against rod probe and lock washer to secure the connection.
2	Thread the stud into first rod segment end. Using a lock washer thread the next segment onto the stud. Apply torque to secure the connection.
Note: Tighten each rod connection point to the following torques: • SLG720 6.0 Nm (4.4 ft-lbs) • SLG726 15 Nm (11 ft-lbs)	
Note: For flanged SLG726 models, ensure the nut does not intrude into the process connector. See Figure 3 for more information.	

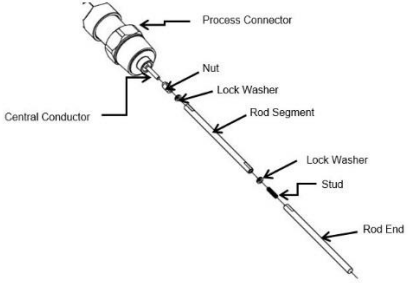


Figure 2: Rod probe assembly

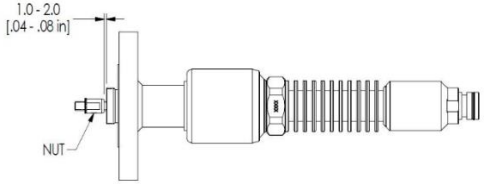


Figure 3: SLG726 flanged process connection, probe nut installation position, mm [in] probe selection

Wire probe assembly

Step	Action
1	Fully thread the nut onto the central conductor. Using a lock washer, thread the wire swage on to the central conductor. Torque the nut against probe and lock washer to secure the connection. **Note:** Tighten the wire stud and nut to the following torque: • SLG720 6.0 Nm (4.4 ft-lbs) • SLG726 15 Nm (11 ft-lbs)
2	If applicable, insert wire probe into end weight. Tighten the 3 set screws to secure end weight to wire probe **Note:** Torque set screws to 6 Nm (4.4 ft-lbs)
Note: For flanged SLG726 models, ensure the nut does not intrude into the bore of the process connector. See Figure 3 for more information.	

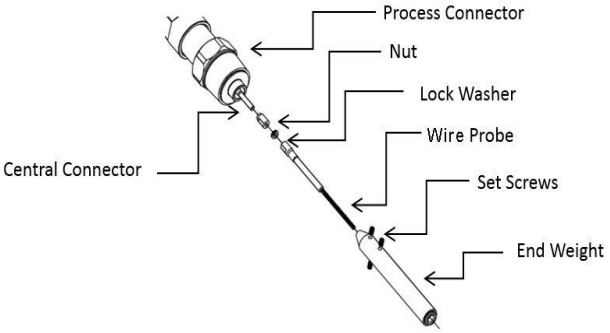


Figure 4: Wire probe assembly

Coaxial probe assembly

Coaxial probes are constructed out of an inner rod and an outer tube. Depending on the length of the coaxial probe it may be constructed out of several segments.

Note: For the flanged HTHP, when constructing the probe, the nut should not intrude into the body of the process connector.

SLG720

Probe construction will depend on the length of the probe. In the case of the SLG 720 the inner rod is constructed out of 1.0m segments and the outer tube is constructed out of 2.0m segments.

There are 2 types of rod segment: and extension segment and an end segment. Extension segments have threads on both ends and the end segment has threads on one end. Rod segments are joined to each other using a stud and lock washer.

There are 3 types of tube segment: Starter segments, extension segments and end segments. Starter segments have an internal thread on one end and an external thread on the other. Extension segments have external threads on both ends. End segments have an external thread on one end and a clean end. The outer tube segments are joined using tube couplers.

Probe Length ≤ 1.0m

Step	Action
1	Fully thread the nut onto the central conductor of the process connector. Place a lock washer between the locknut and the rod segment and torque the nut against the rod segment and lock washer to secure the connection. Note: Tighten rod connection point to the following torque: • SLG720 6.0 Nm (4.4 ft-lbs).
2	Slip the coaxial outer tube over the rod and spacer and tighten to the process connector. Note: Tighten connection point to the following torque: • SLG720 30 Nm (22 ft-lbs). • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
3	Insert an end spacer into the end of tube. Align the holes in the end spacer with the holes in the outer tube and insert the 2 locking pins. Refer to Detail B of Figure 5.

Probe Length 1.0m to 2.0m

Step	Action
1	Fully thread the nut onto the central conductor of the process connector. Place a lock washer between the locknut and the rod segment and torque the nut against the rod segment and lock washer to secure the connection. **Note:** Tighten rod connection point to the following torque: • SLG720 6.0 Nm (4.4 ft-lbs)
2	Slide a spacer onto first rod. Connect the rod "end" segment to first rod using a stud and lock washer. Refer to Detail A of Figure 5. Note: Tighten rod connection point to the following torque: • SLG720 6.0 Nm (4.4 ft-bls)
3	Slip the coaxial outer tube over the rod and tighten to the process connector. Note: Tighten connection point to the following torque: • SLG720 30 Nm (22 ft-lbs) It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
4	Insert an end spacer into the end of tube. Align the holes in the end spacer with the holes in the outer tube and insert the 2 locking pins. Refer to Detail B of Figure 5.

Probe Length > 2.0m

Probes over 2m in length will always have a starter tube segment and an end tube segment. They may have 0 to 2 extension tube segments. It is advisable to build the probe up 2m at a time. The assembly procedure starts as follows:

Step	Action
1	Fully thread the nut onto the central conductor of the process connector. Place a lock washer between the locknut and the first rod segment and torque the nut against the rod segment and lock washer to secure the connection. **Note:** Tighten rod connection point to the following torque: • SLG720 6.0 Nm (4.4 ft-lbs)
2	Prior to securing the next rod segment, place a Teflon spacer over the rod segment end. The wrench flats on the rod end will index the spacer.
3	Connect the subsequent rod segment using a stud and lock washer. **Note:** Tighten rod connection point to the following torque: SLG720 6.0 Nm (4.4 ft-lbs)
4	Slip the starter coaxial outer tube with internal threads over the rod and tighten to the process connector. **Note:** Tighten connection point to the following torque: • SLG720 30 Nm (22 ft-lbs) It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
5	If the probe length is over 4m. Repeat Step 2 and 3 to connect the subsequent 2 rod extension segments. Then use a tube coupler to attach the next tube extension segment. Insert 2 M3 set screws into each coupler. **Note:** Tighten M3 set screws to the 1.0Nm (8.8in-lb). It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on each set screw.
6	If the probe length is over 6m. Repeat Step **5.**

7	Install the rod end segment by repeating Step 2 and 3. Then use a tube coupler to attach the tube end segment. Insert 2 M3 set screws into each coupler. **Note:** Tighten M3 set screws to the 1.0Nm (8.8in-lb). It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on each set screw.
8	Insert and end spacer into the end of the tube. Align the holes in the end spacer with the holes in the outer tube and insert the 2 locking pins. Refer to Detail B of Figure 5.

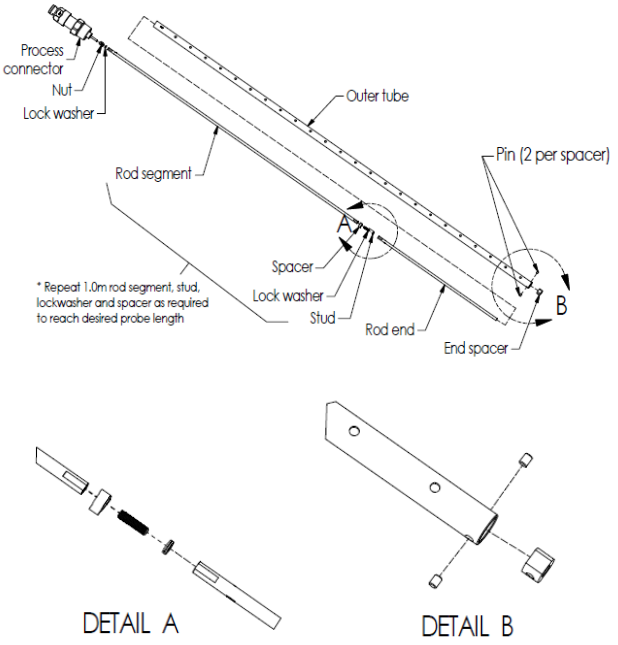


Figure 5: SLG720 Coaxial Probe Assembly

SLG726

Depending on the length of the probe there may be 0 to 3 2.0m rod segments.

- Coaxial probes ≤ 2.0m are shipped with a single outer tube.
- Coaxial probes > 2.0m are shipped with the outer tube in segments.

Probe Length ≤ 2.0m

Step	Action
1	Thread the nut onto the central conductor of the process connector. Refer to Figure 3 for nut position on flanged process connectors. Place a lock washer between the locknut and the first rod segment. Torque the nut against the rod segment and lock washer to secure the connection. **Note:** Tighten rod connection point to the following torque: • SLG726 15 Nm (11 ft-lbs)
2	Slip the coaxial outer tube over the rod and tighten to the process connector. **Note:** Tighten rod connection point to the following torque: • SLG726 15 Nm (1 1ft-lbs) • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
3	Install end spacer between central conductor and outer tube in counterbore. Secure end spacer using the retaining ring.

Probe Length > 2.0m

Step	Action
1	Thread the nut onto the central conductor of the process connector. Refer to Figure 3 for nut position on flanged process connectors. Place a lock washer between the locknut and the first rod segment. Torque the nut against the rod segment and lock washer to secure the connection. **Note:** Tighten rod connection point to the following torque: • SLG726 15 Nm (11 ft-lbs)
2	Slip the coaxial outer tube with internal threads over the rod and tighten to the process connector. **Note:** Tighten rod connection point to the following torque: • SLG726 15 Nm (11 ft-lbs) • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.

3	Prior to securing the next rod segment, place a “star shaped” spacer over the rod segment end. The wrench flats on the rod end will index the spacer.
4	Depending on the probe length there could be 0 to 2 more rod segments and 1 rod "end" segment to assemble. Connect the subsequent rod segment to first, using a stud and lock washer. **Note:** Tighten rod connection point to the following torque: • SLG726 15 Nm (11 ft-lbs) • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
5	Slip a coaxial coupler over the last rod segment and spacer and tighten onto the previous outer tube segment. **Note:** Tighten rod connection point to the following torque: • SLG726 30Nm (22ft-lbs) • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
6	Depending on probe length there may be 0 to 2 coaxial outer tube "extension" segments and 1 coaxial tube "end" segment. Slip the next coaxial tube "extension" segment over the last rod segment and spacer and tighten to the coaxial coupler. **Note:** Tighten rod connection point to the following torque: • SLG726 30 Nm (22 ft-lbs) • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
7	Repeat steps 3-6 above until only the rod "end" segment and coax tube "end" segment remain.
8	Attach the last "star shaped" spacer over the previous rod segment end, as in step 3 above.
9	Attach rod "end" segment as in step 4 above.
10	Slip the coaxial coupler over the rod and spacer and tighten. **Note:** Tighten rod connection point to the following torque: • SLG726 30 Nm (22 ft-lbs) • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.

11	Slip the coaxial end segment over the rod end segment and secure to coaxial coupler. **Note:** Tighten rod connection point to the following torque: • SLG726 30 Nm (22 ft-lbs) • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on the outer conductor threaded joints.
12	Install the end spacer between central conductor and outer tube in counterbore. Secure end spacer using the retaining ring.
13	Insert 2 M3 set screws into each coupler. **Note:** • Tighten M3 set screws to the 1.0 Nm (8.8 in-lb). • It is recommended that a process compatible thread locking compound (i.e. Loctite 242) be used on each set screw.

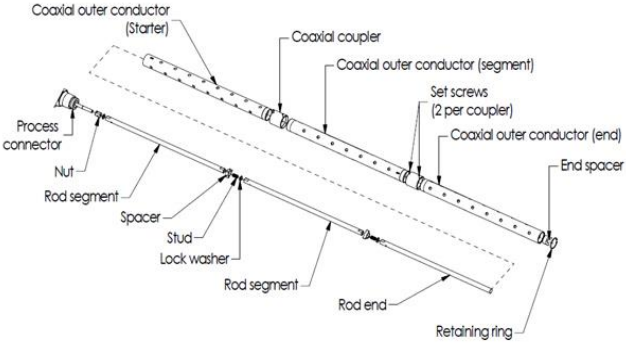


Figure 6: SLG726 Coaxial probe assembly

Saturated Steam Application Probe Assembly

Saturated steam application is available with SLG726 rod and coax probes. The nut and first inner rod segment have a larger diameter. The remaining hardware is identical. Refer to Figure 7 for saturated steam hardware. To assemble the probes, thread the saturated steam application nut to the central conductor, tapered end towards the process connector. For flanged process connectors, ensure the nut position is as shown in Figure 3. Place a lock washer between the locknut and the steam reference rod. Torque the connection to 15 Nm (11 ft-lbs). Proceed with the standard assembly procedures detailed above.

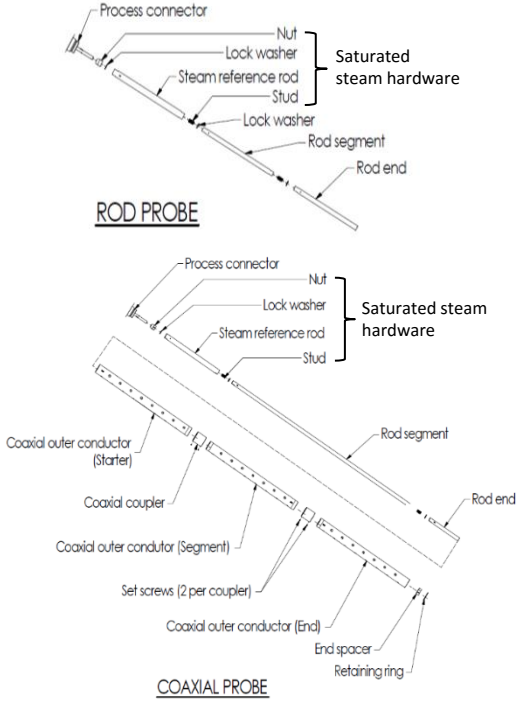


Figure 7 Saturated steam probe assembly

Trimming the probe

WARNING: Trimming the probe requires that the probe length configured in the transmitter is changed accordingly.

Device	Action	
Rod probe	Where clearance to the bottom of the tank is less than 0.4″ (10 mm), the rod must be shortened. Rod probes are supplied in segments. Cut on the terminating rod segment (the one with the unthreaded end).	
Wire probe (Supplied with an unattached end weight)	1	Loosen the three set screws holding the end weight to the wire.
	2	Remove the end weight from the wire.
	3	Measure the required wire length and apply adhesive tape around the wire at the intended cut location. Note: The tape helps hold the wire strands together when cutting.
	4	Make the cut using a bolt cutter or saw.
	5	Insert the wire back into the end weight and tighten the three set screws.
Coaxial probe **Note: Applicable only to SLG720**	1	A Coaxial probe consists of an inner rod and coaxial outer tube. To trim the coaxial probe, both inner rod and coaxial outer tube need to be trimmed. For trimming the inner rod, refer to rod probe trimming instruction detailed above. Avoid trimming the internal thread region of the inner rod.
	2	To trim the coaxial outer tube, start on the terminating segment (the one with the unthreaded end). Mark and trim the outer tube to the same amount as the inner rod. Avoid trimming the coupler region of the outer tube.
	3	Drill a 6 mm hole through the end of the outer tube at location shown in **Error! Reference source not found.**.

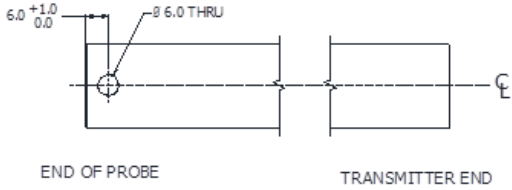


Figure 8: Drill hole position on outer tube

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.

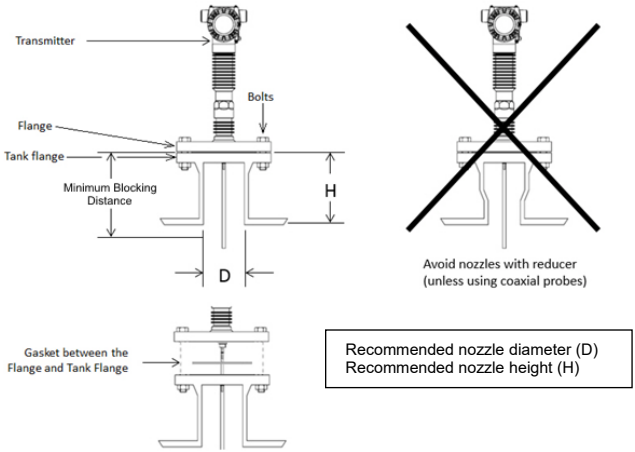


Figure 9: Flange mounting

Threaded mount

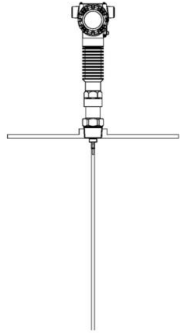


Figure 10: Tank roof mounting using a Threaded Mounting

Step	Action
1	Transmitters with threaded process connectors can be screwed to tanks or nozzles with threaded bosses. For tanks with BSP/G threads, place a gasket on top of the tank, or use a sealant on the threads of the tank connection.

The transmitter must be tightened to the appropriate torque setting. After this is complete, the sensor and transmitter electronics housings can be rotated to the relevant position. Loosen lower two set screws to rotate, see Figure 11.

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

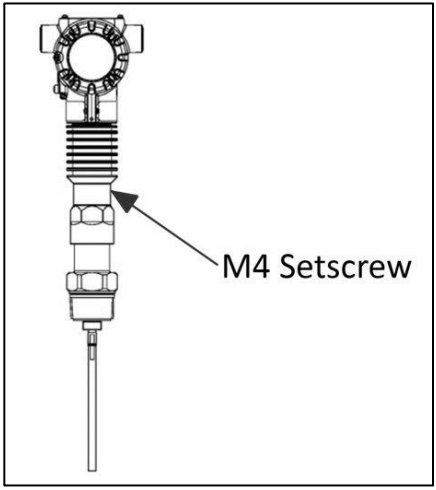
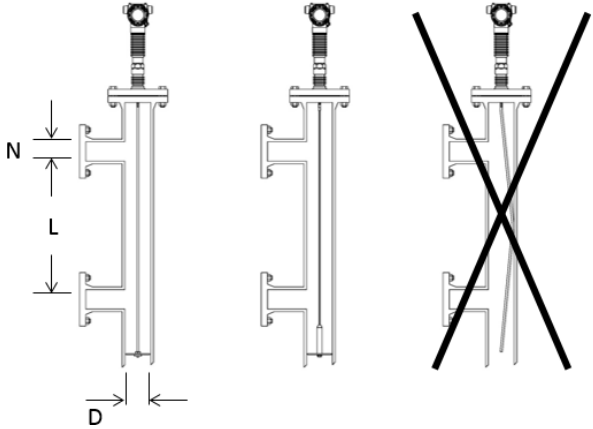


Figure 11: Rotate the transmitter

Mounting on a bypass, bridle, or still well

The SLG 700 transmitter can be mounted in a new or existing bypass pipe, bridle, or a side pipe, see **Figure 12**.

This type of installation is often simpler and allows the addition of radar level measurement to an otherwise busy installation. A similar installation is also possible inside the main container, when installing the SLG700 transmitter on a stilling well.



N = Pipe diameter

D = Bypass diameter (N < D)

L = Effective measurement range (L must be >= 12″

Figure 12: Bypass Installation

Table 3: SLG720 bypass and stillwell recommended diameters

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

Table 4: SLG726 bypass and stillwell recommended diameters

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

Chambers, bypass pipes, and still wells with smaller diameter can lead to problems with build-up. Chambers larger than 6" (150 mm) can be used, but offer little advantage for radar measurement.

The probe must extend the full length of the chamber and 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 1" (25 mm). Probe selection is dependent on length.

For lengths less than 20′ 8″ (6.3 m): Rod probe is recommended.

For lengths more than 20′ 8″ (6.3 m): Wire probe with weight and centering disk is recommended, only wire probes are available.

A centering disk is recommended for rod probes over 1m length to prevent excessive movement caused by strong currents inside the pipe.

Mounting on a non-metallic container

To install a single lead probe into a non-metallic (plastic) vessel, the probe must be mounted with a metal flange (>2″/DN50) or if a threaded process connection is in use, the probe must be screwed into a metal sheet (diameter > 8″/200 mm).

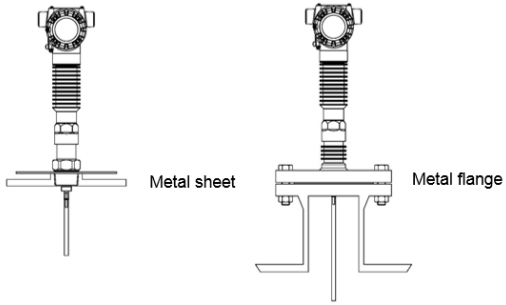


Figure 13: Mounting on a non-metallic vessel

Figure 14 depicts an example of mounting in concrete silos, the placement of the concrete versus the metal sheet used to secure the transmitter. Both Figure 13 and Figure 14 are considered non-metallic mounts. Both types of mountings are subject to the same specifications as described in Mounting on a non-metallic container.

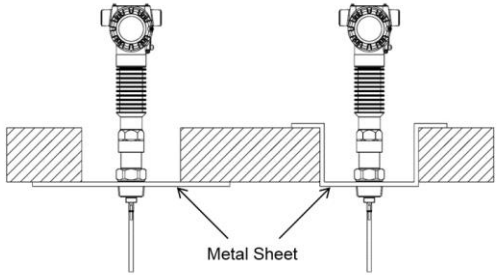


Figure 14: Mounting in concrete silos

Remote mount

In applications where a remotely mounted display is required, the remote mount allows the electronics housing to be mounted 3m away from the process connector. This can be useful when access to the mounting location is limited. To assemble the remote mount, attach the process connector first, followed by securing the mounting bracket to a pipe or wall. Secure the electronics module to the bracket with the 3 supplied M6 screws. Connect the cable and check bends for minimum radius (see Figure 15) to prevent damage. Torque the 2 nuts to 6 Nm (4.4 ft-lbs).

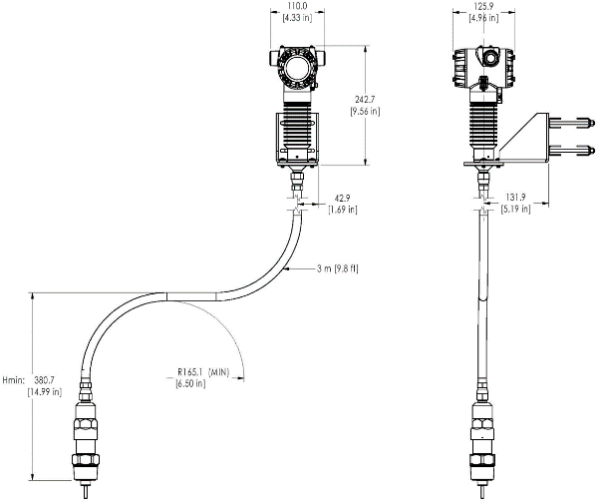


Figure 15: Remote mount

Nozzle mount

The transmitter can be mounted to a tank nozzle using the appropriate flange. See Figure 9 for an example. Table 5 shows recommended nozzle dimensions based on probe type.

Table 5: SLG720 recommended nozzle dimensions

	Single probe (rod/wire)	Coaxial probe
Recommended nozzle diameter (D)	6" (150 mm)	> probe diameter
Minimum nozzle diameter (D)	2" (50 mm)	> probe diameter
Recommended nozzle height (H)	4" (100 mm) + nozzle diameter (*)	N/A
(*) When using a flexible probe in nozzles taller than 6" (150 mm) the SWB wire probe with extension stud is recommended. SWB or PWB are options in the model selection guide. These offer a 300 mm rod extension to keep the selection of the wire probe that is in the nozzle, from moving.		
Note: The Blocking Zone is an area on the transmitter where no measurements are performed.		

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 6 provides recommendations for probe diameters and materials of construction.

Table 6: Probe Diameters

Model	Thread	Probe type	Recommended probe diameter	Recommended probe material
SLG720	M5x0.8	Rod	8 mm	ASTM A-276, Type 316L, condition A, or ASTM B574 alloy UNS N10276 solution annealed.
		Wire	4 mm	ANSI T316
SLG726	M10x1.5	Rod	16 mm	ASTM A-276, Type 316L, condition A
		Wire	4 mm	ANSI T316 (7x7 construction)

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

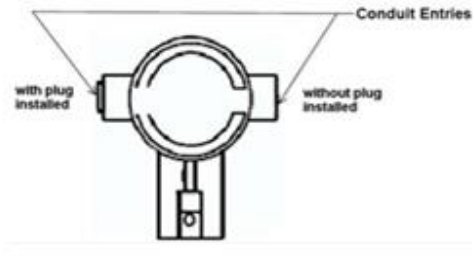


Figure 16: Electronic Housing Conduit Entries

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: 32 Nm or 24 lb-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: 32 Nm or 24 lb-ft.

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

WIRING

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*, Document #34-SL-25-11.

HART / 4-20mA Operating Ranges

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 / 4-20 mA installations as described in Figure 17.

Supply Voltage (Vdc)	Max. Loop Resistance (Ohms)
14	0
19.5	250
24	459
30	750
34	917
40	1200
42	1284

Note: A minimum of 250 Ohms of loop resistance is required to support HART communications.

$$Loop\ resistance = barrier\ resistance + wire\ resistance + receiver\ resistance$$

For all HART installations, Honeywell recommends the HART resistor to be placed on the positive side. Voltage should not exceed 42 VDC. See the process design system documentation for specifics.

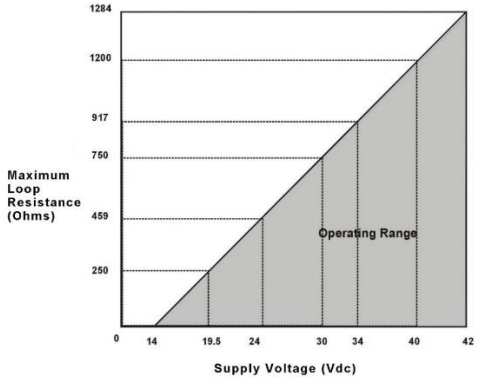


Figure 17: HART / 4-20 mA Operating Voltage (VDC)

See the *SLG 700 User's Manual*, Document #34-SL-25-11 for details on the voltage calculation, and guidance when considering the resistance of intrinsic safety barriers.

	Loop wiring is connected to the Transmitter by simply attaching the positive (+) and negative (–) loop wires to the first two terminals on the left, marked with LOOP+ and LOOP- on the transmitter body in the Electronic Housing as shown in Figure 18. The third terminal to the right is a TEST terminal and is only used for loop current diagnostics / measurements.
	TIP: A current measurement device with low internal resistance (< 10ohms) can be connected between the TEST terminal "+" and the TEST terminal "-" of the Transmitter Terminal Block to acquire a readout of the loop current.
CAUTION	Loop current wiring should never be connected to the TEST "+" terminal. This can damage the Transmitter. Additionally, never connect the current measurement device between the Loop "+" terminal and the TEST "+"terminal. This also will damage the Transmitter.

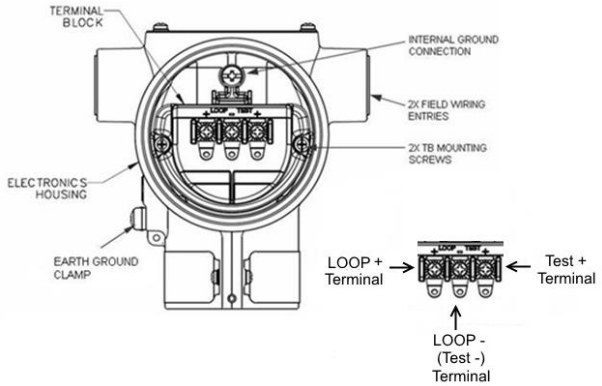


Figure 18: HART 3-Screw Terminal Board and Grounding Screw

Note: The rightmost terminal as shown in Figure 18 is for a loop test and is not available in the Fieldbus option.

FOUNDATION Fieldbus Operating Ranges

The FOUNDATION Fieldbus SLG 700 transmitter requires a terminal voltage in the range 9Vdc to 32Vdc.

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. See section above.
5	Connect the positive loop power lead to the positive (+) terminal and the negative loop power lead to the negative (-) terminal.
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 or 2014/34/EU, the power supply must indicate a voltage limiting device.

The transmitter has internal and external terminals to connect to the ground (earth).

While it is not necessary to ground the transmitter for proper operation, grounding the transmitter can minimize the possible effects of noise on the output signal and protects the housing from lightning and static discharge, and may be required to meet various approval body certifications, for example CE conformity.

An optional terminal block with lightning 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.

Note: The transmitter is polarity-insensitive with respect to loop power connection. Nevertheless, to assist with troubleshooting and maintain same installation procedure, it is recommended to connect loop wiring as per Step 5.

HAZARDOUS LOCATION INSTALLATIONS

For hazardous location installations, refer to the *SmartLine Guided Wave Radar Level Transmitter User's Guide*, Document #34-SL-23-11 for further information and warnings.

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 –SL-within 18" (457.2 mm) 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 19.

Table 7: Jumpers for HART

Top Jumper	Bottom Jumper
Sets the Failsafe direction.	Sets the Write Protect
Default: Up-scale Failsafe	**Default:** OFF (Un-protected)
Up-scale drives the loop to a value greater than 21 mA. Note: Down-scale faults are always latching.	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 t-he 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
5	Screw on the end-cap and tighten the end-cap lock.
6	Turn ON Transmitter power.

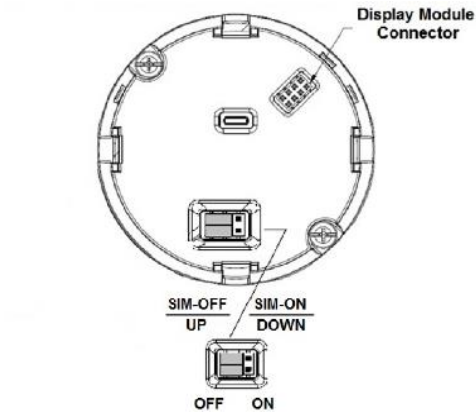


Figure 19: HART Jumper Location

Table 8: HART 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)*

Set the Jumpers for FOUNDATION Fieldbus (FF)

There is no Failsafe jumper on the FOUNDATION Fieldbus transmitters, but there is a Write Protect jumper and a simulation-mode jumper (see manual 34-SL-25-07).

	**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.
4	Set the Write Protect jumper (Bottom jumper) to the desired behavior (Protected or Unprotected). See Table 9 for jumper positioning.
5	Replace the Display Module, if applicable.
6	Screw on the end cap and tighten the end-cap lock.
7	Turn ON Transmitter power.

Table 9: FOUNDATION Fieldbus Write Protect and Simulation Mode jumper positions.

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)*
	*Fieldbus SIM Mode = ON* *Write Protect = ON*

CONFIGURATION GUIDE

The SLG 700 transmitters have two display options:

- Advanced LED Display: Multi-line display.
- No Display: Configuration is not available.

Use Table 10 to configure Advanced Display transmitters. See the *SLG 700 SmartLine Level User's Manual*, Document #34-SL-25-11 for more information.

(R) = Read only

Table 10: Advanced Display Configuration

Display Configuration sub-menu

LCD Contrast	Set Contrast
Common Setup	Set Password (HART only)
	Language (FF read only)
	Rotation Time
	Screen Rotate
Screens 1-8	Screen Format (FF read only)
	Trend Hours (FF read only)
	PV Selection (FF read only)
	Display Units (FF read only)
	Custom Units (R) (FF only)
	Decimals (FF read only)
	Disp High Limit (FF read only)
	Disp Low Limit (FF read only)
	Custom Tag (FF read only)

Basic Configuration sub-menu

General	Short Tag (HART only)
	Length Unit
	Temp Unit
	Velocity Unit
	Volume Unit
Process	Measured Prod
	Vapor DC (single and two liquids, non-flooded only)
	Product DC (single liquids only)
	Upper Prod DC (two liquids only)
	Lower Prod DC (two liquids only)
	Vapor Atten (single and two liquids, non-flooded only)
	Product Atten (single liquid only)
	Lower Prod Atten (two liquids only)
	Upper Prod Atten (two liquids only)
	Max Fill Rate
Measurement	Sensor Height
	Max Product Level
	Level Offset
	Echo Lost Time
Dynm Variables	Measured Prod
	PV
	SV
	TV
	QV

Basic Configuration sub-menu (continued)

4-20 mA Output (HART only)	LRV
	URV
	Damping
	NAMUR Output
	Loop Curr Mode
	Latching Mode
	BDH/BDL Loop
Set LRV (HART only)	Set LRV
	Set URV
Install Date	Year
	Month
	Day
	Install Date
	Write Date

Advanced Configuration sub-menu

Mounting **Note:** Loop must be removed from Automatic Control	Transmtr Model (R)
	Sensor Conn Type (R)
	Proc Conn Type (R)
	Mounting Loc
	Mounting Angle (Visible for Tank, Bracket or Nozzle mounting location only)
	Nozzle Height (Nozzle Mounting Loc only)
	Nozzle Dia (Nozzle Mounting Loc only)
	Bypass Dia (Bypass Mounting Loc only)
	Stillwell Dia (Stillwell Mounting Loc only)
	Backgrnd Type
	Dynm Bkgd Updt (Field and Obstacle Backgrnd Type only)
	Full Tank Det
Backgrnd Capture (Measured Prod not Saturated Steam)	Backgrnd Type
	Use Level (Obstacle Backgrnd Type only)
	Start Capture (capture process is inactive)
	Cancel Capture (capture process is active)
Probe **Note:** Loop must be removed from Automatic Control.	Probe Type
	Probe Length
	Probe End Type
	CenterDiskType
	CenterDisk Dia (Center Disk Type is not None)
	PropagtnFactor
	Block Dist Hi
	Block Dist Low
	SteamRefPrbTyp (Saturated Steam Measured Prod only)
	Steam Ref Len (Saturated Steam Measured Prod only)
Probe Length Cal (SingleLiqLowDC Measured Prod only)	Start Cal (calibration process is inactive)
	Stop Cal (calibration process is active)

Steam Ref Cal (Saturated Steam Measured Prod only)	Start Cal (calibration process is inactive)
	Stop Cal (calibration process is active)
Volume	Vol Calc Type
	Tank Shape
	Tank Diameter
Volume *(continued)*	Tank Length
	Tank Width
	Tank Height
	Volume Offset (Vol Calc Type is Tank Shape only)
Reflectn Model	Ampl Tracking
	Location
	Width
	Attenuation
	Gain
	ObjFuncThrshld
DAC Trim (HART only)	Trim Zero
	Trim Span
	Set DAC Normal
Loop Test (HART only)	Set DAC Output
	Set DAC Normal
HART Params (HART only)	Poll Address
	Final Assy Num
	Show Date
	Year
	Month
	Day
	Write Date

Monitor sub-menu

Critical Diag (R)	Active Diags (R)
	Sensor Module (R)
	Comm Module (R)
	Sensor Comm (R)
	Measurement (R)
	Reset Required (R)
	Soft Reset
	Detail Diag (items below are only visible when Yes)
	Sensor Int RAM (R)
	Sensor Ext RAM (R)
	Sensor Flash CRC (R)
	Sensor Pwr Vosc (R)
	Sensor Pwr 2.5V (R)
	Sensor Pwr 3.3V (R)
	Sensor Pwr Accum (R)
	Sensor Code Flow (R)
	Sensor Oscillator (R)
	Factory Mode (R)
	Low Power Mode (R)
	Reflectn Ref Loc (R)
	Ref Plane Offset (R)

Critical Diag (R)	Unlic Intf Meas (R)
	Unlic Sat Steam (R)
	Unlic Low DC App (R)
	ModelNumMismatch (R)
	Sensr DB Corrupt (R)
	Reset Sensr DB (Sensor DB corrupt only)
	Comm DB Corrupt (R)
	Reset Comm DB (Comm DB corrupt only)

Non-Crit Diag	Active Diags (R)
	Supply Voltage (R)
	Elec Module Temp (R)
	DAC Temp Comp (R) (HART only)
	Sensor Comm (R)
	Display Setup (R) (HART only)
	Characterized (R)
	Charact. Status(R)
	PV Range (R)
	Sensor Over Temp (R)
	Surface Sgnl Str (R)
	Surfac Sgnl Qlty (R)
	Interfc Sgnl Str (R)
	Interfc Sgnl Qlty (R)
	Sensing Section (R)
	Blk Dist Hi Zone (R) (single liquid only)
	Blk Dist Lo Zone (R) (single liquid only)
	Surface in BDH (R) (two liquids only)
	Surface in BDL (R) (two liquids only)
	Interface in BDH (R) (two liquids only)
	Interface in BDL (R) (two liquids only)
	Snsr Calibrated (R)
	Calibration Type (R)
	FldBkgdNotCompat
	Backgrnd Not Set
	FldgBkgdLoadError
Device Vars	Measurd Prod Lvl (R)
	Surface Sgnl Str (R)
	Surface Sgnl Qlty (R)
	Interfc Sgnl Str (R) (two liquids only)
	Interfc Sgnl Qlty (R) (two liquids only)
	Int Elec Temp (R)
Display Info	Firmware Version (R)
Comm Info	Protocol (R)
	Universal Rev (R) (HART only)
	Field Dev Rev (R) (HART only)
	Software Rev (R) (HART only)
	PV Alarm Type (R) (HART only)
	LRV (R) (FF only)
	URV (R) (FF only)

Sensor Info	Firmware Version (R)
	Model Key (R)
	Device ID (R)
Echo Stem Plot	Duration
	Show Stem Plot
Model Number	Model Number (R) (no mismatch only)
	Comm Model Num (R) (mismatch only)
	Sensor Model Num (R) (no mismatch only)
	Matching Source (mismatch only)
	Do Match (mismatch only)

Options	Interface Meas (R)
	Saturated Steam (R)
	Low DC Applic (R)
	License Key

(R) Read-Only parameter

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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