SLN 700 Quick Start Installation Guide
SmartLine Level Non-Contact Radar

34-SL-25-14, Revision 2, November 2020

This document provides descriptions and procedures for the quick installation of Honeywell's SmartLine Non-Contact Radar Level Transmitters.

The SmartLine Level Non-Contact Radar is available as a family of SLN72x models for liquid and solid applications.

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Revision History
2.0 – November 2020

Documentation

To access complete documentation, including language variants, scan the QR code below using your smart phone/device or QR code scanner.

Go to the APP store for your free Smartphone QR scanner

Or you can follow the URL to access the online SmartLine HUB page.

The HUB page will contain direct links to open SmartLine product documentation.

URL
https://hwll.co/SmartLineHUB

QR Code

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INTRODUCTION

The Smartline SLN700L is available for both liquid and solid non-contact radar level measurement. Each model is available with a range of flange or threaded antenna, lens diameters, process connection, and accessories to suit most applications.
Mounting the Transmitter

INSTALLATION

Evaluate the site selected for the SmartLine SLN700 installation with respect to the process system design specifications in table 1. Please note that the display can become unreadable below -20C (-4℉) but it will recover once the temperature increases.

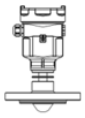
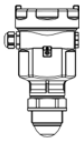
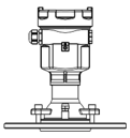
Operating conditions

Table 1: Operating Conditions

Parameter	Operative Limits		Transportation and Storage	
	℃	℉	℃	℉
Ambient Temperature[1]	-25 to 80	-13 to 176	-40 to 80	-40 to 176
Humidity %RH	0 to 100		0 to 100	

Process Connector
The 80 GHz non-contact radar transmitter has three different series of products and associated process connections.

Table 2: Process Connectors

Series	Medium	Applications	Process connections
82 Series 	Liquid	Strong corrosive liquid vapors or foam	Flange options
83 Series 	Liquid	Strong corrosive or pressure resistant liquid	Thread options
87 Series 	Solid	Storage vessel/process vessel or high dust applications	Flange options

For list of all options and accessories please refer to the product specifications, which is available, here: https://www.honeywellprocess.com/smartline-level-transmitter.aspx.

MOUNTING THE TRANSMITTER

There should be no obstacles in the area radiated by the transmitted microwave beam from the lower edge of the antenna to the material surface to be measured within the cone angle of the radar beam. These obstacles include ladders, limit switches, heating equipment, supports, etc. When these are unavoidable, the gauge offers background subtraction ("Virtual Echo Learning") so that obstacles will be ignored during level measurement. In addition, please note that the microwave beam should not intersect with tank fluid in or out flows. In addition, the highest liquid or solid tank level should not encroach into the upper blocking distance of the gauge (typically a few cm). (see Figure 1), The instrument should be kept at a certain distance from the tank wall and the transmitting antenna should be perpendicular to the measured material surface as much as possible.
The instruments installed in a hazardous classified area shall follow the local national installation regulations.
The reference plane for measurement is the sealing surface of threads or flanges.

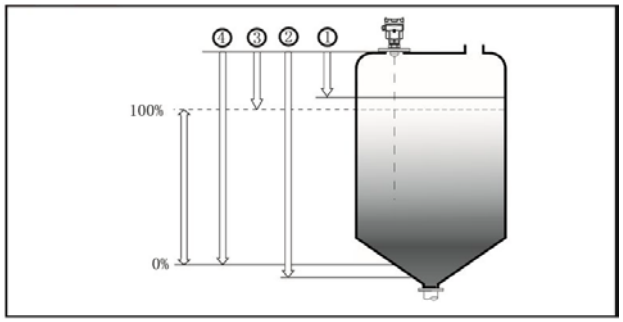


Figure 1: Graphical illustration

1. Near (blocking) distance
2. Far distance
3. Distance at which sensor reads 100% level (or current)
4. Distance at which sensor reads 0 % level (or current)

Installation position

The minimum distance between the antenna and tank wall is variable for different antenna. Please refer to Table 3.to calculate the minimum distance for your particular model. In no instance, should the instrument be mounted closer than 200 mm to the tank wall.

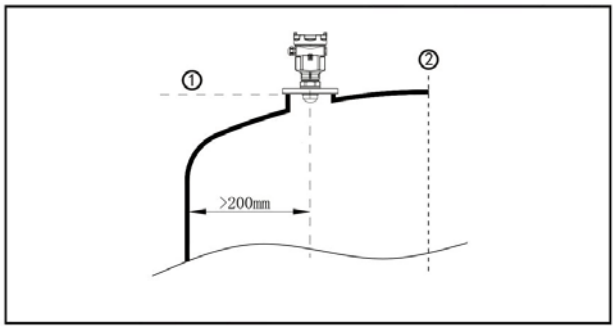


Figure 2: Installation position, >200 mm

1. Reference plane
2. Center of the vessel or symmetry axis

Table 3: Minimal distance to tank wall

SLN700 Model	Min distance to tank wall
83A	1/5 × Tank Height
82A 82B 83B 83C	1/10 × Tank Height
82C 82D 83D 83E 87A 87B 87C 87D	1/20 × Tank Height

For a conical vessel with a flat tank top, the best installation position of the instrument is the top center of the vessel, which ensures that the bottom of the container is measured.

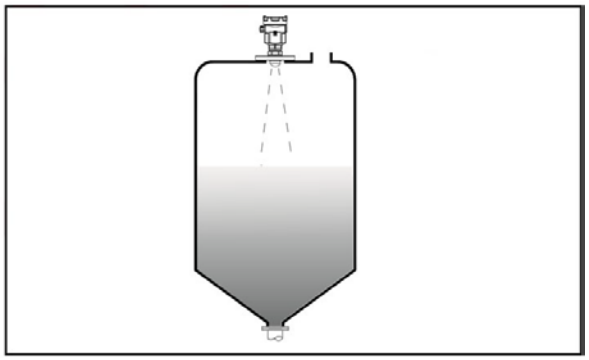


Figure 3: Conical vessel installation

Nozzle installations

In the case of a tank fluid or solid with good reflection properties (high dielectric constant), the sensor may be mounted on a nozzle. The background subtraction ("virtual echo learning") feature can further reduce false echoes from nozzle openings.

Table 4 shows detail of the size limitations of the nozzle.

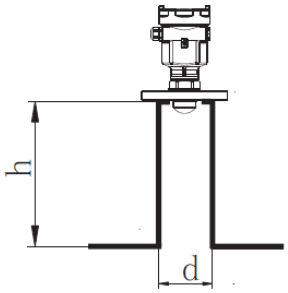


Figure 4: Nozzle specifications diagram

Table 4: Nozzle specification table

Nozzle Diameter d（mm）	Maximum Nozzle Height h（mm）			
	83A	82A 82B 83B 83C	82C 82D 83D 83E	87A 87B 87C 87D
40	150	NA	NA	NA
50	150	150	NA	NA
80	200	200	200	NA
100	300	300	300	300
125	400	400	400	400
150	500	500	500	500

If there are agitators in the tank, the instrument should be installed as far away from these as possible. Once the installation is completed, the ""virtual echo learning" should be carried out while the agitators are running. This will eliminate the influence of false echo generated by mixing blades. If foam, strong liquid agitation or only a narrow clear volume is available then the customer should consider a guided wave radar sensor such as the Honeywell SLG-700 series.

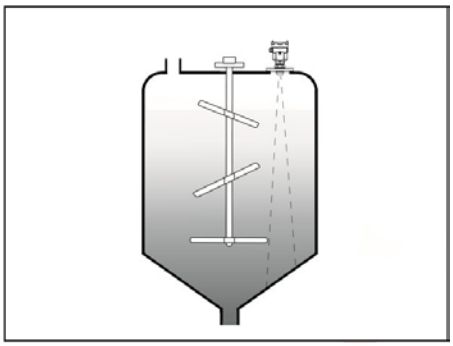


Figure 5: Agitation

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 6: 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

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 Non-Contact Radar User's Manual, Document #34-SL-25-13.

HART / 4-20mA Operating Ranges

The Power supply and the output current signal are carried by the same two-core cable. The allowed supply voltage range is 12V to 30Vdepending on loop resistance. There must always be between 12V and 30V on the transmitter terminals, regardless of loop current. A safety barrier (refer to Table 5 for detailed specification) should be placed between the power supply and instrument for the intrinsically safe version.
The grounding mode of current output can be adopted for the standard instrument, while the floating current output should be adopted for the intrinsically safe instrument. Normally, the grounding terminals can be connected to the grounding point of tank or an available nearby ground in case of plastic tank.

Maximum Loop Resistance (Ω)

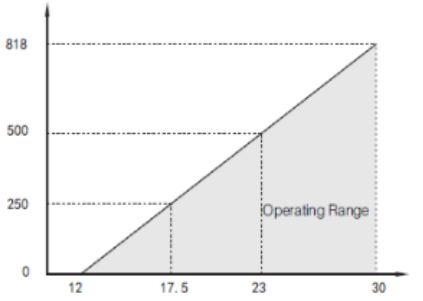


Figure 7: Maximum Loop Resistance (Ω)

Table 5: Maximum Loop Resistance (Ω)

Supply Voltage (VDC)	Max. Loop Resistance (Ω)
12	0
17.5	250
23	500
30	818

A regular two conductor cable can be used as the power supply cable, and the outside diameter of the cable should be (5-9) mm to ensure the sealing of cable entry. The two ends of the shielded cable should be grounded only where allowed by the installation location. In hazardous locations, only one end of the cable can be shielded, typically on the non-hazardous side.

Remove the display to access the wiring connections

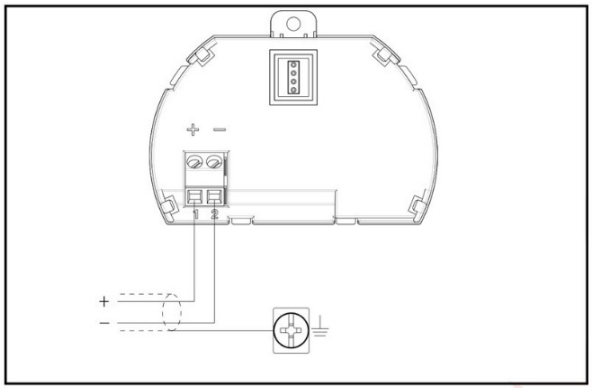


Figure 8: 2-wire wiring for HART

Note: For intrinsically safe installations, shield is normally terminated at one end only

Hazardous Locations & Intrinsic Safety

See manual for Special Conditions of safe use

Table 6: Hazardous Location Ratings

AGENCY	TYPE OF PROTECTION
IECEx TUR 20.0056X	Intrinsically Safe: Ex ia IIC T6…T2 Ga Ex ia IIIC T85˚C...T300˚C Da
ATEX TÜV 20 ATEX 8576 X	Intrinsically Safe: II 1 G Ex ia IIC T6…T2 Ga II 1 D Ex ia IIIC T85˚C…T300˚C Da

Table 7: Intrinsic Safety Entity Parameters

Intrinsic Safety Entity Parameter	4-20mA Terminal 1 & 2	RS485 Terminal 1 & 2	RS485 Terminal 4 & 5
Ui	30.6V	26.4V	6.5V
Ii	131mA	166mA	68mA
Pi	1.0W	1.1W	111mW
Ci	0	0	102µF
Li	102µH	0	0

Table 8: Process Temperature Vs Temperature Class

Transmitter Ambient temperature (℃)	Process Temperature at the antenna (℃)	Temperature Class of entire equipment
-40 to +50	-40 to +50	T6/85C
-40 to +60	-40 to +95	T5/100C
-40 to +70	-40 to +130	T4/135C
	-40 to +195	T3/200C
	-40 to +200	T2/300C

EU Declaration of Conformity

Hereby, Honeywell International Inc. declares that the SLN700 Radar Level Transmitters are in compliance with the directives listed below.

The full text of the EU declaration of conformity is available at the following internet address:
https://www.honeywellprocess.com/library/support/Public/Documents/50164363.pdf

The SLN700 transmitters comply with the following directives

DIRECTIVE	DESCRIPTION
2014/53/EU	Radio Equipment Directive
2014/34/EU	ATEX Directive
2011/65/EU & 2015/863	Restriction of Hazardous Substances Directive

EMC Conformity

The SLN700 transmitters comply with the following EMC standards

STANDARD	DESCRIPTION
EN 301 489-1 V2.2.0	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
EN 301 489-3 V2.1.1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz
EN 302 729 V2.1.1	Short Range Devices (SRD); Level Probing Radar (LPR) equipment operating in the frequency ranges 6 GHz to 8,5 GHz, 24,05 GHz to 26,5 GHz, 57 GHz to 64 GHz, 75 GHz to 85 GHz
EN 302 372 V2.1.1	Short Range Devices (SRD); Tank Level Probing Radar (TLPR) equipment operating in the frequency ranges 4,5 GHz to 7 GHz, 8,5 GHz to 10,6 GHz, 24,05 GHz to 27 GHz, 57 GHz to 64 GHz, 75 GHz to 85 GHz
EN 62311:2008	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

Table 9: Display Menu Tree Basic Settings, Display and Diagnostics

Level 1 / Menu no	Level 2 / Menu no.	Level 3	Level 4	Level 5
1.Basic Settings	1.1 Medium	Liquid	Rapid Material Change	Y N
			First Echo	Normal Small Big Bigger Biggest
			Surface Wave	Y N
			Low DK	Y N
		Solid	Rapid Material Change	Y N
			First Echo	Normal Small Big Bigger Biggest
			Large Angle of Repose	Y N
			Strong Dust	Y N
			Low DK	Y N
	1.2 Unit of measurement	m / ft / inch /cm / mm		
	1.3 Near blanking			
	1.4 Range			
	1.5 Minimum Adjustment			
	1.6 Maximum Adjustment			
	1.7 Current Output	4-20mA / 20-4mA		
	1.8 Sensor Tag			

Level 1 / Menu no	Level 2 / Menu no.	Level 3	Level 4	Level 5
2. Display	2.1 Display Value	Distance / Height / Percent		
	2.2 Language	Chinese / English		
3. Diagnostics	3.1 Choose Curve	Eff Curve / Echo Curve / False Echo / Log curve		
	3.2 Start Simulation	Current/Distance		
	3.3 Sensor Status	T/ DB/Volt/Service Time		
	3.4 Measure status	Max Volt / Min Volt / Min Volt Time		
	3.5 Peak Values	Max Distance / Min Distance		
	3.6 Calibration Date			

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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INSTRUMENTATION & FILTRATION

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