# Rosemount<sup>™</sup> 5600 Series Radar Level Transmitter with HART<sup>®</sup> Protocol





### NOTICE

This guide provides basic guidelines for Rosemount<sup>™</sup> 5600. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting or intrinsically safe (I.S.) installations. Refer to the <u>Rosemount 5600 Reference Manual</u> for more instruction.

The manual and this guide are also available electronically on Emerson.com/Rosemount.

# **A**WARNING

#### Failure to follow safe installation and service guidelines could result in death or serious injury.

- Make sure only qualified personnel perform installation or service.
- Use the equipment only as specified in this QSG and the Reference Manual. Failure to do so may impair the
  protection provided by the equipment.
- Repair, for example substitution of components etc. may jeopardize safety and is under no circumstances allowed.

#### Explosions could result in death or serious injury.

- Verify that the operating environment of the transmitter is consistent with the appropriate hazardous locations specifications.
- In an explosion-proof/flameproof installation, do not remove the transmitter covers when power is applied to the unit.
- Before connecting a HART-based communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.

#### Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.
- Make sure the main power to the Rosemount 5600 transmitter is off and the lines to any other external power source are disconnected or not powered while wiring the transmitter.

#### Process leaks may cause harm or result in death.

- Install and tighten antenna and flanges before applying pressure.
- To avoid process leaks, do not remove tank seal while tank is under pressure.

### Contents

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# 1.0 Mount the transmitter

Identify which type of antenna to install and find the relevant section below.

- Mounting the cone antenna
- Mounting the process seal antenna
- Mounting the cone antenna in a still-pipe/bridle
- Mounting the extended cone antenna
- Mounting the cone antenna with flushing connections

### 1.1 Mounting the cone antenna

1. Mount the flange on top of the cone antenna. Make sure that the bottom side of the flange is flat and all parts are clean and dry.

#### Figure 1. Mounting the Adapter



- 2. Secure the flange with the locking nut. Make sure that the nut fits tightly to the flange.
- 3. Mount the adapter on top of the sleeve.
- 4. Secure the adapter with the locking ring.
- 5. Carefully fit the flange and the cone antenna on the tank nozzle.
- 6. Tighten with screws and nuts.
- 7. Insert the wave guide tube into the upper wave guide. Make sure the O-ring at the lower end of the wave guide tube is in place.
- Place the protection sleeve on the flange. Mount the transmitter head and tighten the nut. Check that the guide pins on the adapter enter the corresponding grooves on the upper wave guide.



### Figure 2. Mounting the transmitter head

9. Proceed with "Connect wiring and power up" on page 8.

### 1.2 Mounting the process seal antenna

1. Place a gasket on top of the socket and mount the antenna. Use the gasket supplied with the process seal antenna.



- 2. Put the loose flange on top of the antenna.
- 3. Mount the antenna by tightening the flange to the tank nozzle.

#### Note

Tighten the flange screws carefully to the recommended torque in Table 1. Tighten opposite screws in pair.

### Table 1. Recommended Torque (Nm) PTFE Seal

DIN Flange	PN16	PN40
DN100	11	15
DN150	15	-
ANSI Flange	150 Psi	300 Psi
4 in.	11	15
6 in.	15	10

4. Insert the wave guide tube into the upper wave guide.

Figure 4. Inserting Wave Guide Tube and Mounting Transmitter Head



- 5. Mount the transmitter head onto the adapter.
- 6. Tighten the nut and make sure that the transmitter head fits tightly to the antenna.
- 7. Proceed with "Connect wiring and power up" on page 8.

# 1.3 Mounting the cone antenna in a still-pipe/bridle

- 1. Mount the antenna and the transmitter head in the same way as a standard cone antenna. See "Mounting the cone antenna" on page 3.
- 2. Make sure that the inclination of the transmitter is less than 1°.



3. To minimize the influence of disturbing echoes from inlet and outlet pipes you may need to rotate the transmitter head 90°.





4. Proceed with "Connect wiring and power up" on page 8.

### 1.4 Mounting the extended cone antenna

- 1. Mount the antenna and transmitter head in the same way as a transmitter with a standard cone antenna. See "Mounting the cone antenna" on page 3.
- 2. Proceed with "Connect wiring and power up" on page 8.

### 1.5 Mounting the cone antenna with flushing connections

 The flange is a part of the antenna assembly and welded to the cone antenna. Carefully fit the antenna assembly and appropriate gasket on the tank nozzle.

#### Figure 7. Mounting the Flushing cone Antenna on the Nozzle



- 2. Insert the wave guide tube into the upper wave guide. Make sure the O-ring at the lower end of the wave guide tube is in place.
- 3. Mount the transmitter head and tighten the nut. Check that the guide pins on the adapter enter the corresponding grooves on the upper wave guide.



- 4. Connect you tubing to the antenna for cleaning, purging, or cooling purposes. Use a minimum 0.4-in. (10-mm) tube or pipe. Typical media to use are nitrogen, air, water, or steam.
- 5. Proceed with "Connect wiring and power up" on page 8.

# 2.0 Connect wiring and power up

Use information on transmitter label for identification of enabled options. After identification, use the relevant connection information on the following pages.

For identification of installed options, see label on the transmitter head. Find the 5601 xxxxZZxxx where ZZ is the primary output identification, see below.

Figure 9. Example of a Rosemount 5600 Transmitter Head Label



- 5A Non-IS HART/4-20 mA, passive
- 5B IS HART/4-20 mA, passive
- 5C Non-IS HART/4-20 mA, active
- 5D IS HART/4-20 mA, active

#### Figure 10. Power Supply



Ultra wide 24-240 V DC or AC 0-60 Hz

Junction Box X1 EEx e



# 2.1 Connecting HART devices

### Figure 12. Typical HART Passive Output Non-IS (Primary)

Junction Box Option 5A Non-IS HART/4-20 mA, passive EEx e



### Figure 13. Typical HART Passive Output IS (Primary)

Option 5B IS HART/4-20 mA, passive



#### Figure 14. Typical HART Active Output Non-IS

Option 5C Non-IS HART/4-20 mA, active





# 3.0 Configure the transmitter

Configure your Rosemount 5600 transmitter using one of the following available configuration tools.

## 3.1 PC Configuration Software Radar Master

The program on the CD automatically starts and suggests an installation of the Radar Master software. You need to restart your PC prior to running the Radar Master program.

### Configure the transmitter using the wizard

The guided setup contains seven steps, and guides you through the basic setup procedure.

### 3.2 Hand-held communicator

For more information on the 375 Field Communicator, see document 00809-0100-4276 and for the 275 HART Communicator, see document 00275-8026-0002.

### 3.3 AMS

The program on the CD automatically starts and suggests an installation using AMS. You need to restart your PC prior to running the AMS program.

# 4.0 Product certifications

Rev 1.9

## 4.1 European directive information

A copy of the EC Declaration of Conformity can be found at the end of the quick start guide. The most recent revision of the EC Declaration of Conformity can be found at <u>Emerson.com/Rosemount</u>.

### 4.2 Ordinary location certification

As standard, the transmitter has been examined and tested to determine that the design meets the basic electrical, mechanical, and fire protection requirements by a nationally recognized test laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

### 4.3 Telecommunication compliance

### FCC

This device complies with Part 15C and Part 90 of the FCC Rules. Certificate: K8CPRO complies with Part 15C K8CPROX complies with Part 90

### IC

This device complies with RSS210 issue 6. Certificate: 2827A-5600PRO

### **R&TTE**

This device complies with ETSI EN 302 372. EU directive 99/5/EC.

### 4.4 Installing equipment in North America

The US National Electrical Code<sup>®</sup> (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions.

The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

# 4.5 USA

**E5** Explosion-proof (XP), Dust-Ignitionproof (DIP)

Certificate: FM 18US0053X

Standards: Class 3600 - 2011; Class 3610 - 2010; Class 3615 - 2006; Class 3810 - 2005; ANSI/NEMA 250 - 1991

Markings: Explosion-proof for use in Class I, Division 1, Groups A, B, C and D, T6;

Dust-Ignition-proof for use in Class II, III, Division 1, Groups E, F and G, T5; Ta= +70  $^{\circ}$ C; Type 4X

Explosion-proof for use in Class I, Division 1, Groups A, B, C and D with Intrinsically Safe Connections to Class I, Division 1, Groups A, B, C and D, T6; Dust-Ignition-proof for use in Class II, III, Division 1, Groups E, F and G, T5, Ta=+70 °C; Type 4X; in accordance with Entity requirements and system control drawing 9150074-994

#### Specific Conditions for Safe Use (X):

- 1. Warning Potential Electrostatic Charging Hazard The enclosure is constructed from non-metallic material. To prevent the risk of electrostatic sparking the plastic surface should only be cleaned with a damp cloth.
- Warning The apparatus enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

### 4.6 Canada

E6 Explosion-proof (XP)

Certificate: 1346169

Standards: CSA C22.2 No 0-10 2010(R2015), CAN/CSA C22.2 No 60079-0:2015, CAN/CSA C22.2 No 60079-1:2016, CAN/CSA C22.2 No 60079-7:2016 and CAN/CSA C22.2 No 60079-11:2014, CSA C22.2 No.142-M1987

Markings: Ex db eb IIC T6 Gb, rated 24-240 Vac, 10W up to two inputs 7 - 30V, 4 - 20mA; up to two outputs 4 - 20mA, 300 Ohm max. or Digital outputs TRL2bus, Profibus DP or Foundation Fieldbus; ambient temperature range [- 40C, + 70C]; for installation refer to drawing # 9150074-937

Ex db eb [ib/ia] IIC T6 Gb, rated 24 - 240Vac, 10W; Digital outputs TRL2bus, Profibus DP or Foundation Fieldbus; ambient temperature range [-40C, +70C]; for installation refer to drawing # 9150074-939.

WARNING: Substitution of components may impair intrinsic safety.

WARNING: POTENTIAL ELECTROSTATIC CHARGING HAZARD.

This equipment has flame paths, which differ from those in CAN/CSA C22.2 No 60079-1 and are not intended for repair.

	Uo	lo	Ро	Со	Lo
Intrinsically Safe Display Output Entity parameters	7.84 V	385.6 mA	0.678 W	8.8 μF	0.17mH
Up to two Intrinsically Safe Outputs Entity parameters	23.1 V	125.7 mA	0.726 W	0,14 μF	2.2 mH

	Ui	li	Pi	Ci	Li
Up to two Intrinsically	30 V	200 mA	1.3 W	0 nF	0 mH
Safe Display Input Entity parameters	30 V	300 mA	1.3 W	0 nF	0 mH

### 4.7 Europe

E1 ATEX Flameproof Certificate: Sira 03ATEX1294X Standards: EN 60079-0:2012/A11:2013. EN 60079-1:2014. EN 60079-7:2015. EN 60079-11:2012, EN 60079-26:2015 & EN 60079-31:2014 Markings: Non-IS Outputs (Primary, Secondary) II ½ GD Ex db eb IIC T6 Ga/Gb (-40°C to +70°C) Ex tb IIIC T 85°C Db IP65 IS Outputs (Primary, Secondary and Display) alt. with Non-IS Primary Outputs  $||(2)(1)\frac{1}{2}$  GD Ex db eb [ib] [ia] IIC T6 Ga/Gb (-40 °C to +70 °C) Ex tb IIIC T85 °C Db IP65 IS Outputs (Display) alt. with Non-IS Primary Outputs II (1) 1/2 GD Ex db ib [ia] IIC T6 Ga/Gb (-40 °C to +70 °C) Fx tb IIIC T85 °C Db IP65

#### Specific Conditions for Safe Use (X):

- 1. As light alloys may be used as the enclosure (or other parts) they may be at the accessible surface of this equipment, in the event of rare incidents, ignitions sources due to impact and friction sparks could occur. This shall be considered when the equipment is being installed in locations that specifically require Group II, Category 1G equipment.
- 2. Under certain extreme circumstances, the non-metallic parts of the equipment may be capable of generating an ignition-capable level or electrostatic charge. Therefore, when used for applications that specifically require Group II, Category 1 equipment, the equipment shall not be installed in a location where the external conditions are conductive to the build-up of electrostatic charge on such surfaces. Additionally, the equipment non-metallic parts shall only be cleaned with a damp cloth.
- 3. This equipment has flame paths, which differ from those in EN/IEC 60079-1 and are not intended for repair.

	Uo	lo	Ро	Со	Lo
Output Entity parameters	7.84 V	385.6 mA	0.678 W	9.3 μF	239 µH

### 4.8 International

E7 IECEx Flameproof Certificate: IECEx SIR 05.0024X Standards: IEC 60079-0:2011, IEC 60079-1:2014, IEC 60079-7:2015, IEC 60079-11:2011, IEC 60079-26:2014 & IEC 60079-31:2013 Markings: Non-IS Outputs (Primary, Secondary) Ex db eb IIC T6 Ga/Gb (-40 °C to +70 °C) Ex tb IIIC T85 °C Db IP65 IS Outputs (Primary, Secondary and Display) alt. with Non-IS Primary Outputs Ex db eb [ib] [ia] IIC T6 Ga/Gb (-40 °C to +70 °C) Ex tb IIIC T85 °C Db IP65 IS Outputs (Display) alt. with Non-IS Primary Outputs Ex db eb [ib] Iia] IIC T6 Ga/Gb (-40 °C to +70 °C) Ex tb IIIC T85 °C Db IP65 IS Outputs (Display) alt. with Non-IS Primary Outputs Ex db eb [ia] IIC T6 Ga/Gb (-40 °C to +70 °C) Ex tb IIIC T85 °C Db IP65

#### Specific Conditions for Safe Use (X):

- 1. As light alloys may be used as the enclosure (or other parts) they may be at the accessible surface of this equipment, in the event of rare incidents, ignitions sources due to impact and friction sparks could occur. This shall be considered when the equipment is being installed in locations that specifically require Group II, Category 1G equipment.
- 2. Under certain extreme circumstances, the non-metallic parts of the equipment may be capable of generating an ignition-capable level or electrostatic charge. Therefore, when used for applications that specifically require Group II, Category 1 equipment, the equipment shall not be installed in a location where the external conditions are conductive to the build-up of electrostatic charge on such surfaces. Additionally, the equipment non-metallic parts shall only be cleaned with a damp cloth.
- 3. This equipment has flame paths which differ from those in EN/IEC 60079-1 and are not intended for repair

	Ui	li	Pi	Ci	Li
Passive Analog Circuit Entity Parameters	30 V	200 mA	0 W	0 μF	0 μΗ

	Uo	lo	Ро	Со	Lo
Active Analog Circuit Entity Parameter	23.1V	125.7 mA	0.726 W	0.14 μF	2.2 μΗ

	Uo	lo	Ро	Со	Lo
Output Entity parameters	7.84 V	385.6 mA	0.678 W	9.3 μF	239 µH

## 4.9 Brazil

E2 INMETRO Flameproof Certificate: IEx 15.0021X Standards: ABNT NBR IEC 60079-0:2013; ABNT IEC 60079-1:2009; ABNT IEC 60079-7:2008; ABNT IEC 60079-11:2013; ABNT IEC 60079-26:2008; ABNT NBR IEC 60079-31:2011

Markings: Ex de IIC T6 Ga/Gb (-40°C  $\leq$  Tamb  $\leq$  +70°C) Ex de [ia Ga] IIC T6 Ga/Gb (-40°C  $\leq$  Tamb  $\leq$  +70°C) Ex de [ib Gb] [ia Ga] IIC T6 Ga/Gb (-40°C  $\leq$  Tamb  $\leq$  +70°C) Ex tb IIIC T85°C Db IP65

#### Specific Conditions for Safe Use (X):

1. See certificate for specific conditions.

	Ui	li	Pi	Ci	Li
Entity parameters HART	30 V <sub>CC</sub>	130 mA	1.0 W	7.26 nF	Negligible
Entity parameters Fieldbus	30 V <sub>CC</sub>	130 mA	1.5 W	4.95 nF	Negligible

## 4.10 China

Flameproof

Certificate: GYJ13.1446X

Standards: GB3836.1-2010, GB 3836.2-2010, GB 3836.3-2010, GB 3836.4-2010, GB 3836.20-2010, GB 12476.1-2000

Markings: Ex de IIC T6 Ga/Gb, Ex de [ib] [ia] IIC T6 Ga/Gb, Ex de [ia] IIC T6 Ga/Gb, DIP A21 TA 85 °C IP65

#### Specific Conditions for Safe Use (X):

1. See certificate for special conditions.

## 4.11 EAC

EM Technical Regulations Customs Union (EAC) Flameproof Certificate: RU C-SE. GB05B.01030 Markings: Ga/Gb Ex d e IIC T6 X Ga/Gb Ex d e [ib Gb] [ia Ga] IIC T6 X Ga/Gb Ex D e [ia Ga] IIC T6 X

#### Specific Conditions for Safe Use (X):

1. See certificate for special conditions. See certificate for entity parameters.

## 4.12 Republic of Korea

Flameproof Certificate: 2011-2456-9 Markings: Ex de IIC T6 tD A20 IP65 T85 °C Ex de [iB] [iA] IIC T6 IP65 T85 °C Ex de [iA] IIC T6 tD A20 IP65 T85 °C

Specific Conditions for Safe Use (X):

1. See certificate for special conditions.

### 4.13 India

Flameproof Certificate: P119223/1 Markings: Ex de IIC T6 Ga/Gb Ex de [ib] ib IIC T4/T6 Ga/Gb

#### Specific Conditions for Safe Use (X):

1. See certificate for specific conditions.

### 4.14 Ukraine

Flameproof, Intrinsically Safe Certificate: UA.TR.047.C.0352-13 Markings: 0 Ex ia IIC T4X 1 Ex d ia IIC T4 X

#### Specific Conditions for Safe Use (X):

1. See certificate for special conditions.

## 4.15 Additional Certifications

### **TÜV Overfill Prevention**

Certificate: Z 65.16-417 Application: TÜV tested and approved by DIBt for overfill prevention according to the German WHG regulations.

#### **Republic of Korea EMC**

Certificate: KCC-REM-ERN-RMDLVMS5600PRO

### 4.16 Pattern approval

GOST Belarus Certificate: RB-03 07 2765 10

GOST Kazakhstan Certificate: KZ.02.02.03473-2013

GOST Russia Certificate: SE.C.29.004.A

China Pattern Approval Certificate: CPA2012-L133

CE	The CE marking symbolizes the conformity of the product with the applicable Community requirements.
(Ex)	The Ex Certificate is a statement of an independent Certification Body declaring that this product meets the requirement of the applicable European Intrinsic Safety directives.
FM	The FM symbol indicates that the marked equipment is certified by FM - Factory Mutual Research Corporation according to FMRC standards and are applicable for installation in hazardous locations.
()	The device uses non-harmonized radio frequencies.
ŧ	Protective Earth
÷	Ground
	Power Supply
750	External cabling must be approved for use in min. 75°C.

### Table 2. Symbols Used on the Rosemount 5600 Series Level Transmitter

# Figure 16. Rosemount 5600 EU Declaration of Conformity

ERSON	C
EU Declaration	n of Conformity <sup>5600</sup>
We,	
Rosemount Tank Radar AB Layoutvägen 1 S-435 33 MÖLNLYCKE Sweden	
declare under our sole responsibility that the p	product,
Rosemount 5600 Series	Radar Level Transmitter
manufactured by,	
Rosemount Tank Radar AB Layoutvägen 1 S-435 33 MÖLNLYCKE Sweden	
s in conformity with the provisions of the Euro amendments, as shown in the attached schedule	opean Community Directives, including the latest
Presumption of conformity is based on the applocuments or other documents and, when appli bertification, as shown in attached schedule.	lication of the harmonized standards, normative cable or required, a European Community notified
aganahastalo	
U	(function name - printed)
(signature)	

ERSON	
Schedule No: 5600	
EMC Directive (2014/30/EU)	
EN 61326-1:2013	
ATEX Directive (2014/34/EU)	
Sira 03ATEX1294X	
<ul> <li>Flameproof:</li> <li>Equipment Group II, Category 1/2 G, Ex de IIC T6 Ga/Gb</li> <li>Equipment Group II, Category (2)(1) 1/2 G (Ex de [ib] [ia] IIC T6 Ga/Gb</li> <li>Equipment Group II, Category (1) 1/2 G (Ex de [ia] IIC T6 Ga/Gb</li> <li>Equipment Group II, Category 1 D, Ex t IIIC T85 Db</li> <li>EN 60079-0:2012: EN 60079-1:2007: EN 60079-7:2007: EN 60079-11:2012:</li> </ul>	
EN 60079-26:2007; EN 60079-31:2013	
Low Voltage Directive (2014/35/EU)	
IEC 61010-1:2010	
DE Dimedia: (2014/52/ELD)	
ETSI EN 302372:2016; EN 62479:2010	
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音有Glillia ROGS言任彻贝相过取入水度恢值时即行至与列衣							
	Hazardous Substances / 有害物质						
Part Name 部件名称	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 镉 (Cd)	Hexavalent Chromium 六价铬 (Cr +6)	Polybrominated biphenyls 多溴联苯 (PBB)	Polybrominated diphenyl ethers 多溴联苯醚(PBDE)	
Electronics Assembly 电子组件	х	0	0	0	0	0	
Housing Assembly 壳体组件	0	0	0	x	0	0	

#### List of Model Parts with China RoHS Concentration above MCVs 含有China RoHS 管控物质超过最大浓度限值的部件型号列表

This table is proposed in accordance with the provision of SJ/T11364

本表格系依据SJ/T11364的规定而制作.

O: Indicate that said hazardous substance in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

O: 意为该部件的所有均质材料中该有害物质的含量均低于GB/T 26572所规定的限量要求.

X: Indicate that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

X: 意为在该部件所使用的所有均质材料里,至少有一类均质材料中该有害物质的含量高于GB/T 26572所规定的限量要求.



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### ROSEMOUNT