

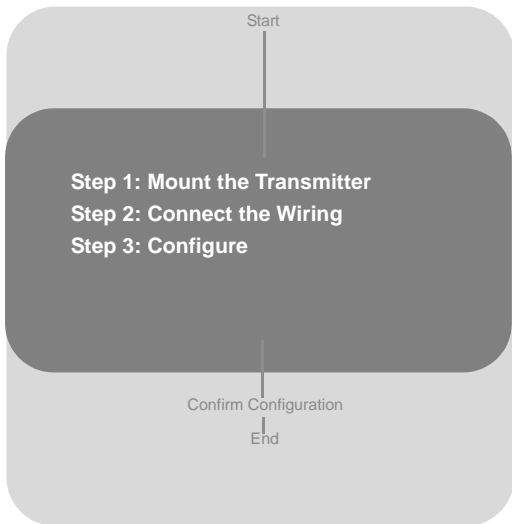
Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

Radar Level Transmitter



HART®



ROSEMOUNT

www.rosemount.com



EMERSON
Process Management

Quick Installation Guide

00825-0100-4026, Rev BA
November 2005

Rosemount 5400 Series

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IMPORTANT NOTICE

This installation guide provides basic guidelines for the Rosemount[®] 5400 Series. It does not provide detailed information. Refer to the 5400 Series Reference Manual (document number 00809-0100-4026) for more instructions. The manual and this Quick Installation Guide (QIG) are also available electronically on www.rosemount.com.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

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 Quick Installation Guide (QIG) and the Reference Manual. Failure to do so may impair the protection provided by the equipment.
- Any substitution of non-recognized spare parts may jeopardize safety. Repair, e.g. substitution of components etc. may also 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 Explosionproof/Flameproof installation, do not remove the transmitter cover when power is applied to the unit.
- Before connecting a HART[®] or FOUNDATION[™] fieldbus 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 mains power to the 5400 Series transmitter is off and the lines to any other external power source are disconnected or not powered while wiring the transmitter.

Antennas with non-conducting surfaces

- Antennas with non-conducting surfaces (e.g. Rod antenna and Process Seal antenna) may generate an ignition-capable level of electrostatic charge under extreme conditions. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

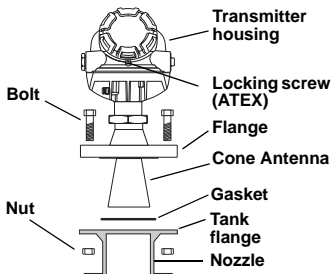
Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

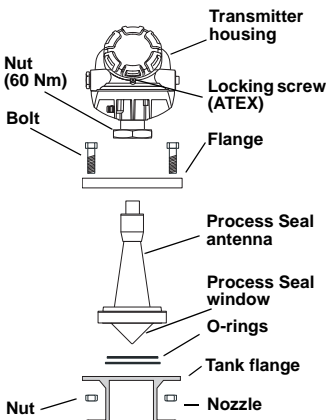
Rosemount 5400 Series

STEP 1: MOUNT THE TRANSMITTER



Cone antenna with flange

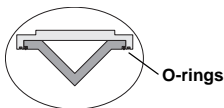
1. Place a gasket on top of the tank flange.
2. Lower the transmitter with antenna and flange into the tank nozzle.
3. Tighten the bolts and nuts with sufficient torque regarding flange and gasket choice.



Process Seal antenna with flange

1. Put the two O-rings in the corresponding grooves on the underside of the antenna process window. See the Reference Manual (00809-0100-4026) for temperature and pressure restrictions.
2. Place the antenna on top of the nozzle.
3. Mount the flange and tighten the bolts cross-wise. See the Reference Manual for torque information.
4. Mount the transmitter head and tighten the nut to 60 Nm.
5. Re-tighten the flange bolts after 24 hours.

Process Seal Window



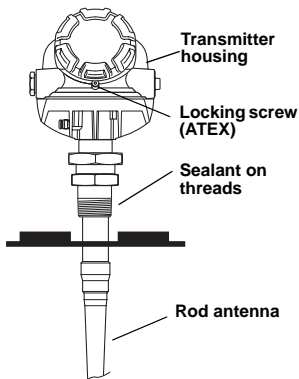
Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

STEP 1 CONTINUED...

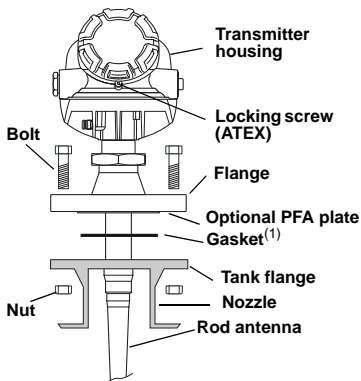


Rod antenna with threaded connection

1. Lower the transmitter and antenna into the tank.
2. Screw the transmitter into the process connection.

NOTE

Tank connections with NPT threads require a sealant for pressure-tight joints.



Rod antenna with flange

1. Place a gasket on top of the tank flange⁽¹⁾. The thickness and material of the gasket must be suitable for the process.
2. Lower the transmitter with antenna and flange into the tank nozzle.
3. Tighten the bolts and nuts with sufficient torque regarding flange and gasket choice.

See the Reference Manual (00809-0100-4026) for more details.

⁽¹⁾ Gasket is optional for the All-PFA version of the rod antenna.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

STEP 2: CONNECT THE WIRING

It is recommended to use shielded twisted pair wiring (18-12 AWG), suitable for the supply voltage and approved for use in hazardous areas if applicable. For electrical information such as power supply, see diagrams and drawings for HART[®] and FOUNDATION[™] fieldbus on the following pages.

To Connect the Transmitter

1. Make sure the housing is grounded (including IS ground inside Terminal compartment) in accordance with Hazardous Locations Certifications, national and local electrical codes.
2. Make sure the power supply is disconnected.
3. Remove the terminal block cover (see picture on the next page).
4. Pull the cable through the cable gland/conduit. For Explosionproof/Flameproof installations, only use cable glands or conduit entry devices of certified Explosionproof or Flameproof type. Install wiring with a drip loop. The bottom of the loop must be lower than the cable/conduit entry.
5. Connect wires as illustrated on the following pages.
6. Use the enclosed metal plug to seal any unused port.
7. Mount the cover and tighten the cable gland. Make sure the cover is fully engaged to meet explosion proof requirements (Adapters are required if M20 glands are used).
For ATEX installations, lock the cover with the Locking screw.
8. Connect the power supply.

NOTE

Use Teflon[®] tape or other sealant at the NPT threads in the Cable Entries.

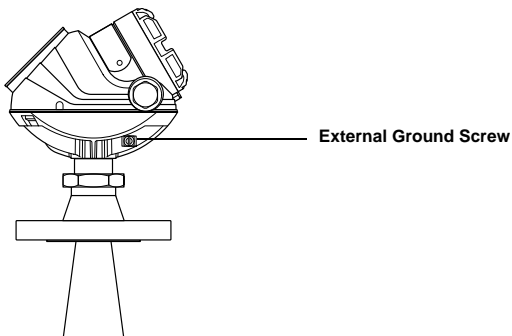
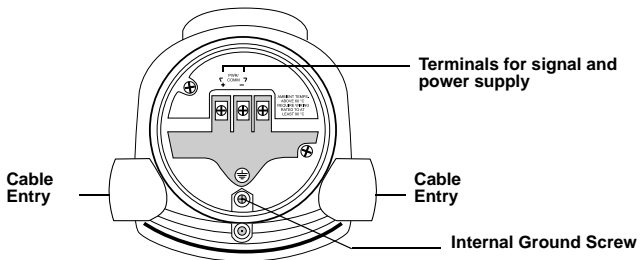
Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

Terminal Block



HART®

The 5400 Series transmitter operates with power supply ranging from 16-42.4 V dc (16-30 V dc in IS applications, 20-42.4 V dc in Explosionproof/Flameproof applications).

The Rosemount 275/375 Handheld Communicator requires a minimum load resistance (R_L) of 250 Ohm within the loop in order to function properly, see diagrams below.

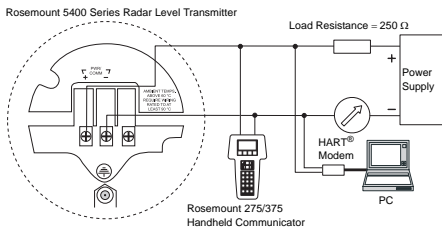
Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

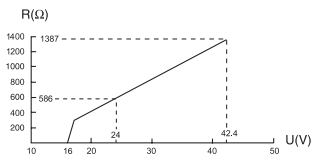
Non-Intrinsically Safe Power Supply



Load Limitations

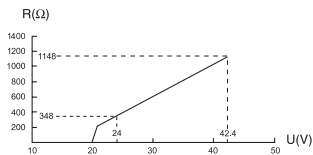
The Rosemount 275/375 Handheld Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. The maximum load resistance can be obtained from the following diagrams.

Non-Hazardous Installations



R: Maximum Load Resistance
U: External Power Supply Voltage

Explosionproof/Flameproof (EEx d) Installations



NOTE

For the EEx d case the diagram is only valid if the HART[®] load resistance is at the + side and if the - side is grounded, otherwise the load resistance value is limited to 435 Ohm.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

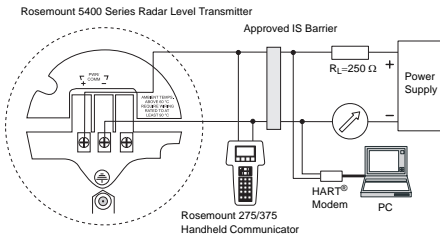
HART[®], continued

Intrinsically Safe Power Supply

IS Parameters:

$U_i=30\text{ V}$, $I_i=130\text{ mA}$, $P_i=1\text{ W}$,

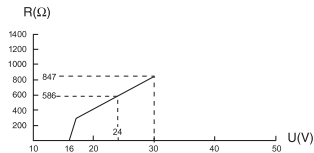
$L_i=0\text{ H}$, $C_i=7.26\text{ nF}$



Load Limitations

The Rosemount 275/375 Handheld Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. The maximum load resistance can be obtained from the following diagram.

Intrinsically Safe Installations



R: Maximum Load Resistance

U: External Power Supply Voltage

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

STEP 2 CONTINUED...

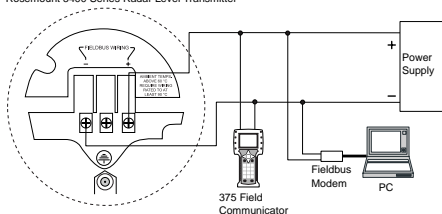
FOUNDATION™ fieldbus

The 5400 Series transmitter, FOUNDATION™ fieldbus version, operates with power supply ranging from 9-32 V dc (9-30 V dc in IS applications and 16-32 V dc in Explosionproof / Flameproof applications).

FISCO, IS applications: 9-17.5 V dc.

Non-Intrinsically Safe Power Supply

Rosemount 5400 Series Radar Level Transmitter



Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

Intrinsically Safe Power Supply

IS Parameters:

$U_i=30\text{ V}$, $I_i=300\text{ mA}$,

$P_i=1.3\text{ W}$, $L_i=0\text{ H}$,

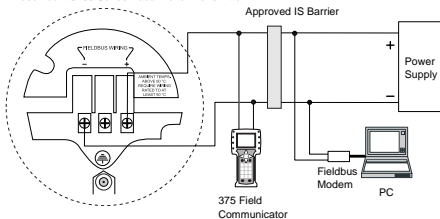
$C_i=0\text{ nF}$

FISCO IS Parameters:

$P_i=5.32\text{ W}$, $L_i=0\text{ H}$, $C_i=0\text{ nF}$

$U_i=17.5\text{ V}$, $I_i=380\text{ mA}$

Rosemount 5400 Series Radar Level Transmitter



Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

STEP 3: CONFIGURE THE TRANSMITTER

If the transmitter is pre-configured in factory it is not necessary to proceed with the following steps, unless you need to verify/change settings.

Basic configuration can easily be done either with Rosemount RadarMaster, a Rosemount 275/375 Handheld Communicator, AMS Suite or DeltaV (for FOUNDATION™ fieldbus). For advanced configuration features, Rosemount RadarMaster is required.

The Rosemount RadarMaster Guided Setup includes a Wizard for Basic Configuration, sufficient in most cases. Further configuration options are available using the Setup Functions, described in the Reference Manual (00809-0100-4026).

Configuration with the Rosemount RadarMaster Guided Setup is described on the following pages, and the corresponding Rosemount 275⁽¹⁾/375 Handheld Communicator fast key commands and FOUNDATION™ fieldbus parameters are given.

The configuration instructions in this Quick Installation Guide cover standard installations. For more complicated situations, e.g extremely turbulent and boiling applications or for installations that have disturbing objects within the radar beam etc, see the Reference Manual (00809-0100-4026).

Installing the Rosemount RadarMaster Software

To install the RadarMaster software:

1. Insert the installation CD into your CD-ROM drive.
2. Follow the instructions. If the installation program is not automatically started, run **Setup.exe** from the CD.

(1) HART® communication only.

Quick Installation Guide

00825-0100-4026, Rev BA

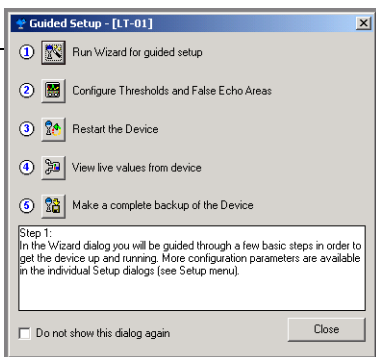
November 2005

Rosemount 5400 Series

Configuration using the Rosemount RadarMaster Software

1. Start the RadarMaster software (*Programs>Saab Rosemount>Rosemount RadarMaster*).
2. Connect to the desired transmitter. Once the transmitter is connected the *Guided Setup* window appears (it opens automatically when a transmitter is connected).

Run Wizard



3. Click the **"Run Wizard for guided setup"** button. Follow the instructions for a Basic Configuration and you will be guided through a short transmitter installation procedure.
4. The first window in the Configuration Wizard presents general information such as **Device Type** (5400), **Device Model** (5401 / 5402), **Antenna Type**, serial number and communication protocol. Check that the information complies with the ordering information. Click Next.
5. The *General* window lets you enter **Tag**, **Tag Descriptor**⁽¹⁾, **Message**⁽¹⁾ and **Date**⁽¹⁾. This information is not required for the operation of the transmitter and can be left out if desired. Click Next and the following window appears

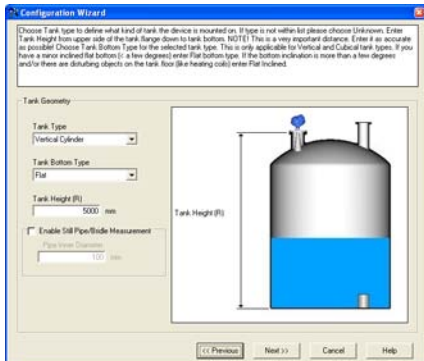
(1) Only for HART[®] communication.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series



6. Choose the **Tank Type** that corresponds to the actual tank. If none of the available options matches the actual tank, choose Unknown.

HART[®] command: 1,3,4,1

FOUNDATION[™] fieldbus parameter: TRANSDUCER 1100 >

GEOM_TANK_TYPE

Tank Bottom Type is important for the measurement performance close to the tank bottom.

HART[®] command: 1,3,4,2

FOUNDATION[™] fieldbus parameter: TRANSDUCER 1100 >

GEOM_TANK_BOTTOM_TYPE

Tank Height is the distance from the Upper Reference Point to the tank bottom. Make sure this number is as accurate as possible.

See the Reference Manual 00809-0100-4026 for details.

HART[®] command: 1,3,4,3

FOUNDATION[™] fieldbus parameter: TRANSDUCER 1100 >

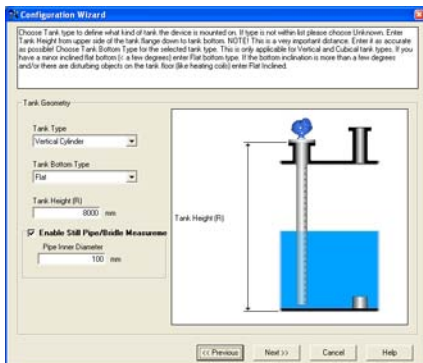
GEOM_TANK_HEIGHT

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series



Select the **Enable Still-pipe/Bridle Measurement** check box and enter the **Pipe Inner Diameter** if the transmitter is installed on a pipe or bridle.

HART[®] command: 1,3,4,4 (enable function) followed by 1,3,4,5

FOUNDATION[™] fieldbus parameter:

TRANSDUCER 1100 > SIGNAL_PROC_CONFIG (enable function)

followed by TRANSDUCER 1100 > ANTENNA_PIPE_DIAM

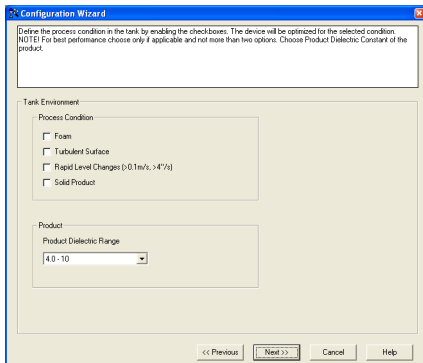
Click Next and the following window appears.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series



7. In the Process Condition box, select the check boxes that correspond to the conditions in your tank. You should select as few options as possible and not more than two. See the Reference Manual 00809-0100-4026 for details.

Process Condition

HART® command: 1,3,4,6,1

FOUNDATION™ fieldbus parameter: TRANSDUCER 1100 >
ENV_ENVIRONMENT

Product Dielectric Constant

HART® command: 1,3,4,6,2

FOUNDATION™ fieldbus parameter: TRANSDUCER 1100 >
ENV_DIELECTR_CONST

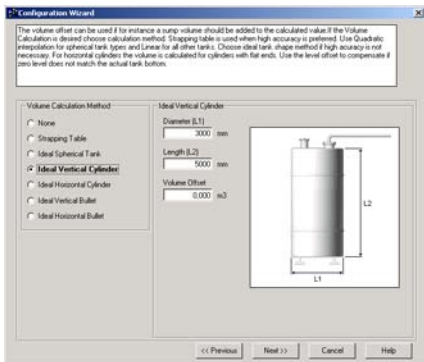
Click Next and the following window appears.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series



8. If volume calculation is desired, choose a pre-defined **Volume Calculation Method** that is based on a tank shape that corresponds to the actual tank. Choose None if volume calculation is not desired.

HART[®] code: 1,3,4,7,1

FOUNDATION[™] fieldbus parameter: TRANSDUCER 1300>

VOL_VOLUME_CALC_METHOD

Choose Strapping Table if the actual tank does not match any of the available pre-defined tank options or if high volume accuracy is desired.

Enter tank dimensions:

Diameter

HART[®] code: 1,3,4,7,2

FOUNDATION[™] fieldbus parameter: TRANSDUCER 1300>

VOL_IDEAL_DIAMETER

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

Length

HART[®] code: 1,3,4,7,3

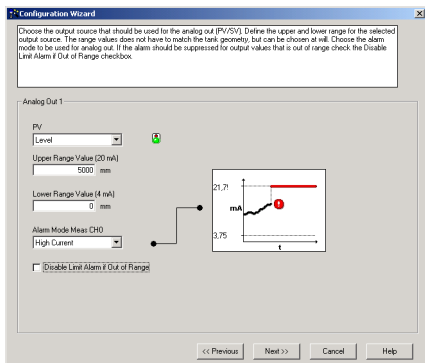
FOUNDATION[™] fieldbus parameter: TRANSDUCER 1300>
VOL_IDEAL_LENGTH

Volume Offset

HART[®] code: 1,3,4,7,4

FOUNDATION[™] fieldbus parameter: TRANSDUCER 1300>
VOL_VOLUME_OFFSET

Click Next and the following window appears.



Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

9. This step is not applicable for FOUNDATION™ fieldbus. Parameters are instead entered in the AI-block.

For HART® communication, choose Primary Variable, **PV**, (HART® code: 1,3,5,1).

Specify the analog output range by setting the **Upper Range Value** (20 mA), and the **Lower Range Value** (4 mA) to the desired corresponding level values (HART® code: 1,3,5,2).

The **Alarm Mode** (HART® code: 1,3,5,3) specifies the output state when a measurement error occurs. The following values are used:
High: 21.75 mA (standard) or 22.5 mA (Namur)

Low: 3.75 mA (standard)

Freeze: presents value when error occurs.

Click Next.

10. The Basic Configuration with the RadarMaster Wizard is now finished.

Continue with Steps 2 to 5 in the *Guided Setup* window:

- Configure thresholds and false echo areas
- Restart the device
- View live values from the device
- Make a complete backup of the device

See the Reference Manual (00809-0100-4026) for further information.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

PRODUCT CERTIFICATES

SAFETY NOTE AND SPECIAL CONDITIONS FOR SAFE USE (X-MARKING IN NEMKO ATEX CERTIFICATE)

The intrinsically safe circuits do not withstand the 500 V ac test as specified in EN 50020 clause 6.4.12.

Parts of the rod antenna and the process seal antenna are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC according to EN 50014, clause 7.3 (20 cm²) and Category II 1G according to EN 50284, clause 4.4.3 (4 cm²). Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Impact and friction hazards need to be considered according to EN 50284, clause 4.3.1 when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made of light metal alloys, and used in Category II 1 G.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

Factory Mutual (FM) Approvals

E5⁽¹⁾ Explosion Proof for Class I, Div. 1,

Groups B, C and D;

Dust Ignition Proof for Class II/III, Div. 1, Groups E, F and G;

With Intrinsically Safe connections to

Class I, II, III, Div. 1, Groups B, C, D, E, F and G.

Temp. Code T4

Ambient temperature limits: -40°C to +70°C⁽²⁾.

Seal not required.

I5, IE⁽¹⁾

Intrinsically Safe for Class I, II, III, Div. 1, Groups A, B, C, D, E, F and G,

Class I, Zone 0, AEx ia IIC T4 when installed per Control

Drawing: 9150079-905.

Non-Incendive Class I, Div. 2, Groups A, B, C and D;

Suitable for Class II, III, Div. 2, Groups F and G.

4-20 mA / HART[®] model: $U_i=30$ V dc, $I_i=130$ mA, $P_i=1.0$ W,

$C_i=7.26$ nF, $L_i=0$ H.

FOUNDATION[™] fieldbus model: $U_i=30$ V dc, $I_i=300$ mA, $P_i=1.3$ W,

$C_i=0$ nF, $L_i=0$ H.

FISCO model: $U_i=17.5$ V dc, $I_i=380$ mA, $P_i=5.32$ W, $L_i=C_i=0$.

Max operation:

4-20 mA / HART[®] model: 42.4 V, 25 mA,

FOUNDATION[™] fieldbus model: 32 V, 25 mA.

Temp. Code T4

Ambient temperature limits: -40°C to +70°C⁽²⁾

(1) Ordering information code for Product Certifications, see the Product Data Sheet (00813-0100-4026) or Reference Manual (00809-0100-4026).

(2) +60°C with FOUNDATION[™] fieldbus or FISCO option.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

ATEX Approval

Nemko 04ATEX1073X

E1⁽¹⁾ Flame Proof:



II 1/2 GD T73°C⁽²⁾.

EEx iad IIC T4 (-40°C<T_a<+70°C⁽³⁾)

I1, IA⁽¹⁾

Intrinsically Safe:



II 1 GD T73°C⁽²⁾.

EEx ia IIC T4 (-40°C<T_a<+70°C⁽³⁾).

4-20 mA / HART[®] model: U_i=30 V dc, I_i=130 mA, P_i=1.0 W,

C_i=7.26 nF, L_i=0 H.

FOUNDATION[™] fieldbus model: U_i=30 V dc, I_i=300 mA, P_i=1.5 W,

C_i=0 nF, L_i=0 H.

FISCO model: U_i=17.5 V dc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.

Installation Drawing: 9150079-907

(1) Ordering information code for Product Certifications, see the Product Data Sheet (00813-0100-4026) or Reference Manual (00809-0100-4026).

(2) +63°C with FOUNDATION[™] fieldbus or FISCO option.

(3) +60°C with FOUNDATION[™] fieldbus or FISCO option.

Quick Installation Guide

00825-0100-4026, Rev BA

November 2005

Rosemount 5400 Series

Canadian Standards Association (CSA) Approval

E6⁽¹⁾ Explosionproof with internal Intrinsically Safe Circuits [Exia]
Class I, Div. 1, Groups B, C and D;

Temp Code T4.

Class II, Div. 1 and 2, Groups E, F and G;

Class III, Div. 1

Ambient temperature limits -40°C to +70°C⁽²⁾

Factory sealed.

I6, IF⁽¹⁾

Intrinsically Safe Exia:

Class I, Div. 1, Groups A, B, C and D.

Temp Code T4.

4-20 mA / HART[®] model: $U_i=30$ V dc, $I_i=130$ mA, $P_i=1.0$ W,
 $C_i=7.3$ nF, $L_i=0$ H.

FOUNDATION[™] fieldbus model: $U_i=30$ V dc, $I_i=300$ mA, $P_i=1.3$ W,
 $C_i=0$ nF, $L_i=0$ H.

FISCO model: $U_i=17.5$ V dc, $I_i=380$ mA, $P_i=5.32$ W, $L_i=C_i=0$.

Installation Drawing: 9150079-906

Ambient temperature limits -40°C to +70°C⁽²⁾.

For information on product certificates, refer to the Reference Manual (document number 00809-0100-4026).

(1) Ordering information code for Product Certifications, see the Product Data Sheet (00813-0100-4026) or Reference Manual (00809-0100-4026).

(2) +60°C with FOUNDATION[™] fieldbus or FISCO option.