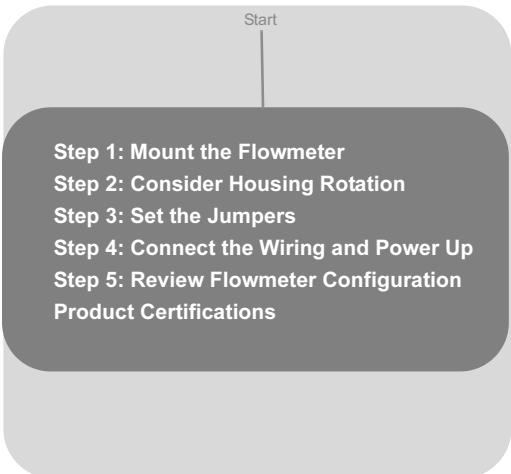
Quick Installation Guide
00825-0100-4003, Rev BA
March 2003

Model 8800C

Model 8800C Vortex Flowmeter



HART®

Fieldbus Foundation

CE

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EMERSON.
Process Management

Quick Installation Guide
00825-0100-4003, Rev BA
March 2003

Model 8800C

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⚠ IMPORTANT NOTICE

This installation guide provides basic guidelines for the Rosemount® Model 8800C Vortex Flowmeter. It does not provide instructions for detailed configuration, diagnostics, maintenance, service, troubleshooting, Explosion-Proof, Flame-Proof, or Intrinsically Safe (I.S.) installations. Refer to the Model 8800C reference manual (document number 00809-0100-4003) and Model 8800C Foundation fieldbus manual (document number 00809-0100-4772) for more instruction. The manuals and this QIG are also available electronically on www.rosemount.com.

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Model 8800C

⚠ WARNING

Explosions could result in death or serious injury:

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Please review the approvals section of the Model 8800C reference manual for any restrictions associated with a safe installation.

- 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.
- Verify the operating atmosphere of the flowmeter is consistent with the appropriate product certifications.

In an Explosion-Proof/Flame-Proof installation, do not remove the flowmeter covers when power is applied to the unit.

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.

STEP 1: MOUNT THE FLOWMETER

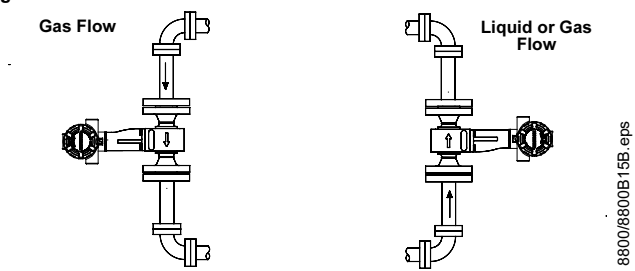
Design process piping so the meter body will remain full, with no entrapped air. The vortex flowmeter can be installed in any orientation without affecting accuracy. However, the following are guidelines for certain installations.

Vertical Mounting

If the vortex flowmeter will be installed in a vertical orientation:

- Install upward or downward flow for gas or steam.
- Install upward flow for liquids.

Figure 1. Vertical Installation

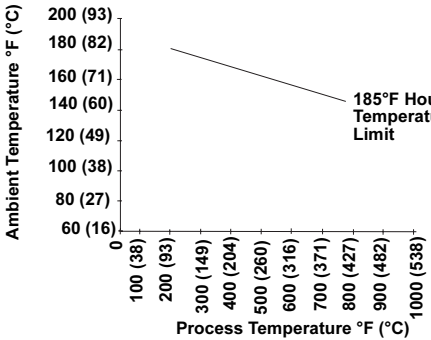


High Temperature Mounting

The maximum temperature for integral electronics is dependent on the ambient temperature where the flowmeter is installed. The electronics must not exceed 185°F (85°C).

Figure 2 shows combinations of ambient and process temperatures needed to maintain a housing temperature of less than 185°F (85°C).

Figure 2. Model 8800C Ambient/Process Temperature Limits



8800_26aa.eps

Meter and pipe insulated with 3 inches of ceramic fiber insulation. Horizontal Pipe and Vertical meter position.

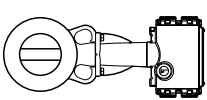
The following orientations are recommended for applications with high process temperatures.

- Install with meter body beside or below process pipe.
- Insulation around pipe may be necessary to maintain ambient temperature below 185°F (85°C).

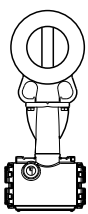
NOTE

Insulate pipe and meter body only. Do not insulate support tube bracket so heat can be dissipated.

Figure 3. High Temperature Installation



The meter body installed with the electronics to the side of the pipe



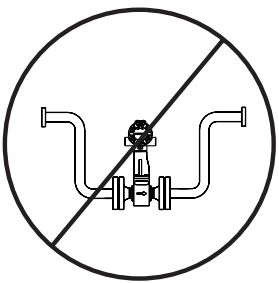
The meter body installed with the electronics below the pipe

For steam and fluids with small solids content, it is recommended to have the flowmeter installed with the electronics to the side of the pipe. This will minimize potential measurement errors by allowing the condensate or solids to flow under the shedder bar without interrupting the vortex shedding.

Steam Installations

Avoid installation shown Figure 4. Such conditions may cause a water-hammer condition at startup due to trapped condensation.

Figure 4. Improper Installation

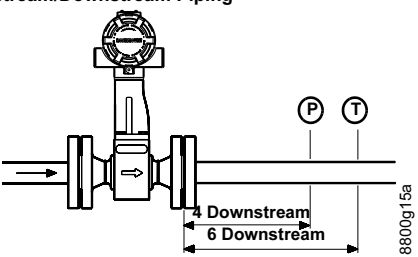


Upstream/Downstream Requirements

The Model 8800C Flowmeter may be installed with a minimum of ten straight pipe diameters (D) upstream and five straight pipe diameters (D) downstream by following the K-factor corrections as described in the Model 8800C Installation Effects Technical Data Sheet (00816-0100-3250). No K-factor correction is required if 35 straight pipe diameters upstream (35D) and 10 straight pipe diameters downstream (10D) are available.

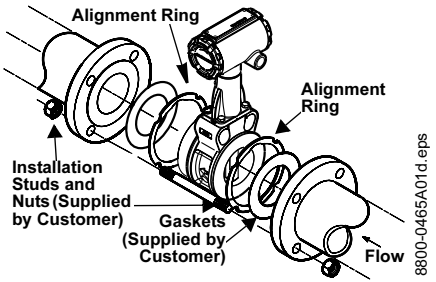
When using pressure and temperature transmitters in conjunction with the Model 8800C for compensated mass flows install the transmitters downstream of the Model 8800C flowmeter as shown in Figure 5.

Figure 5. Upstream/Downstream Piping



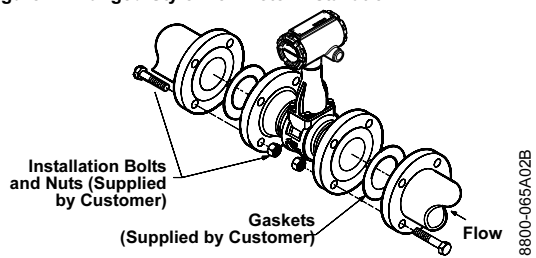
Install Wafer Style Flowmeters according to Figure 6.

Figure 6. Wafer Style Installation



Install Flanged-Style Flowmeters according to Figure 7.

Figure 7. Flanged-Style Flowmeter Installation



NOTE

The required bolt load for sealing the gasket joint is affected by several factors, including operating pressure and gasket material, width, and condition. A number of factors also affect the actual bolt load resulting from a measured torque, including condition of bolt threads, friction between the nut head and the flange, and parallelism of the flanges. Due to these application-dependent factors, the required torque for each application may be different. Follow the guidelines outlined in the ASME Pressure Vessel Code (Section VIII, Division 2) for proper bolt tightening. Make sure the flowmeter is centered between flanges of the same nominal size as the flowmeter.

Remote Electronics

If you order one of the remote electronics options (options R10, R20, R30, or RXX), the flowmeter assembly ships in two parts:

1. The meter body with an adapter installed in the support tube and an interconnecting coaxial cable attached to it.
2. The electronics housing installed on a mounting bracket.

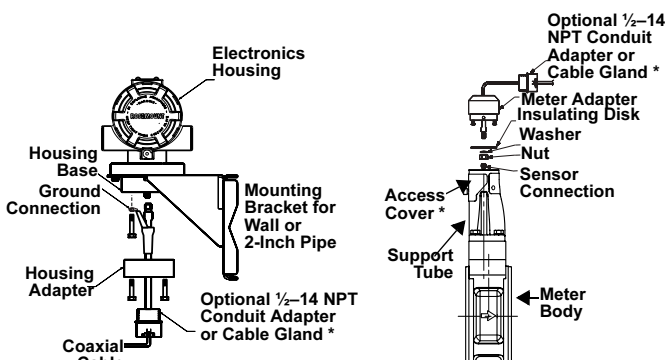
Mounting

Mount the meter body in the process flow line as described earlier in this section. Mount the bracket and electronics housing in the desired location. The housing can be repositioned on the bracket to facilitate field wiring and conduit routing.

Cable Connections

Refer to Figure 8 and the instructions on page 10 to connect the loose end of the coaxial cable to the electronics housing.

Figure 8. Remote Electronics Installation



** Access Cover is available only in 6 inch (DN50) and 8 inch (DN 200) wafer style flowmeters.*

1. If you plan to run the coaxial cable in conduit, carefully cut the conduit to the desired length to provide for proper assembly at the housing. A junction box may be placed in the conduit run to provide a space for extra coaxial cable length.
2. Slide the conduit adapter or cable gland over the loose end of the coaxial cable and fasten it to the adapter on the meter body support tube.
3. If using conduit, route the coaxial cable through the conduit.
4. Place a conduit adapter or cable gland over the end of the coaxial cable.
5. Remove the housing adapter from the electronics housing.
6. Slide the housing adapter over the coaxial cable.
7. Remove one of the four housing base screws.
8. Attach and securely tighten the coaxial cable nut to the connection on the electronics housing.
9. Attach the coaxial cable ground wire to the housing via the housing base ground screw.
10. Align the housing adapter with the housing and attach with three screws.
11. Tighten the conduit adapter or cable gland to the housing adapter.

CAUTION

To prevent moisture from entering the coaxial cable connections, install the interconnecting coaxial cable in a single dedicated conduit run or use sealed cable glands at both ends of the cable.

STEP 2: CONSIDER HOUSING ROTATION

The entire electronics housing may be rotated in 90 degree increments for easy viewing. Use the following steps to change the housing orientation:

1. Loosen the screw on the access cover (on the support tube) and remove the cover (6 inch [DN150] and 8 inch [DN 200] Wafer Style only).
2. Loosen the three housing rotation set screws at the base of the electronics housing with a hex wrench by turning the screws clockwise (inward) until they will clear the support tube.
3. Slowly pull the electronics housing out of the support tube.

NOTE

Do not pull the housing more than 1.5 inches (40 mm) from the top of the support tube until the sensor cable is disconnected. Damage to the sensor may occur if this sensor cable is stressed.

4. Unscrew the sensor cable from the housing with a $^{5}/_{16}$-inch open end wrench.
5. Rotate the housing to the desired orientation.
6. Hold it in this orientation while you screw the sensor cable onto the base of the housing.

NOTE

Do not rotate the housing while the sensor cable is attached to the base of the housing. This will stress the cable and may damage the sensor.

7. Place the electronics housing into the top of the support tube.
8. Use a hex wrench to turn the three housing rotation screws counter-clockwise (outward) to engage the support tube.
9. Replace the access cover on the support tube and then tighten the screw (6 inch [DN150] and 8 inch [DN 200] Wafer Style only).

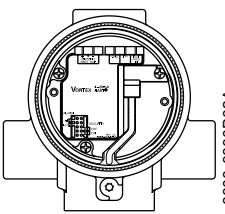
STEP 3: SET THE JUMPERS

Adjust jumpers to desired settings.

HART

If alarm and security jumpers are not installed, the flowmeter will operate normally with the default alarm condition alarm *high* and the security *off*.

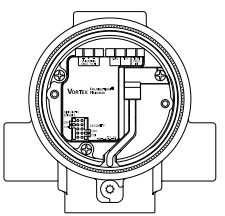
Figure 9. Hart Jumpers and LCD



FOUNDATION Fieldbus

If security and simulate enable jumpers are not installed, the flowmeter will operate normally with the default security *off* and simulate enable *off*.

Figure 10. Fieldbus Jumpers and LCD



STEP 4: CONNECT THE WIRING AND POWER UP

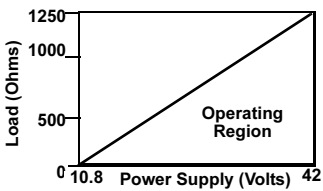
Power Supply

HART

The dc power supply should provide power with less than two percent ripple. The total resistance load is the sum of the resistance of the signal leads and the load resistance of the controller, indicator, and related pieces. Note that the resistance of intrinsic safety barriers, if used, must be included.

Figure 11. Load Limitation

Maximum Loop Resistance = 41.7 (Power Supply Voltage - 10.8)



The HART Communicator requires a minimum loop resistance of 250Ω

FOUNDATION fieldbus

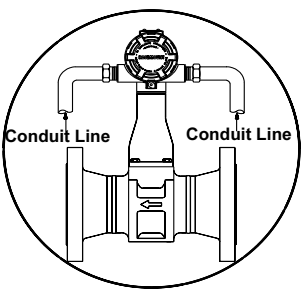
The flowmeter requires 9-32V dc at the power terminals. Each fieldbus power supply requires a power conditioner to decouple the power supply output from the fieldbus wiring segment.

Conduit Installation

Prevent condensation in any conduit from flowing into the housing by mounting the flowmeter at a high point in the conduit run. If the flowmeter is mounted at a low point in the conduit run, the terminal compartment could fill with fluid.

If the conduit originates above the flowmeter, route conduit below the flowmeter before entry. In some cases a drain seal may need to be installed.

Proper Conduit Installation with Model 8800C



Use the following steps to wire the flowmeter:

1. Remove the housing cover on the side marked FIELD TERMINALS.
2. Connect the positive lead to the "+" terminal and the negative lead to the "-" terminal as shown in Figure 12 for HART installations and Figure 13 for FOUNDATION fieldbus installations.
3. For HART installations utilizing the pulse output, connect the positive lead to the "+" terminal of the pulse output and the negative lead to the "-" terminal of the pulse output as shown in Figure 12. A separate 5 to 30V dc power supply is required for the pulse output.

NOTE

Do not connect the powered signal wiring to the test terminals. Power could damage the test diode in the test connection. Shielded, twisted pair cable should be used for best results. Use 24 AWG or larger wire and do not exceed 5,000 feet (1,500 meters). For FOUNDATION fieldbus use wire specifically designed for fieldbus installations for maximum performance. In ambient temperatures above 149°F (65°C) use wire or cable rated to 194°F (90°C).

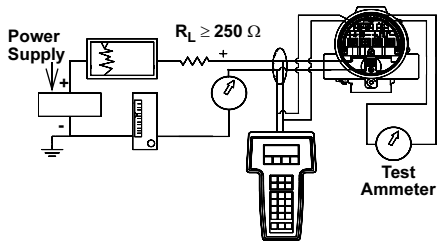
Figure 12 shows wiring connections necessary to power a Model 8800C and enable communications with a hand-held HART communicator.

Figure 13 shows wiring connections necessary to power the Model 8800C with FOUNDATION fieldbus.

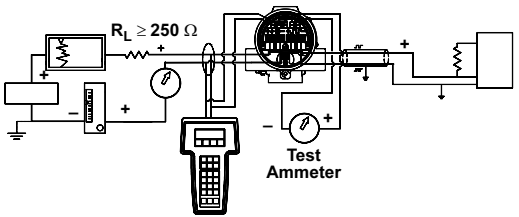
4. Plug and seal unused conduit connections.
5. If applicable, install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the flowmeter housing.

Figure 12. Flowmeter Wiring Diagrams for HART protocol

4-20mA Wiring



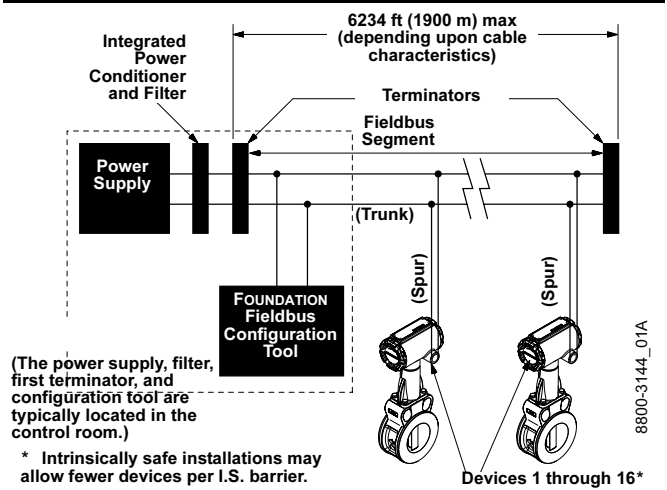
4-20mA and Pulse Wiring with Electronic Totalizer/Counter



NOTE

Installation of the transient protection terminal block does not provide transient protection unless the Model 8800C case is properly grounded.

Figure 13. Flowmeter Wiring Diagram for FOUNDATION fieldbus protocol



STEP 5: REVIEW FLOWMETER CONFIGURATION

Before operating the Model 8800C in an installation, you should review the configuration data to ensure that it reflects the current application. In most cases, all of these variables are pre-configured at the factory. Configuration may be required if your Model 8800C is not configured or if the configuration variables need revision.

Rosemount recommends the following variables are reviewed before startup:

- Service Type
- PV Units
- Process Density and Density Units
  (Only when mass flow units are selected).
- Range Values
- Process Temperature
- Mating Pipe ID
- K-Factor

NOTE

For detailed configuration information see the Model 8800C Vortex Flowmeter manual (00809-0100-4003) and the Model 8800C FOUNDATION fieldbus manual (00809-0100-4772).

Table 1. Fast Keys for Model 8800C

Alarm Jumper	HART Fast Key	Function	HART Fast Key
Alarm Jumpers	1, 4, 3, 1, 3	Num Req Preams	1, 4, 3, 3, 2
Analog Output	1, 4, 3, 1	Poll Address	1, 4, 3, 3, 1
Base Time Unit	1, 3, 3, 5, 2	Process Density	1, 3, 3, 2, 2
Base Volume Unit	1, 3, 3, 5, 1	Process Temperature	1, 3, 5
Burst Mode	1, 4, 3, 3, 3	Process Variables	1, 1
Burst Option	1, 4, 3, 3, 4	Pulse Output	1, 4, 3, 2
Conversion Number	1, 3, 3, 5, 4	Pulse Output Scale	1, 4, 3, 2, 1
D/A Trim	1, 4, 3, 1, 4	Pulse Output Test	1, 4, 3, 2, 2
Damping	1, 3, 7	PV Percent Range	1, 1, 2
Date	1, 4, 5, 5	Range Values	1, 3, 4
Descriptor	1, 4, 5, 3	Review	1, 5
Density Ratio	1, 3, 3, 3, 2	Revision Numbers	1, 4, 5, 7
Device ID	1, 4, 5, 7, 6	Scaled D/A Trim	1, 2, 6 or 1, 4, 3, 1, 5
Filter Restore	1, 4, 4, 3	Self Test	1, 2, 1, 2
Final Assembly Number	1, 4, 5, 7, 5	Service Type	1, 3, 2
Flange Type	1, 4, 1, 5	STD/ Nor Flow Units	1, 3, 3, 3, 1
K-Factor	1, 4, 1, 2	Special Units	1, 3, 3, 5
Local Display	1, 4, 3, 4	Status	1, 2, 1, 1
Loop Test	1, 4, 3, 1, 2	Tag	1, 3, 1
Low Flow Cutoff	1, 4, 4, 2, 3	Total	1, 1, 4, 1
Low Pass Filter	1, 4, 4, 2, 4	Totalizer Control	1, 1, 4
LRV	1, 3, 4, 2	Transmitter Test	1, 2, 1, 2
LSL	1, 3, 4, 5	Trigger Level	1, 4, 4, 2, 5
Manufacturer	1, 4, 5, 1	URV	1, 3, 4, 1
Mass Flow Units	1, 3, 3, 2, 1	User Defined Units	1, 3, 3, 5, 3
Mating Pipe ID (Inside Diameter)	1, 3, 6	USL	1, 3, 4, 4
Message	1, 4, 5, 4	Shedding Frequency	1, 1, 5, 2
Meter Body Number	1, 4, 1, 4	Wetted Material	1, 4, 1, 3
Minimum Span	1, 3, 4, 3	Write Protect	1, 4, 5, 6

PRODUCT CERTIFICATIONS

Approved Manufacturing Locations

Rosemount Inc. — Eden Prairie, Minnesota, USA

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on our website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive

Rosemount Inc. complies with the ATEX Directive.

Flame-Proof enclosure Ex d protection type in accordance with EN50 018

- Transmitters with Flame-Proof enclosure type protection shall only be opened when power is removed.
- Closing of entries in the device must be carried out using the appropriate EEx d metal cable gland or metal blanking plug.
- Do not exceed the energy level, which is stated on the approval label.

Type n protection type in accordance with EN50 021

Closing of entries in the device must be carried out using the appropriate EExe or EExn metal cable gland and metal blanking plug or any appropriate ATEX approved cable gland and blanking plug with IP66 rating certified by an EU approved certification body.

European Pressure Equipment Directive (PED)

Model 8800 Vortex Flowmeter Line Size 40 mm to 300 mm

Certificate Number PED-H-20 CE 0434

Module H Conformity Assessment

Mandatory CE-marking for flowmeters in accordance with Article 15 of the PED can be found on the flowtube body (CE 0434).

Flowmeter categories I – IV, use module H for conformity assessment procedures.

Model 8800 Vortex Flowmeter Line Size 15 mm and 25 mm

Sound Engineering Practice

Flowmeters that are SEP or Category I with Explosion-Proof protection are outside the scope of PED and cannot be marked for compliance with PED.

Hazardous Location Certifications

Model 8800C with HART Protocol

North American Certifications

Factory Mutual (FM)

E5 Explosion-Proof for
Class I, Division 1,
Groups B, C, and D;
Dust-ignition proof for
Class II/III, Division 1,
Groups E, F, and G;
Temp Code T5 (T_a = -50°C to 85°C)
factory sealed.

I5 Intrinsically safe for use in
Class I, Division 1,
Groups A, B, C, and D;
Class II/III, Division 1,
Groups E, F, and G;
Temp. code T4; when connected in accordance with Rosemount drawings 08800-0106 and 00268-0031;
Non-incendive for Class I, Division 2,
Groups A, B, C, and D;
Temperature Code T4

K5 E5 and I5 combination

Canadian Standards Association (CSA)

E6 Explosion-Proof for
Class I, Division 1,
Groups B, C, and D;
Dust-ignition proof for
Class II, Division 1,
Groups E, F, and G;
Class III, Division 1
Suitable for Class I, Division 2,
Groups A, B, C, and D;
hazardous locations;
factory sealed.

I6 Intrinsically safe for
Class I, Division 1,
Groups A, B, C, and D;
When connected in accordance with Rosemount drawing 08800-0111;
Temperature code T3C

C6 E6 and I6 combination

European Certifications

CENELEC Intrinsic Safety and Dust Certification

I1 ATEX Marking ⟨Ex⟩ II 1 GD
Certification No. BAS99ATEX1222
EEx ia IIC T5 (-50°C ≤ Ta ≤ 40°C)
EEx ia IIC T4 (-50°C ≤ Ta ≤ 70°C)
Dust Certification T80°C (Ta= -20°C to 70°C)
IP 66
CE 1180
Input Parameters:
U_i = 30 VDC
I_i(1) = 300 mA
P_i(1) = 1 W
C_i = 0.0 μF
L_i = 40 μH

CENELEC Type N Certification

N1 ATEX Marking ⟨Ex⟩ II 3 GD
Certification No. BAS99ATEX3221
EEx nL IIC T5 (T_{amb}= -40 °C to 70 °C)
Dust Certification T80°C (Ta= -20°C to 70°C)
IP 66
Input Parameters:
U_i = 42 V dc Max

(1) Total for flowmeter

CENELEC Flame-Proof Certification

ED Certification No. KEMA99ATEX3852X

ATEX Marking Remote Mount:

Transmitter: ⟨Ex⟩ II 2(1) G
EEx d [ia]IIC T6 (T_{amb}= -50°C to 70°C)

Meter Body: ⟨Ex⟩ II I G
EEx ia IIC T6 (T_{amb}= -50°C to 70°C)

ATEX Marking Integral Mount: Ex II 1/2 G
EEx d [ia] IIC T6 (T_{amb}= -50°C to 70°C)
Um = 250V

CE 1180

Special Conditions

When the equipment is installed particular precautions must be taken to ensure taking account with the effect of the fluid temperature, that the ambient temperature of the electrical parts of the apparatus is comprised between -50 °C and 70 °C.

The remote mounted sensor may only be connected to the flowmeter with the associated cable, supplied by the manufacturer.

Model 8800C With FOUNDATION Fieldbus Protocol

North American Certifications

Factory Mutual (FM) Approvals

E5 Explosion-Proof for
Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/III, Division 1, Groups E, F, and G.
Factory sealed.
Temperature Code T5 (T_a= -50°C to 85°C)

I5 Intrinsically safe for use in
Class I, Division 1, Groups A, B, C, and D.
Class II/III, Division 1,Groups E, F, and G.
Temp. Code T4; when connected in accordance with Rosemount drawings 08800-0106 and 00268-0031.
Non-incendive for Class I, Division 2,
Groups A, B, C, and D.
Temperature Code T4

K5 E5 and I5 combination

Canadian Standards Association (CSA) Approvals

E6 Explosion Proof for
Class I, Division 1, Groups B, C, and D; Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G; Class III, Division 1.
Suitable for Class I, Division 2, Groups A, B, C, and D hazardous locations.
Factory sealed.

I6 Intrinsically Safe for
Class I, Division 1, Groups A, B, C, and D;
When connected in accordance with Rosemount drawing 08800-0111.
Temperature Code T3C.

C6 E6 and I6 combination.

European Certifications

CENELEC Intrinsic Safety and Dust Certification

I1 ATEX Marking ⟨Ex⟩ II 1 GD
Certification No. BAS99ATEX1241X
EEx ia IIC T4 (-50°C ≤ Ta ≤ 60°C)
Dust Certification T80°C (-20°C ≤ Ta ≤ 60°C)
IP 66
CE 1180
Input Parameters:
U_i = 30 VDC
I_i(1) = 300 mA
P_i(1) = 1.3 W
C_i = 0.0 μF
L_i = 20 μH

Special Conditions for Safe Use (x)

The apparatus (with T1 option) is not capable of withstanding the 500V insulation test required by EN 50020: 1994. This must be taken into account when installing the apparatus.

CENELEC Type N Certification

N1 ATEX Marking Ex II 3 GD
Certification No. BAS99ATEX3240
EEx nL IIC T5 (-40°C ≤ Ta ≤ 70°C)
Dust Certification T80°C (-20°C ≤ Ta ≤ 70°C)
IP 66
Input Parameters:
U_i = 42 V dc Max

Special Conditions for Safe Use (x)

The apparatus is not capable of withstanding the 500V insulation test required by EN 50021: 1999. This must be taken into account when installing the apparatus.

(1) Total for flowmeter

CENELEC Flame-Proof Certifications

ED Certification No. KEMA99ATEX3852X

ATEX Marking Remote Mount:

Transmitter: ⟨Ex⟩ II 2(1) G
EEx d [ia]IIC T6 (T_{amb}= -50°C to 70°C)

Meter Body: ⟨Ex⟩ II I G
EEx ia IIC T6 (T_{amb}= -50°C to 70°C)

ATEX Marking Integral Mount: Ex II 1/2 G
EEx d [ia] IIC T6 (T_{amb}= -50°C to 70°C)
Um = 250V

CE 1180

Special Conditions

When installing the equipment particular precautions must be taken to ensure taking account with the effect of the fluid temperature, that the ambient temperature of the electrical parts of the apparatus is comprised between -50 °C and 70 °C.

The remote mounted sensor may only be connected to the flowmeter with the associated cable, supplied by the manufacturer.