Quick Start Guide
00825-0300-4809, Rev EB
June 2016

Rosemount™ 485 Annubar™ Pak-Lok Assembly

EMERSON™
Process Management

NOTICE

This guide provides basic guidelines for Rosemount 485 Annubar. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, Explosion-proof, Flameproof, or Intrinsically Safe (I.S.) installations. Refer to Rosemount 485 Annubar Reference Manual for more instruction. This manual is also available electronically on EmersonProcess.com/Rosemount.

If the Rosemount Annubar was ordered assembled to a Rosemount Pressure Transmitter, see the following Quick Start Guides for information on configuration and hazardous locations certifications:

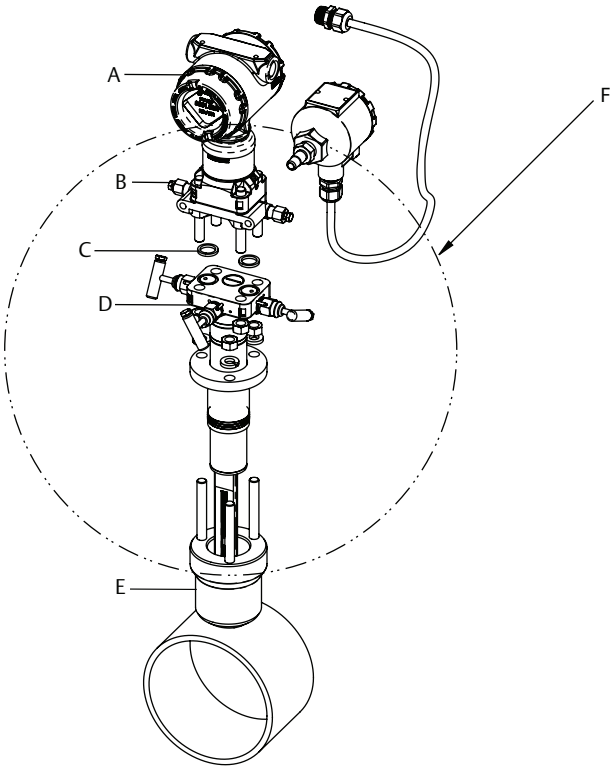
- Rosemount 3051S Series Pressure Transmitter and Rosemount 3051SF Series Flowmeter Quick Start Guide.
- Rosemount 3051S MultiVariable Transmitter and Rosemount 3051SF Series Flowmeter MultiVariable Transmitter Quick Start Guide.
- Rosemount 3051 Pressure Transmitter and Rosemount 3051CF Series Flowmeter Transmitter Quick Start Guide.
- Rosemount 2051 Pressure Transmitter and Rosemount 2051CF Series Flowmeter Transmitter Quick Start Guide.

⚠WARNING

Process leaks may cause harm or result in death. To avoid process leaks, only use gaskets designed to seal with the corresponding flange and o-rings to seal process connections. Flowing medium may cause the Rosemount 485 Annubar Assembly to become hot and could result in burns.

Contents

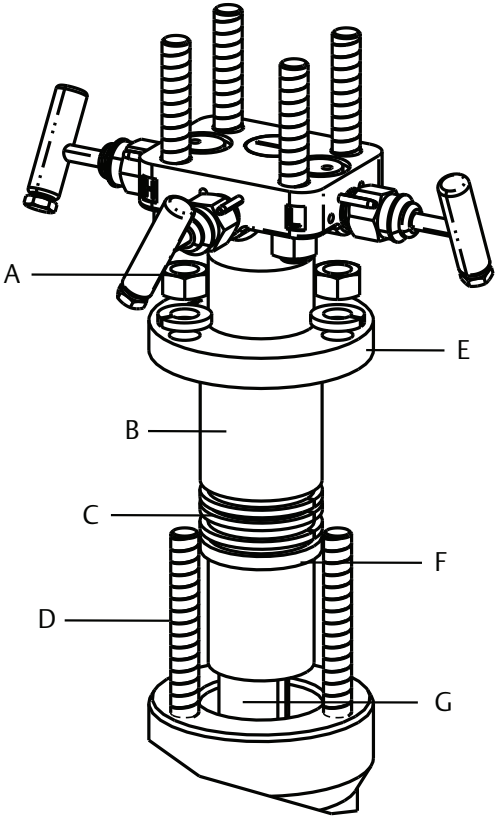
Figure 1. Rosemount 485 Annubar Pak-Lok Assembly Exploded View[1]



A. Transmitter
B. Coplanar flange with drain vents
C. 2× O-rings
D. Direct-mount transmitter connection with valves
E. Pak-Lok body
F. See Figure 2 for details

1. *Transmitter and housing are shown for clarity purposes — only supplied if ordered.*

Figure 2. Rosemount 485 Annubar Pak-Lok Assembly Detail Exploded View

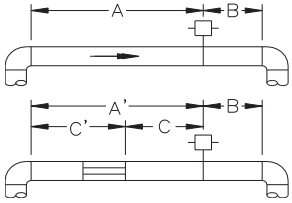
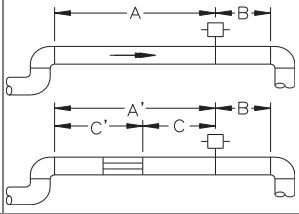
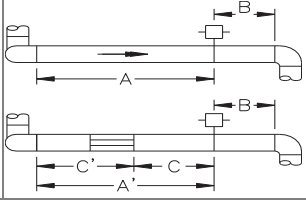
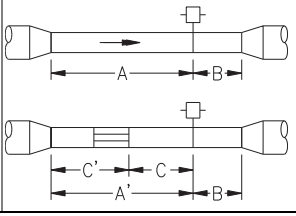


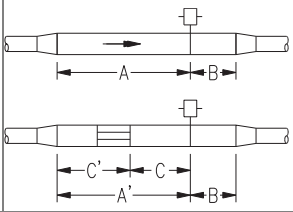
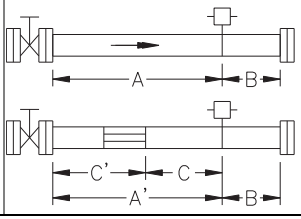
A. Nuts
B. Follower
C. 3× Packing rings
D. Studs
E. Compression plate
F. Retaining ring
G. Rosemount 485 Annubar Sensor

1.0 Location and orientation

Correct orientation and straight run requirements must be met for accurate and repeatable flow measurements. Refer to Table 1 for minimum pipe diameter distances from upstream and downstream disturbances.

Table 1. Straight Run Requirements

	In plane / Out of plane	Upstream pipe diameters					Downstream pipe diameters
		Without straightening vanes		With straightening vanes			
		In plane A	Out of plane A	A'	C	C'	B
1		8 N/A	10 N/A	N/A 8	N/A 4	N/A 4	4 4
2		11 N/A	16 N/A	N/A 8	N/A 4	N/A 4	4 4
3		23 N/A	28 N/A	N/A 8	N/A 4	N/A 4	4 4
4		12 N/A	12 N/A	N/A 8	N/A 4	N/A 4	4 4

5		18 N/A	18 N/A	N/A 8	N/A 4	N/A 4	4 4
6		30 N/A	30 N/A	N/A 8	N/A 4	N/A 4	4 4

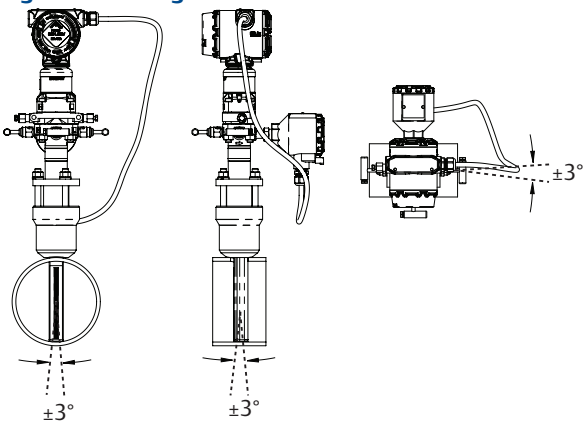
Note

- Consult the factory for instructions regarding use in square or rectangular ducts.
- If proper lengths of straight run are not available, position the mounting such that 80% of the run is upstream and 20% is downstream. This will result in degraded accuracy.
- Use straightening vanes to reduce the required straight run length.
- Row 6 in Table 1 applies to gate, globe, plug, and other throttling valves that are partially opened, as well as control valves.

1.1 Misalignment

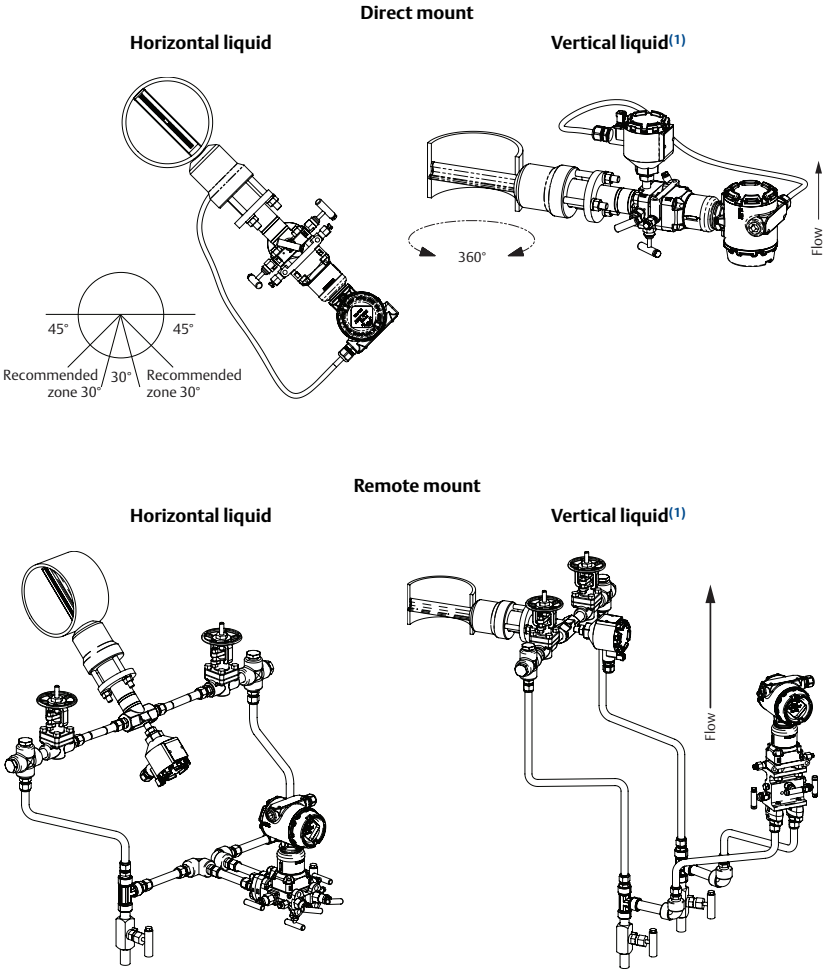
Rosemount 485 Annubar installation allows for a maximum misalignment of 3°.

Figure 3. Misalignment



1.2 Flowmeter Orientation

Figure 4. Flowmeter Orientation for Liquid

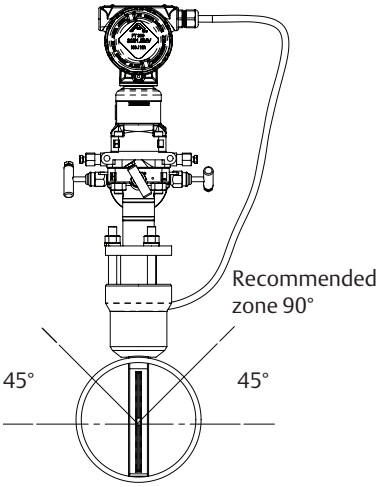


1. Downward flow is not recommended.

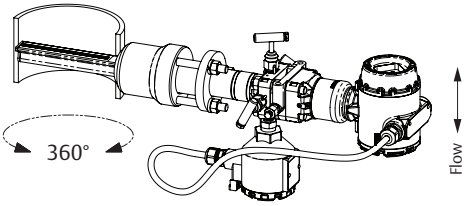
Figure 5. Flowmeter Orientation for Gas

Direct mount

Horizontal gas

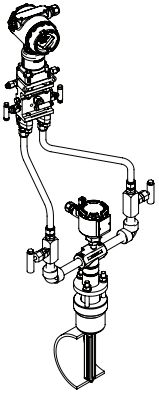


Vertical gas



Remote mount

Horizontal gas



Vertical gas

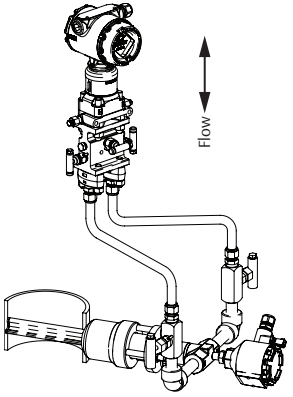
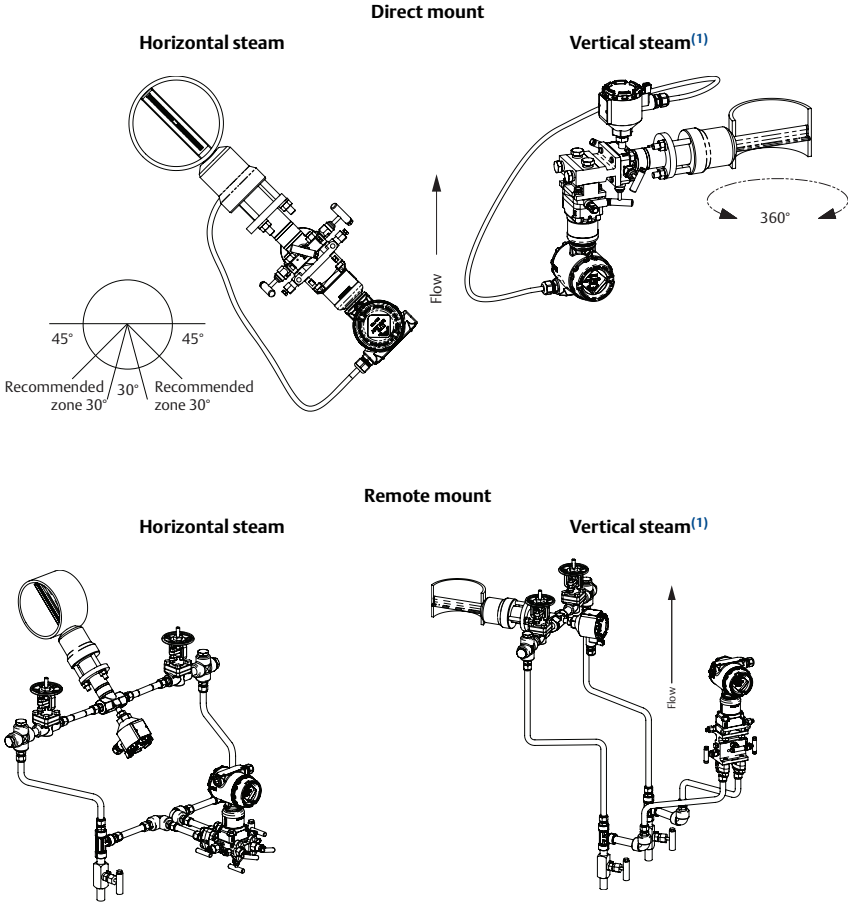


Figure 6. Flowmeter Orientation for Steam



1. Downward flow is not recommended.

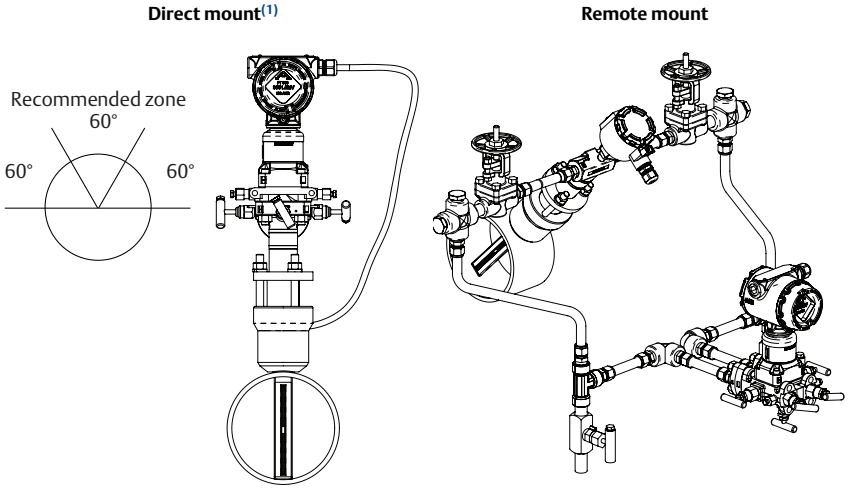
Note

For steam applications with DP readings between 0.75 and 2 inH_2O in horizontal pipes, consider installing the primary element/flowmeter mounting in the top mounting for steam configuration.

1.3 Top mounting the flowmeter for steam

Top mounting in steam is an alternative mounting method for steam installations that can be used if there are space restrictions or other concerns. This installation method is intended for applications that run with limited interruptions or shutdowns. Also, for outdoor applications, top mounting can eliminate the need for heat tracing, if steam is flowing.

Figure 7. Horizontal Top Mounting for Steam



1. For wet steam, do not mount the flowmeter at the direct vertical position. Mounting at an angle will avoid measurement inaccuracy due to water running along the bottom of the pipe.

This orientation can be used for any steam temperature. For remote mount installations, the impulse piping should slope up slightly from the instrument connections on the Rosemount Annubar to the cross fittings, allowing condensate to drain back into the pipe. From the cross fittings, the impulse piping should be routed downward to the transmitter and the drain legs. The transmitter should be located below the instrument connections of the Rosemount Annubar. Depending on the environmental conditions, it may be necessary to insulate the mounting hardware.

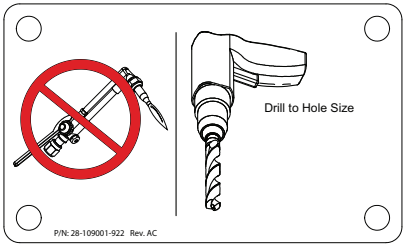
2.0 Drill sensor holes

1. Determine the sensor size based on the probe width (see Table 2).

Table 2. Sensor Size/Hole Diameter Chart

Sensor size	Sensor width	Hole diameter	
1	0.590-in. (14,99 mm)	3/4-in. (19 mm)	+1/32-in (0,8 mm) – 0.00
2	1.060-in. (26,92 mm)	1 5/16-in. (34 mm)	+1/16-in. (1,6 mm) – 0.00
3	1.935-in. (49,15 mm)	2 1/2-in. (64 mm)	+1/16-in. (1,6 mm) – 0.00

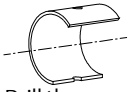
2. Depressurize and drain the pipe.
3. Select the location to drill the hole.
4. Determine the diameter of the hole to be drilled according to the specifications in Table 2. Drill the mounting hole into the pipe with a hole saw or drill. DO NOT TORCH CUT THE HOLE.



⚠WARNING

When drilling the mounting hole(s), Emerson™ Process Management recommends the use of a magnetic drill or pipe clamping fixture to safely drill the hole. Use appropriate personal protective equipment and procedures when drilling and welding.

5. Although it is not commonly selected, if an opposite-side support model is supplied, a second identically sized hole must be drilled opposite the first hole so that the sensor can pass completely through the pipe. (To determine if you have an opposite-side support model, measure the distance from the tip to the first slot or hole. If the distance is greater than 1-in. (25,4 mm), it is the opposite-side support model.) To drill the second hole, follow these steps:
   a. Measure the pipe circumference with a pipe tape, soft wire, or string. (For the most accurate measurement the pipe tape needs to be perpendicular to the axis of flow.)
   b. Divide the measured circumference by two to determine the location of the second hole.
   c. Re-wrap the pipe tape, soft wire, or string from the center of the first hole. Then, using the number calculated in step b, mark the center of what will become the second hole.
   d. Using the diameter determined in step 4, drill the hole into the pipe with a hole saw or drill. DO NOT TORCH CUT THE HOLE.



Drill the appropriate diameter hole through the pipe wall.

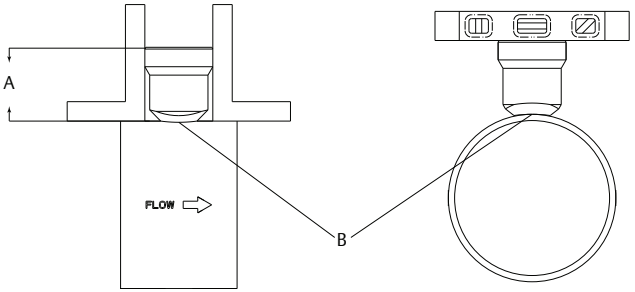
Note
Drill the hole 180° from the first hole for opposite- side support models.

6. Deburr the drilled holes on the inside of the pipe.

3.0 Weld mounting hardware

1. Center the Pak-Lok body over the mounting hole, gap 1/16-in. (1,6 mm), and place four 1/4-in. (6 mm) tack welds at 90° increments.
2. Check alignment of the Pak-Lok body both parallel and perpendicular to the axis of flow (see Figure 8). If alignment of mounting is within tolerances, finish weld per local codes. If alignment is outside of specified tolerance, make adjustments prior to finish weld.

Figure 8. Alignment



A. Lower Mounting Height (LMH)(1)
B. Tack welds

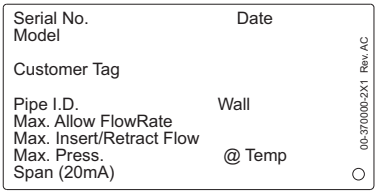
1. LMH values are as follows:
   Sensor size 1 — 2.89-in.(73 mm)
   Sensor size 2 — 3.92-in.(100 mm)
   Sensor size 3 — 3.96-in.(101 mm)

3. If opposite side support is being used, center the fitting for the opposite side support over the opposite side hole, gap 1/16-in. (1,6 mm), and place four 1/4-in. (6 mm) tack welds at 90° increments. Insert the sensor into the mounting hardware. Verify that the tip of the sensor is centered in the opposite side fitting and that the plug will fit around sensor. Finish weld per local codes. If the alignment of the sensor does not allow enough clearance to insert the opposite side plug, make the necessary adjustments prior to making the finish weld.
4. To avoid serious burns, allow the mounting hardware to cool before continuing.

4.0 Insert the Rosemount Annubar Sensor

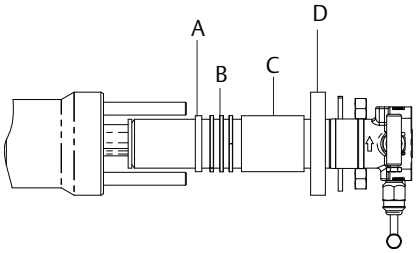
Note
Refer to "Rosemount 485 Annubar Pak-Lok Assembly Exploded View" on page 3 for component descriptions.

1. Thread studs into the Pak-Lok body.
2. To ensure that the flowmeter contacts the opposite side pipe wall, mark the tip of the sensor with a marker. (Do not mark if ordered with option code P2 or PA.)
3. Insert the flowmeter into the Pak-Lok body until the sensor tip contacts the pipe wall (or support plug), twisting the flowmeter back and forth.
4. Verify that the sensor tip made contact with the opposite side pipe wall by removing the flowmeter and ensuring that some of the marker has been rubbed off. For special-cleaned sensors, look for wear marks on the tip. If the tip did not touch the wall, verify the measured pipe ID and wall match the tagging information and re-insert.



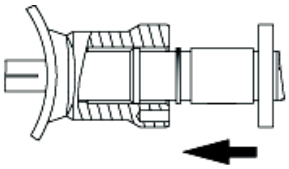
5. Align the flow arrow on the head with the direction of flow. Re-insert the flow meter into the Pak-Lok body and install the first packing ring on the sensor between the retaining ring and the follower. Take care not to damage the split packing rings.

Figure 9. Packing Ring Detail

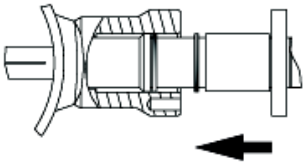


A. Retaining ring
B. 3× Packing rings
C. Follower
D. Compression plate

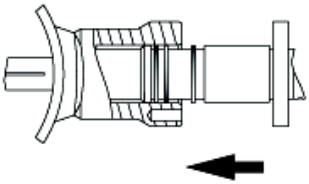
6. Push the packing ring into the Pak-Lok body and against the weld retaining ring. Repeat this process for the two remaining rings, alternating the location of the packing ring split by 120°.
   a. Install the first packing ring underneath the follower.
   b. Use the follower and the compression plate to compress the first packing ring against the retaining ring.



   c. Install the second packing ring underneath the follower. Alternate packing ring splits by 120 degrees to each other.
   d. Use the follower and the compression plate to compress the second packing ring against the first packing ring.



   e. Install the third packing ring underneath the follower.
   f. Use the follower and the compression plate to compress the third packing ring against the second packing ring.



7. Tighten the nuts onto the studs:
   a. Place the included split-ring lock washer between each of the nuts and the compression plate. Give each nut one half turn in succession until the split-ring lock washer is flat between the nut and the compression plate. Torque is as follows.

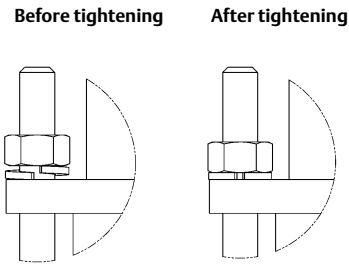
Table 3. Torque Requirements

Sensor size	Torque
1	40 in-lb (4,5 N-m)
2	100 in-lb (11,3 N-m)
3	250 in-lb (28,2 N-m)

b. Inspect the unit for leakage. If any exists, tighten the nuts in one-quarter turn increments until there is no leakage.

Note
On sensor size 1, failure to use the split-ring Lock washers, improper washer orientation, or over-tightening the nuts may result in flowmeter damage.

Figure 10. Split-Ring Lock Washer Orientation



Note
Pak-Lok sealing mechanisms generate significant force at the point where the sensor contacts the opposite pipe wall. Caution needs to be exercised on thin-walled piping (ANSI Sch 10 and lower) to avoid damage to the pipe.

8. Verify that a gap exists between the compression plate and the Pak-Lok body. If the gap is not within the tolerances shown in Table 4, repeat steps 6 and 7 to ensure the packing was installed correctly. If the gap is still not within tolerances, contact your Emerson Process Management representative for technical support.

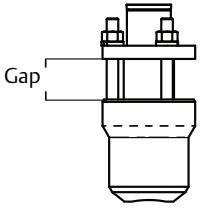


Table 4. Minimum and Maximum Gap Dimensions

	Sensor size		
	1	2	3
Minimum gap in. (mm)	0.52 (13,3)	0.52 (13,3)	1.19 (30,2)
Maximum gap in. (mm)	1.25 (31,8)	1.93 (48,9)	1.93 (48,9)

5.0 Mount the transmitter

5.1 Mounting a transmitter with a direct mount head and valves

It is not necessary to retract the Rosemount Annubar when direct mounting a transmitter with valves.

1. Place PTFE O-rings into grooves on the Rosemount Annubar Head.
2. Align the high side of the transmitter to the high side of the sensor (“Hi” is stamped on the side of the head) and install.
3. Tighten the nuts in a cross pattern to 384 in-lb (43 N-m).

5.2 Mounting a transmitter with a remote mount head

Temperatures in excess of 250 °F (121 °C) at the transmitter sensor module diaphragms will damage the transmitter. Remote mounted transmitters are connected to the sensor by means of impulse piping, which allows process temperatures to decrease to a point where the transmitter is no longer vulnerable.

Different impulse piping arrangements are used depending on the process fluid and must be rated for continuous operation at the pipeline design pressure and temperature. A minimum of $^{1}/_{2}$-in. (12 mm) outer diameter stainless steel tubing with a wall thickness of at least 0.035-in. (0,9 mm) is recommended for 600# ANSI (DN50 PN100) and below. Above 600# ANSI (DN50 PN100), stainless steel tubing with a minimum wall thickness of $^{1}/_{16}$-in.(1,6 mm). Threaded pipe fittings are not recommended because they add potential leak points.
The following restrictions and recommendations apply to impulse piping location:

1. Impulse piping that runs horizontally must slope at least one inch per foot (83 mm/m).
   - Slope downward (toward the transmitter) for liquid and steam applications.
   - Slope upward (toward the transmitter) for gas applications.
2. Outdoor installations for liquid, saturated gas, or steam may require insulation and/or heat tracing to prevent freezing.
3. An instrument manifold is recommended for all installations. Manifolds allow an operator to equalize the pressures prior to zeroing and isolates the process fluid from the transmitter.

Figure 11. Valve identification for 5-valve and 3-Valve Manifolds

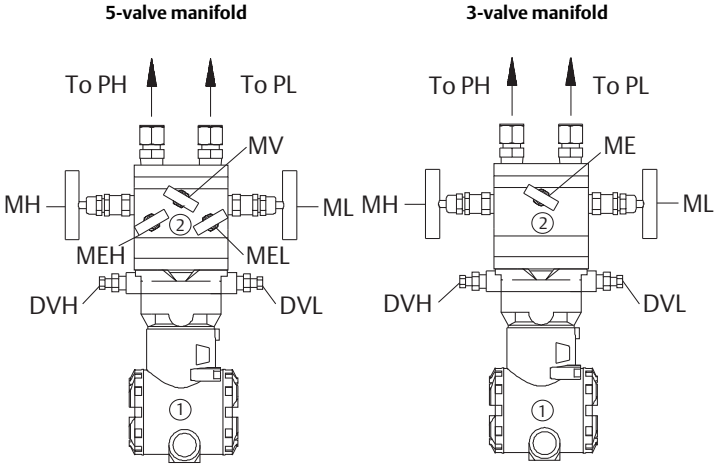


Table 5. Description of Impulse Valves and Components

Name	Description	Purpose
Components		
1	Transmitters	Reads Differential Pressure
2	Manifold	Isolates and equalizes electronics
Manifold and impulse valves		
PH	Primary sensor(1)	High and low side pressure process connections.
PL	Primary sensor(2)	
DVH	Drain/vent valve(1)	Drains (for gas service) or vents (for liquid or steam service) the DP sensor diaphragms
DVL	Drain/vent valve(2)	
MH	Manifold valve high(1)	Isolates high side or low side pressure from the process
ML	Manifold valve low(2)	
MEH	Manifold equalizer(1)	Allows high and low pressure side access to the vent valve, or for isolating the process fluid
MEL	Manifold equalizer(2)	
ME	Manifold equalizer	Allows high and low side pressure to equalize
MV	Manifold vent valve	Vents process fluid

1. High pressure
2. Low pressure

6.0 Product certifications

6.1 Approved Manufacturing Locations

Rosemount Inc. – Shakopee, Minnesota USA

Rosemount DP Flow Design and Operations – Boulder, Colorado USA

Emerson Process Management GmbH & Co. OHG – Wessling, Germany

Emerson Process Management Asia Pacific Private Limited – Singapore

Emerson Beijing Instrument Co., Ltd – Beijing, China

6.2 European Directive Information

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

European Pressure Equipment Directive (PED) (97/23/EC)

Rosemount 485 Annubar — Refer to EC declaration of conformity for conformity assessment

Pressure Transmitter — See appropriate Pressure Transmitter QSG

6.3 Hazardous Locations Certifications

For information regarding the transmitter product certification, see the appropriate transmitter QSG:

- Rosemount 3051S Series Pressure Transmitter and Rosemount 3051SF Series Flowmeter Quick Start Guide.
- Rosemount 3051S MultiVariable Transmitter and Rosemount 3051SF Series Flowmeter MultiVariable Transmitter Quick Start Guide.
- Rosemount 3051 Pressure Transmitter and Rosemount 3051CF Series Flowmeter Transmitter Quick Start Guide.
- Rosemount 2051 Pressure Transmitter and Rosemount 2051CF Series Flowmeter Transmitter Quick Start Guide.

Figure 12. Rosemount Primary Element Declaration of Conformity

EMERSON. Process Management

EU Declaration of Conformity

No: DSI 1000 Rev. L

CE

We,

Rosemount, Inc.
8200 Market Boulevard
Chanhassen, MN 55317-9685
USA

declare under our sole responsibility that the products,

Rosemount Primary Elements: 405x, 485, 585, 1195, 1495, 1595
Rosemount DP Flowmeters: 2051CFx, 3051CFx, 3051SFx

manufactured by,

Rosemount / Dieterich Standard, Inc.
5601 North 71st Street
Boulder, CO 80301
USA

to which this declaration relates, is in conformity with the provisions of the European Union Directives as shown in the attached schedule.

Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Union notified body certification, as shown in the attached schedule.

(signature)	Vice President of Global Quality (function)
Kelly Klein (name)	19 Apr 2016 (date of issue)

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EMERSON. Process Management

EU Declaration of Conformity

No: DSI 1000 Rev. L

CE

PED Directive (97/23/EC) ***This directive is valid until 18 July 2016***
PED Directive (2014/68/EU) ***This directive is valid from 19 July 2016***

Summary of Classifications		
Model/Range	PED Category	
	Group 1 Fluid	Group 2 Fluid
Rosemount 585 - 150#-900# All Lines	SEP	SEP
Rosemount 585 - 1500# & 2500# All Lines	III	SEP
Rosemount 405C, 405A, x051xFC	SEP	SEP
Rosemount 1195, x051xFP with 150#, 1-1/2" Flange	I	SEP
Rosemount 1195, x051xFP with 300# or 600#, 1" or 1-1/2" Flange	II	I
Rosemount 1195, x051xFP with 1" or 1-1/2" Threaded & Welded Connection	II	I
Rosemount 485/x051SxFA: 1500# & 2500# All Line Sizes, Flanged	III	SEP
Rosemount 485/x051xFA: Sensor Size 2, 150#, 6"to 24" Line Sizes, FloTap	I	SEP
Rosemount 485/x051xFA: Sensor Size 2, 300#, 6"to 24" Line Sizes, FloTap	II	I
Rosemount 485/x051xFA: Sensor Size 2, 600#, 6"to 16" Line Sizes, FloTap	II	I
Rosemount 485/x051xFA: Sensor Size 2, 600#, 18"to 24" Line Sizes, FloTap	III	II
Rosemount 485/x051xFA: Sensor Size 3, 150#, 12"to 44" Line Sizes, FloTap	II	I
Rosemount 485/x051xFA: Sensor Size 3, 150#, 46"to 72" Line Sizes, FloTap	III	II
Rosemount 485/x051xFA: Sensor Size 3, 300#, 12" to 72" Line Sizes, FloTap	III	II
Rosemount 485/x051xFA: Sensor Size 3, 600#, 12"to 36" Line Sizes, FloTap	III	II
Rosemount 485/x051xFA: Sensor Size 3, 600#, 48" to 72" Line Sizes, FloTap	IV*	III
All other Rosemount Primary Elements and DP Flowmeters	SEP	SEP

Certificate of Assessment – CE-0041-H-RMT-001-13-USA

IV* *Category IV Flo Tap requires a B1 Certificate for design examination and H1 Certificate for special surveillance*

EMERSON. Process Management

EU Declaration of Conformity

No: DSI 1000 Rev. L

CE

Pressure Equipment Directive Notified Body:

Bureau Veritas UK Limited [Notified Body Number: 0041]
Parklands, Wilmslow Road, Didsbury
Manchester M20 2RE
United Kingdom

表格 1B: 含有 China RoHS 管控物质超过最大浓度限值的部件型号列表 Rosemount 485
Table 1B: List of Rosemount 485 Parts with China RoHS Concentration above MCVs

部件名称 Part Name	有害物质 / Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr +6)	多溴联苯 Polybrominated biphenyls (PBB)	多溴联苯醚 Polybrominated diphenyl ethers 多溴联苯醚 (PBDE)
铝制温度传感器外壳组件 Aluminum RTD Housing Assembly	O	O	O	X	O	O

本表格系依据 SJ/T11364 的规定而制作.
This table is proposed in accordance with the provision of SJ/T11364
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.
O: Indicate that said hazardous substance in all of the homogeneous materials for this part is below 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.
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.

上述申明仅适用于选择铝制外壳组件的产品。其他所有差压流量一次元件的组件所含有的 China RoHS 管控物质浓度均低于 GB/T 26572 所规定的限量要求。关于差压流量计变送器组件的管控物质浓度的申明，请参看变送器的快速安装指南。

The disclosure above applies to units supplied with aluminum connection heads. No other components supplied with DP Flow primary elements contain any restricted substances. Please consult the transmitter Quick Start Guide (QIG) for disclosure information on transmitter components.

00825-0300-4809

Quick Start Guide
00825-0300-4809, Rev EB
June 2016

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