Quick Installation Guide
00825-0400-4809, Rev CA
September 2003

Rosemount 485 Annubar® Flanged Flo-Tap Assembly

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Process Management

Quick Installation Guide
00825-0400-4809, Rev CA
September 2003

Flanged Flo-Tap 485 Annubar

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⚠ IMPORTANT NOTICE

This installation guide provides basic guidelines for Rosemount 485 Annubar. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, Explosion-proof, Flame-Proof, or instrinsically safe (I.S.) installations. Refer to the 485 Annubar reference manual (document number 00809-0100-4810) for more instruction. This manual is also available electronically on www.rosemount.com.

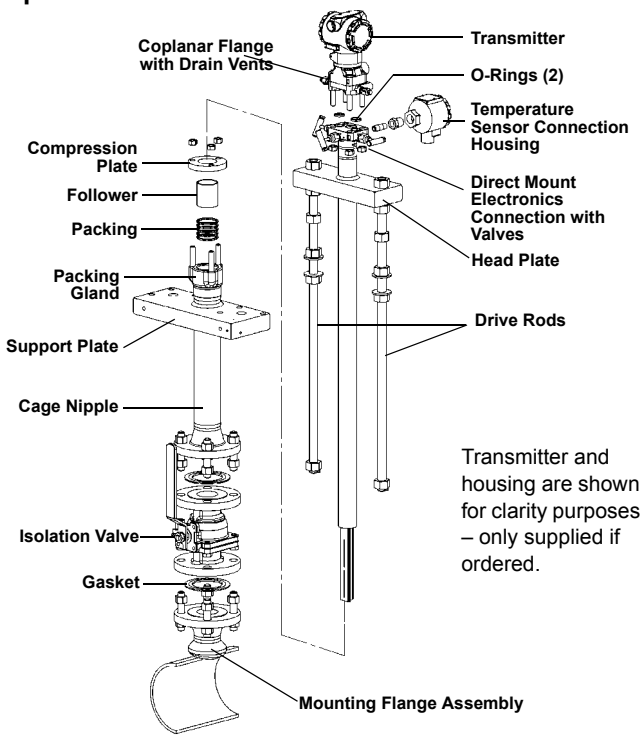
If the 485 Annubar was ordered assembled to a Rosemount 3051S transmitter, the new assembly is the Rosemount 3051SFA Probar Flowmeter. See the following Quick Installation Guide for information on configuration and hazardous locations certifications: Rosemount 3051S Series Pressure Transmitter (document number 00825-0100-4801).

If the 485 Annubar was ordered assembled to a Rosemount 3095MV transmitter, the new assembly is the Rosemount 3095MFA Mass Probar Flowmeter. See the following Quick Installation Guide for information on configuration and hazardous locations certifications: Rosemount 3095MV (document number 00825-0100-4716).

⚠ 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 485 Annubar assembly to become hot and could result in burns.

485 Annubar® Flanged Flo-Tap Assembly Exploded View

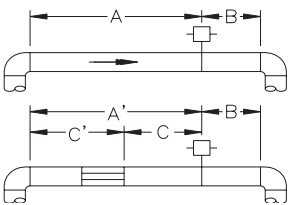
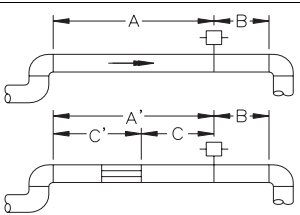
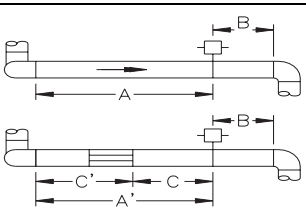


NOTE
Use an appropriate pipe sealing compound rated for the service temperature on all threaded connections.

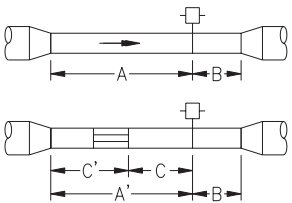
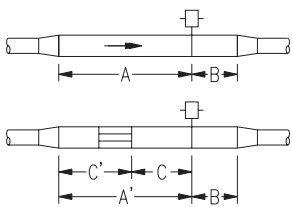
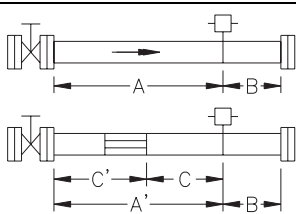
STEP 1: LOCATION AND ORIENTATION

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 disturbances.

Table 1. Straight Run Requirements

	Upstream Dimensions					Downstream Dimensions
	Without Vanes		With Vanes			
	In Plane A	Out of Plane A	A'	C	C'	
1 	8 —	10 —	— 8	— 4	— 4	4 4
2 	11 —	16 —	— 8	— 4	— 4	4 4
3 	23 —	28 —	— 8	— 4	— 4	4 4

STEP 1 CONTINUED...

	Upstream Dimensions					Downstream Dimensions
	Without Vanes		With Vanes			
	In Plane A	Out of Plane A	A'	C	C'	
4 	12 —	12 —	— 8	— 4	— 4	4 4
5 	18 —	18 —	— 8	— 4	— 4	4 4
6 	30 —	30 —	— 8	— 4	— 4	4 4

STEP 1 CONTINUED...

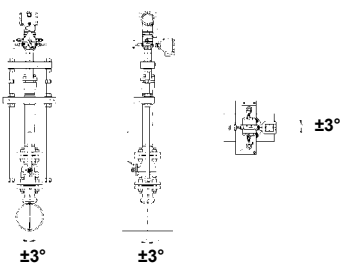
NOTE

- *For gas service, multiply values from Table 1 by 1.5.*
- Consult the factory for instructions regarding use in square or rectangular ducts.
- “In Plane A” means the bar is in the same plane as the elbow. “Out of Plane A” means the bar is perpendicular to the plane of the elbow.
- If proper lengths of straight run are not available, position the mounting such that 80% of the run is upstream and 20% is downstream.
- 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.

Misalignment

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

Figure 1. Misalignment



STEP 1 CONTINUED...

Horizontal Orientation

For proper venting and draining, the sensor should be located in the upper half of the pipe for air and gas applications. For liquid and steam applications, the sensor should be located in the bottom half of the pipe.

Figure 2. Gas

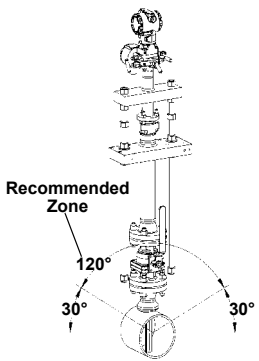
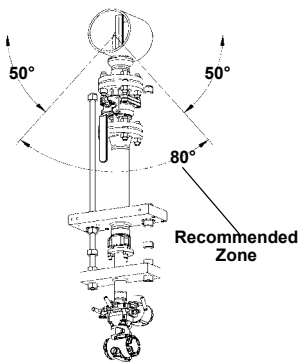


Figure 3. Liquid and Steam



STEP 1 CONTINUED...

Vertical Orientation

The sensor can be installed in any position around the circumference of the pipe provided the vents are positioned properly for bleeding or venting. Optimal results for liquid or steam are obtained when flow is up. The preferred orientation for air or gas is flow down, but upwards flow is acceptable. For steam applications, a 90° spacer will be added to provide water legs to ensure the transmitter stays within temperature limits.

Figure 4. Steam

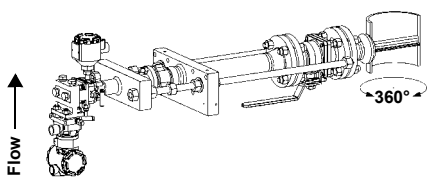


Figure 5. Liquid

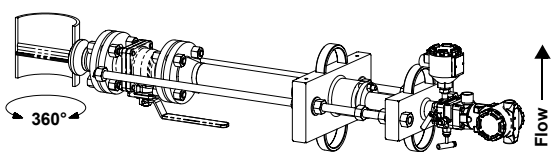
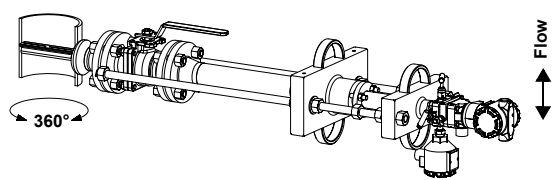


Figure 6. Gas



STEP 2: WELD MOUNTING HARDWARE

NOTE
Rosemount-supplied mounting includes critical alignment hardware that assists in the correct drilling of the mounting hole. It also assists in the alignment of the sensor to the mounting hole for insertion.

1. At the pre-determined position, place the flanged assembly on the pipe, gap 1/16-in (1.5 mm), and measure the distance from the outer diameter of the pipe to the face of the flange. Compare this to Table 2 and adjust the gap as necessary.

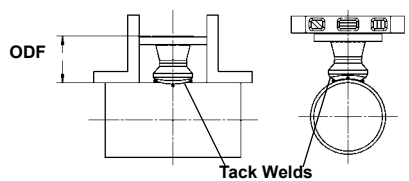
Table 2. Flange Sizes and ODF Per Sensor Size

Sensor Size	Flange Size	ODF (in. (mm))	Size	ODF (in. (mm)
1	1 1/2-in. 150#	3.88 (98.5)	DN40 PN16	3.09 (78.6)
1	1 1/2-in. 300#	4.13 (104.9)	DN40 PN40	3.21 (81.6)
1	1 1/2-in. 600#	4.44 (112.7)	DN40 PN100	3.88 (98.6)
1	1 1/2-in. 900#	4.94 (125.4)	Not Applicable	Not Applicable
1	1 1/2-in. 1500#	4.94 (125.4)	Not Applicable	Not Applicable
1	1 1/2-in. 2500#	6.76 (171.6)	Not Applicable	Not Applicable
2	2.0-in. 150#	4.13 (104.8)	DN50 PN16	3.40 (86.3)
2	2.0-in. 300#	4.38 (111.2)	DN50 PN40	3.51 (89.3)
2	2.0-in. 600#	4.76 (120.8)	DN50 PN100	4.30 (109.3)
2	2.0-in. 900#	5.88 (149.2)	Not Applicable	Not Applicable
2	2.0-in. 1500#	5.88 (149.2)	Not Applicable	Not Applicable
2	3.0-in. 2500#	9.87 (250.7)	Not Applicable	Not Applicable
3	3.0-in. 150#	4.63 (117.5)	DN80 PN16	3.84 (97.6)
3	3.0-in. 300#	5.00 (126.9)	DN80 PN40	4.16 (105.6)
3	3.0-in. 600#	5.38 (136.6)	DN80 PN100	4.95 (125.6)
3	4.0-in. 900#	8.19 (208.0)	Not Applicable	Not Applicable
3	4.0-in. 1500#	8.56 (217.5)	Not Applicable	Not Applicable
3	4.0-in. 2500#	11.19 (284.2)	Not Applicable	Not Applicable

STEP 2 CONTINUED...

2. Place four 1/4-in. (6-mm) tack welds at 90° increments. Check alignment of the mounting both parallel and perpendicular to the axis of flow (see Figure 7). If alignment of the mounting is within tolerances, finish weld per local codes. If outside of specified tolerance, make adjustments prior to making the finish weld.
3. To avoid serious burns, allow the mounting hardware to cool before continuing.

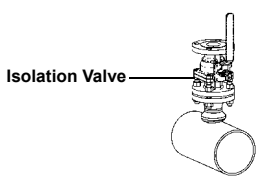
Figure 7. Alignment



STEP 3: INSTALL ISOLATION VALVE

1. Position the isolation valve onto the mounting flange. Ensure the valve stem is positioned so that when the Flo-Tap is installed, the insertion rods will straddle the pipe and the valve handle will be centered between the rods (see Figure 8). (Note: Interference will occur if the valve is located inline with the rods.)
2. Fasten the isolation valve to the mounting using gasket, bolts, and nuts.

Figure 8. Isolation Valve Orientation



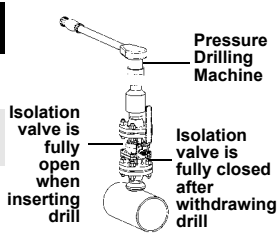
STEP 4: MOUNT DRILLING MACHINE

Drilling Machine is not provided with assembly.

1. Determine the sensor size based on the probe width (see Table 3).
2. Mount the drilling machine to the isolation valve.
3. Open the valve fully.
4. Drill the hole into the pipe wall in accordance with the instructions provided by the drilling machine manufacturer (use Table 3 to select the proper drill bit for the sensor that is being used).
5. Retract the drill fully beyond the valve.

Table 3. Sensor Size / Hole Diameter Chart

Sensor Width	Sensor Size	Hole Diameter	
0.590-in. (14.99 mm)	1	3/4-in. (20 mm)	+ 1/32-in (1 mm) – 0.00
1.060-in. (26.92 mm)	2	1 5/16-in. (35 mm)	+ 1/16-in. (1 mm) – 0.00
1.935-in. (49.15 mm)	3	2 1/2-in. (65 mm)	+ 1/16-in. (1 mm) – 0.00



STEP 5: REMOVE DRILLING MACHINE

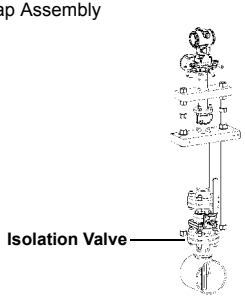
1. Verify that the drill has been retracted past the valve.
2. Close the isolation valve to isolate the process.
3. Bleed drilling machine pressure and remove.
4. Check isolation valve and mounting for leakage.

STEP 6: MOUNT THE ANNUBAR

1. Align the flow arrow on the head with the direction of flow.
2. Use the supplied gaskets and flange bolts to fasten the Flo-Tap assembly to the isolation valve.
3. Tighten the nuts in a cross pattern to compress the gasket evenly.
4. Ensure that the vent valves are closed before proceeding.
5. Quickly open and close the isolation valve to pressurize the 485. During installation, there is a potential for leakage at the packing. Use extreme caution if the flowing medium is steam or caustic.
6. Check the entire installation for leakage. Tighten as required to stop any connection from leaking. Repeat steps 4 and 5 until there is no leakage.
   a. If Flo-Tap comes equipped with the gear drive option, place the PVC protector rod assembly over the drive rods and attach to gear drive with supplied hardware.

NOTE
Flo-Tap 485 Annubars have the potential to carry a large amount of weight at a great distance from the piping, necessitating external support. The support plate has threaded holes to assist in supporting the 485 Annubar.

Figure 9. Install Flo-Tap Assembly



STEP 7: INSERT THE ANNUBAR

Standard Drive (M)

1. **Open the isolation valve fully.**
2. Rotate the drive nuts clockwise (as viewed from the top). The nuts must be tightened alternately, about two turns at a time, to prevent binding caused by unequal loading.
3. Continue this procedure until the tip of the sensor firmly contacts the opposite side of the pipe.
   a. The orange stripes are visual indication of when the sensor is approaching the opposite side wall.
   b. As the orange strip approaches the support plate, place a finger above the packing gland while cranking. When movement stops, the sensor is in contact with the opposite side wall.
   c. Turn the handle an additional $^1/_4$- to $^1/_2$-in. to secure the sensor.

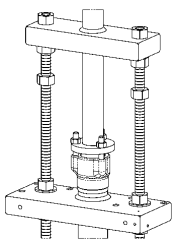
Gear Drive (G)

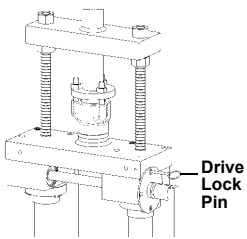
1. **Open the isolation valve fully.**
2. Rotate the crank clockwise. If a power drill with an adapter is used, do not exceed 200 rpm.
3. Continue rotating the crank until the sensor firmly contacts the opposite side of the pipe.
   a. The orange stripes are visual indication of when the sensor is approaching the opposite side wall.
   b. As the orange stripes approach the support plate, remove the power drill and continue cranking manually. Place a finger above the packing gland while cranking. When movements stops, the sensor is in contact with the opposite side wall.
   c. Turn the handle an additional $^1/_4$- to $^1/_2$-in. to secure the sensor.
4. Secure the drive by inserting the drive lock pin as shown in Figure 10.

STEP 7 CONTINUED...

Figure 10. Insert the Sensor

Standard Drive (M)	Gear Drive (G)





STEP 8: MOUNT THE TRANSMITTER

Transmitter Mounting, Direct Mount Head with Valves

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

1. Place Teflon® (PTFE) O-rings into grooves on the face of 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 400 in•lb (45 N•m).

Transmitter Mounting, Direct Mount Head without Valves

1. Place Teflon (PTFE) O-rings into grooves on the face of head.
2. Orient the equalizer valve(s) so they are easily accessible. Install a manifold with the smooth face mating to the face of the head. Tighten in cross pattern to a torque of 400 in•lb (45 N•m).
3. Place Teflon (PTFE) O-rings into grooves on the face of the manifold.
4. 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.
5. Tighten the nuts in a cross pattern to 400 in•lb (45 N•m).

STEP 8 CONTINUED...

Transmitter Mounting with Remote Mount Head

Temperatures in excess of 250 °F (121 °C) at the electronics will damage the transmitter. Remote mounted electronics are connected to the sensor by means of impulse piping, which allows service flow temperatures to decrease to a point where the electronics are 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. (1 mm) is recommended. Threaded pipe fittings are not recommended because they create voids where air can become entrapped and create leakage points.

The following restrictions and recommendations apply to impulse piping location:

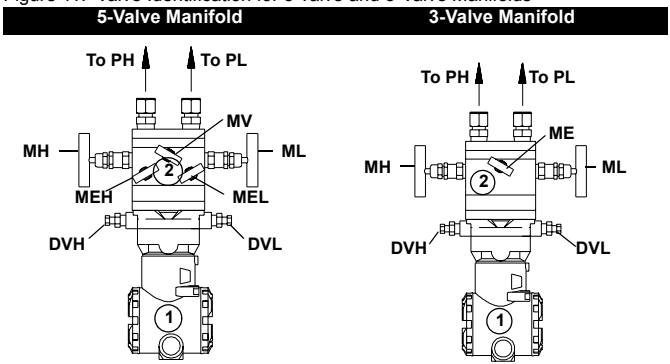
- Impulse piping that runs horizontally must slope at least one inch per foot (83 mm/m).
  - Slope downward (toward the electronics) for liquid and steam applications
  - Slope upward (toward the electronics) for gas applications.
- For applications with temperature below 250 °F (121 °C), impulse piping should be as short as possible to minimize temperature changes. Insulation may be required.
- For applications above 250 °F (121 °C), impulse piping should have a minimum length of one foot (0.3048 m) for every 100 °F (38°C) temperature increase over 250 °F (121 °C). Impulse piping must be non-insulated to reduce fluid temperature. Any threaded connections should be checked after the system reaches the intended temperature because connections may come loose with contraction and expansion caused by temperature change.
- Outdoor installations for liquid, saturated gas, or steam may require insulation and heat tracing to prevent freezing.

STEP 8 CONTINUED...

- When impulse piping is longer than six feet (1.8 m) the high and low impulse lines must be positioned together to maintain equal temperature. They must be supported to prevent sagging and vibration.
- Impulse lines should be positioned in protected areas or against walls or ceilings. Use appropriate pipe sealing compound rated for the service temperature on all threaded connections. Do not place the impulse piping near high temperature piping or equipment.

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 electronics.

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



STEP 8 CONTINUED...

Table 4. Description of Impulse Valves and Components

Name	Description	Purpose
Components		
1	Electronics	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 electronics chambers
DVL	Drain/Vent Valve(2)	
MH	Manifold(1)	Isolates high side or low side pressure from the process
ML	Manifold(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

Recommended Installations

Gas Service

Secure the electronics above the sensor to prevent condensable liquids from collecting in the impulse piping and the DP cell.

Liquid Service (up to 250 °F (121 °C))

Secure the electronics below the sensor to ensure that air will not be introduced into the impulse piping or the electronics.

STEP 8 CONTINUED...

Figure 12. Gas

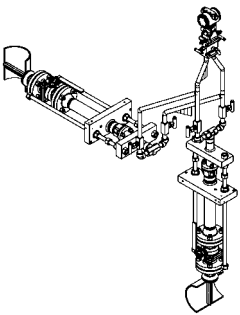
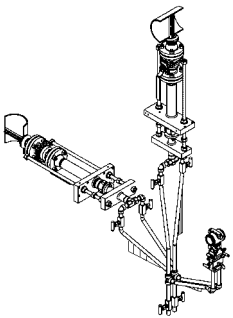


Figure 13. Liquid



Steam or Liquid Service (above 250 °F (121 °C))

Mount the electronics below the process piping, adjust 10 to 15 degree above direct vertical down. Route the impulse piping down to the electronics and fill the system with cool water through the two tee fittings.

Figure 14. Horizontal Line

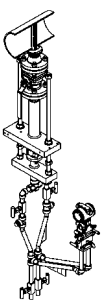
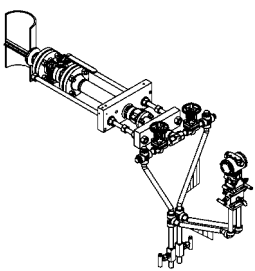


Figure 15. Vertical Line



STEP 9: RETRACTING THE ANNUBAR

Standard Drive (M)

1. Rotate the drive nuts counter-clockwise (as viewed from the top). The nuts must be loosened alternately, about two turns at a time, to prevent binding caused by unequal loading.
2. Continue this procedure until the rod end nuts are against the packing body mechanism.

Gear Drive (G)

1. Remove the drive lock pin.
2. Rotate the crank counter-clockwise. If a power drill with an adapter is used, do not exceed 200 rpm.
3. Retract until the rod end nuts are against the packing body mechanism.

PRODUCT CERTIFICATION

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. 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 QIG

Hazardous Locations Certifications

For information regarding the electronics product certification, see the appropriate transmitter QIG:

- Rosemount 3051SF (document number 00825-0100-4801)
- Rosemount 3095MF (document number 00825-0100-4716)

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