Rosemount 585 Annubar® Flanged Assembly

Start

End

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⚠ IMPORTANT NOTICE

This installation guide provides basic guidelines for Rosemount 585 Annubar. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, Explosion-proof, Flame-Proof, or intrinsically safe (I.S.) installations. Refer to the 585 Annubar reference manual (document number 00809-0100-4585) for more instruction. This manual is also available electronically on www.rosemount.com.

If the 585 Annubar was ordered assembled to a Rosemount 3051S transmitter, 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 585 Annubar was ordered assembled to a Rosemount 3095 transmitter, see the following Quick Installation Guide for information on configuration and hazardous locations certifications: Rosemount 3095MV (document number 00825-0100-4716).

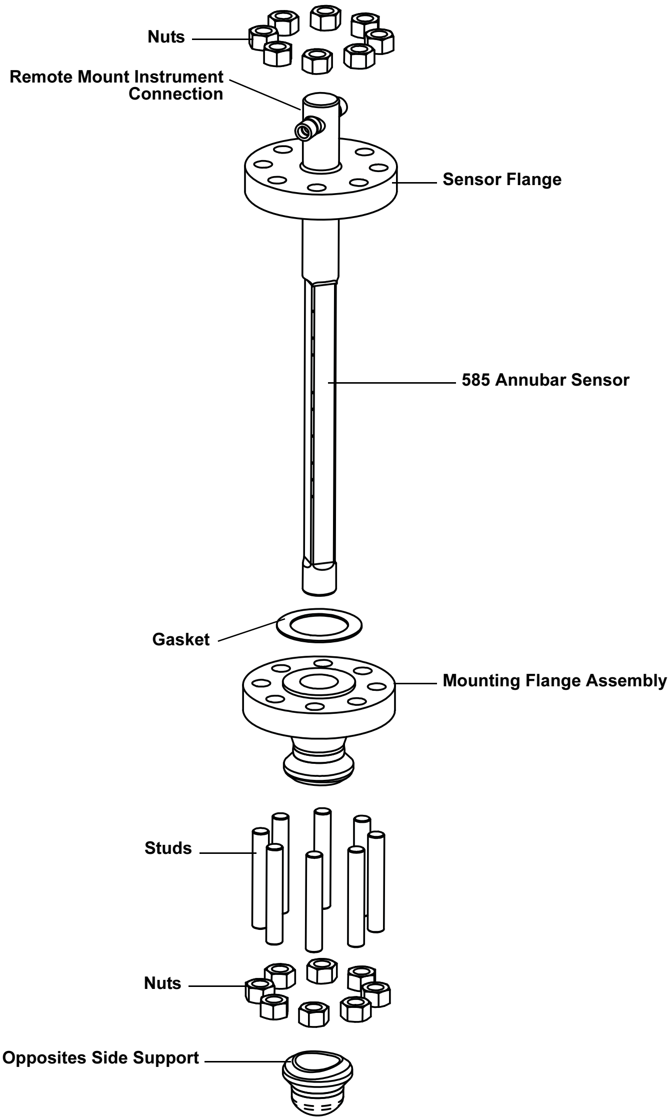
⚠ WARNING

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 585 Annubar assembly to become hot and could result in burns.

⚠ CAUTION

If pipe/duct wall is less than 0.125-in. (3,2 mm) use extreme caution when installing sensor. Thin walls can deform during welding, installation or from the weight of a cantilevered flowmeter. These installations may require a fabricated outlet, saddle or external flowmeter support. Please consult factory for assistance.

585 Annubar® Assembly Exploded View

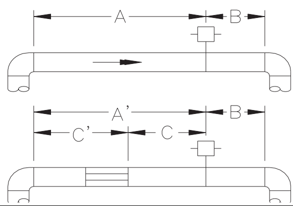
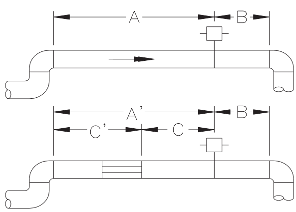
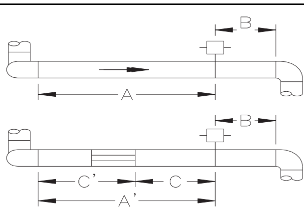
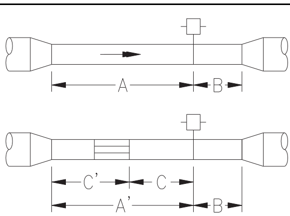


NOTE
Use an appropriate pipe sealing compound rated for the service temperature on all threaded connections.

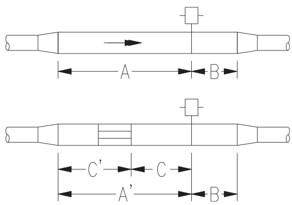
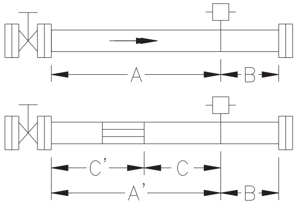
Step 1: Location and Orientation

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 Straightening Vanes		With Straightening Vanes			
	In Plane	Out of Plane				
	A	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
4 	12 —	12 —	— 8	— 4	— 4	4 4

STEP 1 CONTINUED...

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

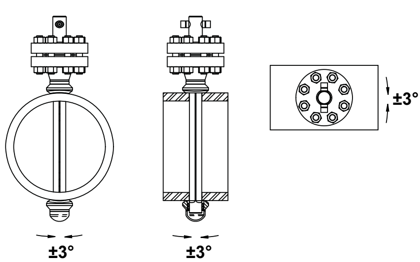
NOTE

- Consult the factory for instructions regarding use in square or rectangular ducts.
- "In Plane A" means the sensor 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

585 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 gas applications. For liquid and steam applications, the sensor should be located in the bottom half of the pipe.

Figure 2. Gas

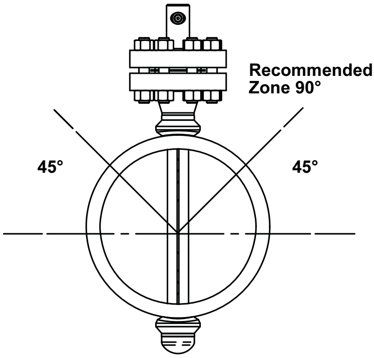


Figure 3. Liquid and Steam

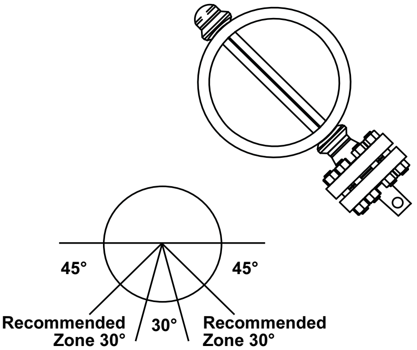
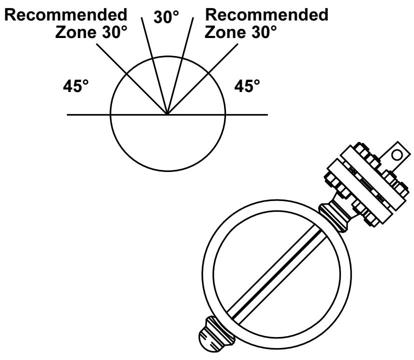


Figure 4. Steam on Top

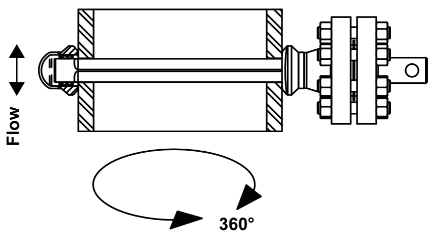


STEP 1 CONTINUED...

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. For steam applications, a 90° spacer is included to provide water legs to ensure the transmitter stays within temperature limits.

Figure 5. Liquid, Gas, or Steam



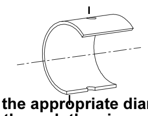
STEP 2: DRILL HOLES INTO PIPE

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

Table 2. Sensor Size / Hole Diameter Chart

Sensor Size	Sensor Width	Hole Diameter	
11	0.80-in. (20,32 mm)	7/8-in. (23 mm)	+ 1/32-in (0,8 mm) – 0.00
22	1.20-in. (30,48 mm)	1 5/16-in. (34 mm)	+ 1/16-in. (1,6 mm) – 0.00
44	2.30-in. (58,42 mm)	2 1/2-in. (64 mm)	+ 1/16-in. (1,6 mm) – 0.00

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



Drill the appropriate diameter hole through the pipe wall.

5. A second identically sized hole must be drilled opposite the first hole so that the sensor can pass completely through the pipe. 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 the preceding step, mark the center of what will become the second hole.
   d. Using the diameter determined in step 3, drill the hole into the pipe with a hole saw or drill. DO NOT TORCH CUT THE HOLE.
6. Deburr the drilled holes on the inside of the pipe.

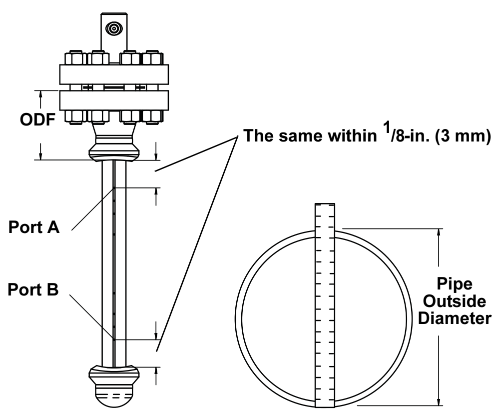
STEP 3: ASSEMBLE AND CHECK FIT-UP

For accurate measurement, use the following steps to ensure that Ports A and B are equal distances from the inside walls of the pipe.

1. Assemble the 585 to the mounting hardware with the gaskets and bolts.
2. Hand tighten the bolts just enough to hold the position of the sensor centered in the mounting hardware.
3. Check the fit of the assembly to the pipe by inserting a rule or stiff wire through both mounting holes. Note the distance. All sensing holes must be inside the pipe inner diameter. See Figure 6.
4. Add $^{1}/_{16}$-in. (1,6 mm) to the measured distance for the weld gap and transfer to the assembly starting at the high point of the weldolet.
5. Measure the distance from the high point of the weldolet to the first sensing hole, port B, then subtract $^{1}/_{16}$-in (1,6 mm).
6. Measure the distance from the end of the transferred length in step 4 to the last sensing hole, port A.
7. Compare the numbers obtained in steps 5 and 6.

Small discrepancies can be compensated for with the fit-up of the mounting hardware. Large discrepancies may cause installation problems or error.

Figure 6. Fit-up check for 585 Annubar with Opposite-Side Support



STEP 4: WELD MOUNTING HARDWARE

1. Center the flanged assembly over the mounting hole, gap 1/16 in. (1,6 mm), and measure the distance from the outer diameter of the pipe to the face of the flange. Compare this to Table 3 and adjust the gap as necessary.

Table 3. Flange Sizes and ODF Per Sensor Size

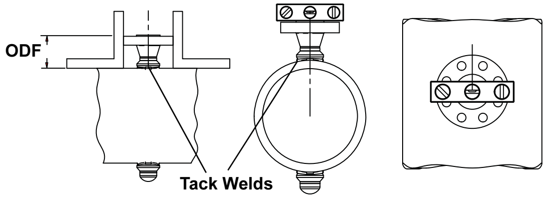
Sensor Size	Flange Type	Pressure Class	Flange Size / Rating / Type	ODF in. (mm)(1)
11	A	1	1 1/2-in. 150# RF	3.88 (99)
11		3	1 1/2-in. 300# RF	4.13 (105)
11		6	1 1/2-in. 600# RF	4.44 (113)
11		N	1 1/2-in. 900# RF	4.94 (125)
11		F	1 1/2-in. 1500# RF	4.94 (125)
11		T	1 1/2-in. 2500# RF	6.76 (172)
11	R	1	1 1/2-in. 150# RTJ	4.07 (103)
11		3	1 1/2-in. 300# RTJ	4.32 (110)
11		6	1 1/2-in. 600# RTJ	4.44 (113)
11		N	1 1/2-in. 900# RTJ	4.94 (125)
11		F	1 1/2-in. 1500# RTJ	4.94 (125)
11		T	1 1/2-in. 2500# RTJ	6.82 (173)
11	D	1	DN40 PN16 RF	3.21 (81)
11		3	DN40 PN40 RF	3.21 (81)
11		6	DN40 PN100 RF	3.88 (99)
22	A	1	2.0-in. 150# RF	4.13 (105)
22		3	2.0-in. 300# RF	4.38 (111)
22		6	2.0-in. 600# RF	4.76 (121)
22		N	2.0-in. 900# RF	5.88 (149)
22		F	2.0-in. 1500# RF	5.88 (149)
22		T	3.0-in. 2500# RF	9.87 (251)
22	R	1	2.0-in. 150# RTJ	4.32 (110)
22		3	2.0-in. 300# RTJ	4.63 (117)
22		6	2.0-in. 600# RTJ	4.82 (122)
22		N	2.0-in. 900# RTJ	5.94 (151)
22		F	2.0-in. 1500# RTJ	5.94 (151)
22		T	3.0-in. 2500# RTJ	10.00 (254)
22	D	1	DN50 PN16 RF	3.40 (86)
22		3	DN50 PN40 RF	3.52 (89)
22		6	DN50 PN100 RF	4.31 (109
44	A	1	3.0-in. 150# RF	4.63 (117.5)
44		3	3.0-in. 300# RF	5.00 (126.9)
44		6	3.0-in. 600# RF	5.38 (136.6)
44		N	4.0-in. 900# RF	8.19 (208.0)
44		F	4.0-in. 1500# RF	8.56 (217.5)
44		T	4.0-in. 2500# RF	11.19 (284.2)
44	R	1	3.0-in. 150# RTJ	4.82 (122)
44		3	3.0-in. 300# RTJ	5.25 (133)
44		6	3.0-in. 600# RTJ	5.44 (138)
44		N	4.0-in. 900# RTJ	8.25 (209)
44		F	4.0-in. 1500# RTJ	8.63 (219)
44		T	4.0-in. 2500# RTJ	11.38 (289)
44	D	1	DN80 PN16 RF	3.85 (98)
44		3	DN80 PN40 RF	4.16 (106)
44		6	DN80 PN100 RF	4.95 (126)

(1) Tolerances for the ODF dimension above a 10-in. (254 mm) line size is ±0.060-in. (1,6 mm). Below 10-in. (254 mm) line size is ±0.030-in. (0,8 mm).

STEP 4 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 alignment is outside of specified tolerance, make adjustments prior to making the finish weld.

Figure 7. Alignment



3. 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 the plug will fit around sensor. Finish weld per local codes. If alignment of the bar does not allow enough clearance to insert the opposite side plug, make adjustments prior to making the finish weld.
4. To avoid serious burns, allow the mounting hardware to cool before continuing.

STEP 5: INSERT THE ANNUBAR

1. Align the flow arrow on the head with the direction of flow. Assemble the bar to the mounting flange using a gasket, bolts, and nuts.
2. Tighten the nuts in a cross pattern to allow even compression of the gasket.
3. If opposite side support is threaded, apply an appropriate thread sealing compound to the support plug threads and tighten.
4. If opposite side support is a socket weld fitting, insert the plug into the sockolet fitting until the parts contact. Retract the plug 1/16 in. (1,6 mm), remove the Annubar sensor, and apply fillet weld per local codes.

STEP 6: 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 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 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 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).

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 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 including and under 600# ANSI (DN 50 PN100). Above 600# ANSI (DN 50 PN100), use $^1/_{16}$-in. (1,6 mm) stainless steel tubing. 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:

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. 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.
3. 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.
4. Outdoor installations for liquid, saturated gas, or steam may require insulation and heat tracing to prevent freezing.

STEP 6 CONTINUED...

5. 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.
6. 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 transmitter.

Figure 8. Valve Identification for 5-valve and 3-Valve Manifolds

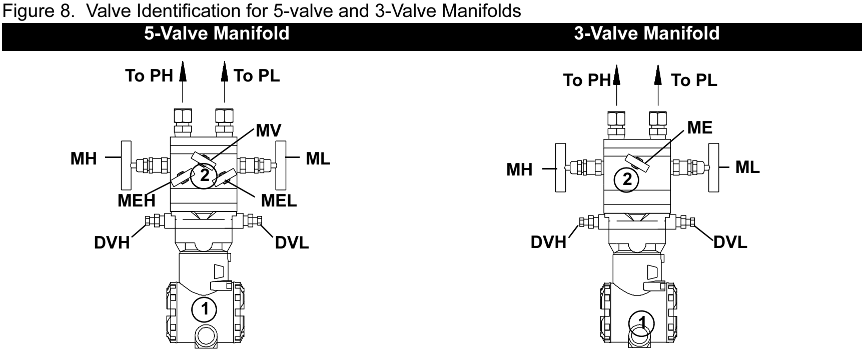


Table 4. Description of Impulse Valves and Components

Name	Description	Purpose
Components		
1	Transmitter	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(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

STEP 6 CONTINUED...

Recommended Installations

Gas Service

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

Figure 9. Horizontal Gas

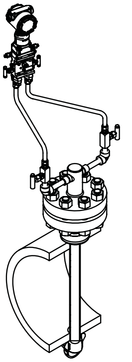
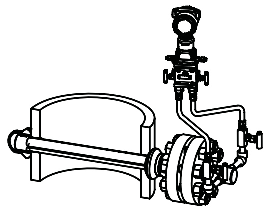


Figure 10. Vertical Gas



Steam and Liquid Service

Mount the transmitter below the process piping. Route the impulse piping down to the transmitter and fill the system with cool water through the two tee fittings.

Figure 11. Horizontal Steam and Liquid

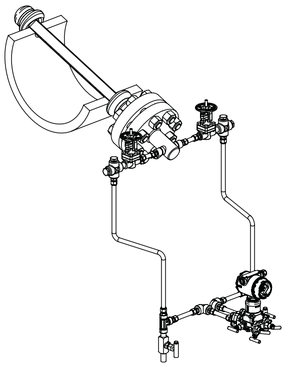
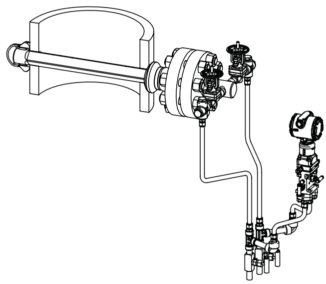


Figure 12. Vertical Steam and Liquid



NOTE
Ensure the drain legs are long enough to capture the dirt particles and sediment.

STEP 6 CONTINUED...

Steam on Top Service

Table 5. Steam on Top Temperature Limits

Transmitter Connection Platform	Maximum Temperature
Remote Mount	850 °F (455 °C)
Direct Mount	400 °F (205 °C)

For remote mount installations the impulse piping should slope up slightly from the instrument connections on the 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 Annubar. Depending on the environmental conditions, it may be necessary to insulate the mounting hardware.

Figure 13. Horizontal Steam on Top