Instruction

MI 022-335
February 2016

Model CO Compact Orifice
For Use With I/A Series® Differential Pressure Transmitters

Installation

Foxboro®

by Schneider Electric

Introduction

The Model CO Compact Orifice is a wafer body orifice plate that includes an integral 3-valve manifold. This unit mounts directly to IDP10, IDP25, IDP50, IMV25, and IMV30 transmitters. The compact orifice and transmitter, which are assembled at the factory, is shipped ready for installation in a pipeline. It is suitable for liquid, gas, or steam service in pipeline sizes ranging from DN 15 to DN 100 or 1/2 to 4 inches having ANSI or DIN flanges.

A standard alignment ring, for use with the pipeline size and ANSI or DIN flange selected, is provided with each compact orifice. Pipeline installation kits (containing studs, nuts, and gaskets) consistent with pipeline size and flange type are optionally available.

Specifications

Process Temperature Limits

-40 to +232°C (-40 to +450°F)

Maximum Working Pressure

Per ANSI Class 600 or DIN PN 100 flanges

Process Connections

Mounts between ANSI Class 150, 300, or 600 flanges or DIN PN 16, PN40, or PN 100 flanges.

Process Wetted Materials

Orifice Plate: 316 ss

Adapter Plate Gaskets: ptfe

Flange Gaskets (with optional installation kit):
Durlon 8500 Aramid/Inorganic Fiber with NBR rubber binder.

Approximate Weight

Table 1. Approximate Weight

Nominal Line Size		Approximate Weight	
mm	in	kg	lb
15	1/2	4.8	11.8
25	1	5.5	12.3
40	1 1/2	5.9	13.1
50	2	6.2	13.8
80	3	7.0	15.6
100	4	7.8	17.3

Orifice Size

The orifice size differs with the pipe size used and the nominal beta ratio selected (0.40 or 0.65). The beta ratio is defined as d/D, where d is the bore size and D is the Internal diameter of the pipe.

Table 2. Orifice Size

Nominal Line Size		Orifice Size			
		β = 0.40		β = 0.65	
mm	in	mm	in	mm	in
15	1/2	6.32	0.249	10.26	0.404
25	1	10.67	0.420	17.32	0.682
40	1 1/2	16.36	0.644	26.59	1.047
50	2	21.01	0.827	34.14	1.344
80	3	31.17	1.277	50.65	1.994
100	4	40.89	1.610	66.47	2.617

Mounting Arrangements

Recommended mounting arrangements are dependent upon the flow direction and fluid state.

Gas in Horizontal Pipes

The transmitter housing should be mounted above the pipeline to ensure that condensate does not collect on the transmitter sensing diaphragms. Orient the unit within the 120° recommended zone as shown in Figure 1.

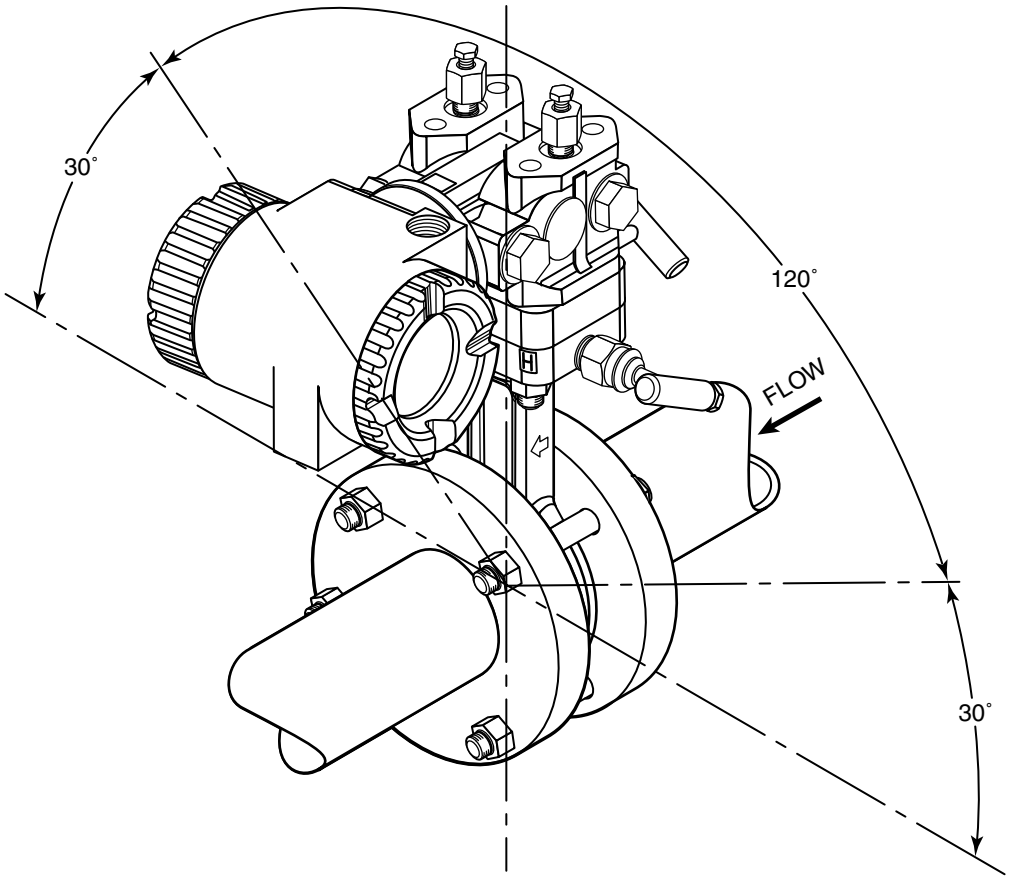

Figure 1. Recommended Mounting for Gas in Horizontal Pipe

Liquid or Steam in Horizontal Pipes

The transmitter housing should be mounted below the pipeline to ensure that gasses do not collect on the transmitter sensing diaphragms. Orient the unit within the 80° recommended zone as shown in Figure 2.

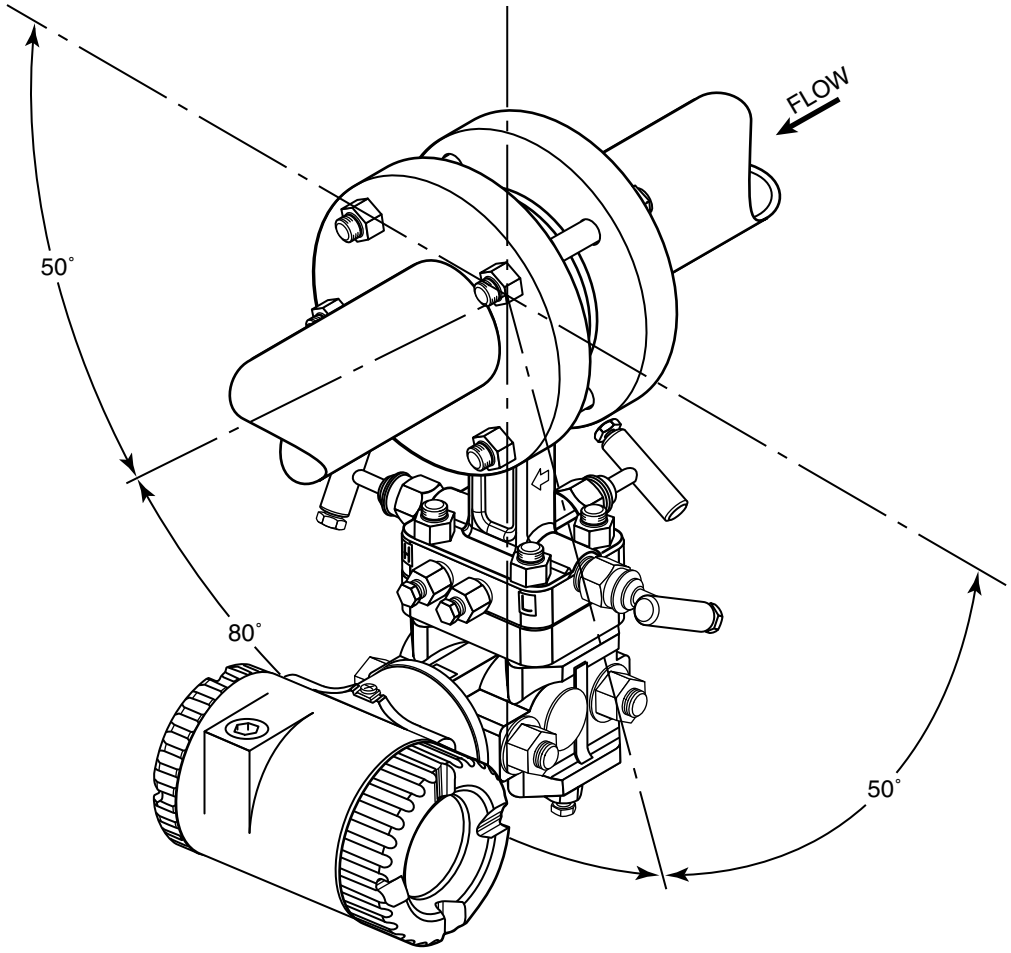

Figure 2. Recommended Mounting for Liquid or Steam in Horizontal Pipe

Liquid in Vertical Pipes

Liquid flow in vertical pipes should be in the upward direction. By doing this, the transmitter housing is mounted with the vents facing upward to allow gas to be bled off. See Figure 3.

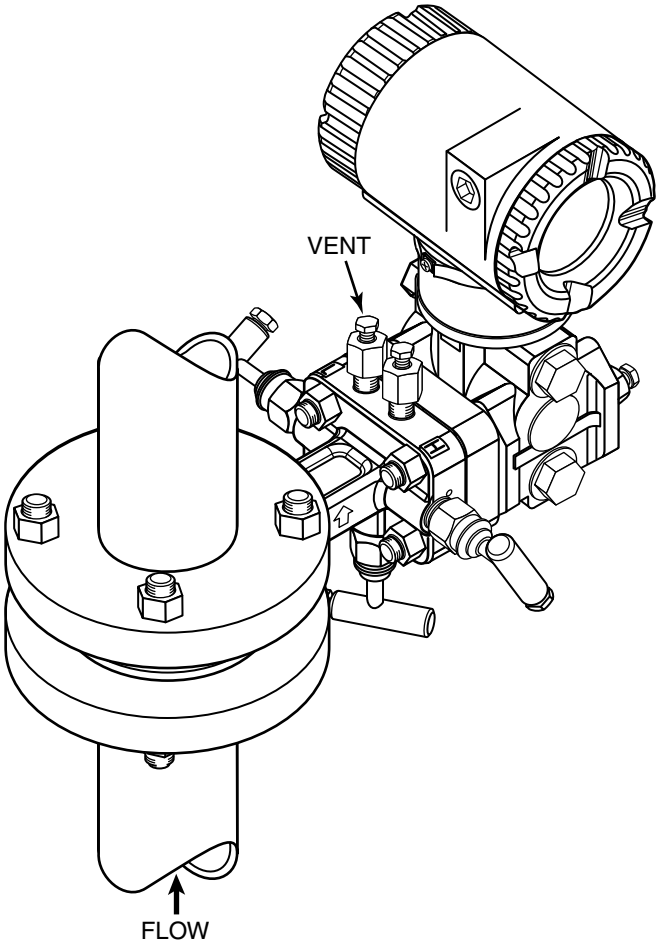

Figure 3. Recommended Mounting for Liquid in Vertical Pipe

Gas in Vertical Pipes

Gas flow in vertical pipes can be in the upward or downward direction. Figure 4 shows the transmitter mounted with flow in the downward direction.

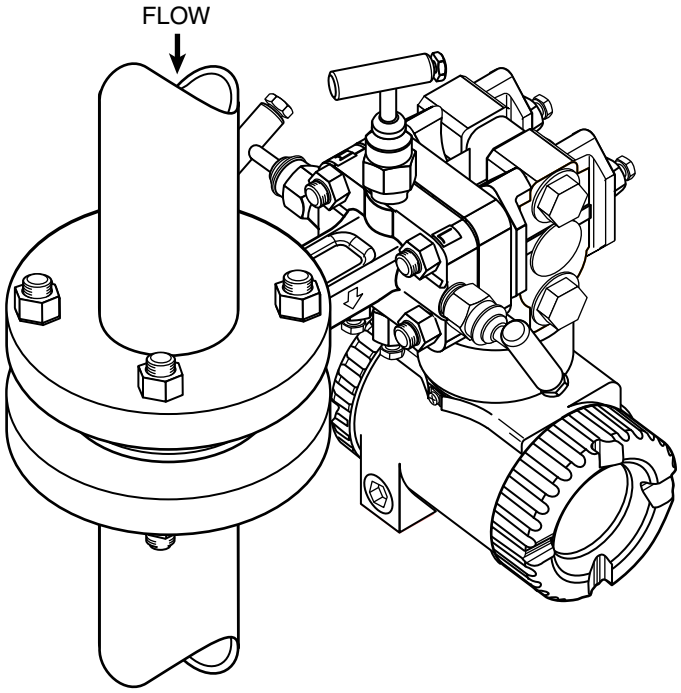

Figure 4. Recommended Mounting for Gas in Vertical Pipe

Straight Pipe Recommendations

The use of straight pipe upstream and downstream reduces the effects of disturbances in the pipeline. Table 3 lists the recommendations for straight pipe use (in number of pipe diameters). The distances vary with the type of disturbance and the beta ratio used.

Table 3. Straight Pipe Recommendations

Type of Disturbance	Distance in Number of Pipe Diameters (a,b)			
	β = 0.40		β = 0.65	
	Upstream	Downstream	Upstream	Downstream
Reducer	5	6 (3)	11 (6)	7 (3.5)
90° Bend or Tee	14 (7)		22 (11)	
Two or More 90° Bends in the Same Plane	18 (9)		32 (16)	
Two or More 90° Bends in Different Planes	36 (18)		54 (27)	
Expander	16 (8)		25 (13)	
Globe Valve Fully Open	20 (10)		28 (14)	
Gate Valve Fully Open	12 (6)		16 (8)	

(a) Recommended distances per ISO 5167.

(b) Values in parentheses are associated with an additional 0.5% discharge coefficient uncertainty.

Installation Procedure

1. Insert flange gaskets. Position the gaskets so that the ID of each gasket is centered on the ID of the adjacent piping. For ease of installation, the gasket can be secured to the flange face with small pieces of tape.

NOTE

Gaskets are required and must be supplied by the user unless the optional installation kit for compact orifice (AS Code CI) is obtained. Select a gasket material suitable for the process.

⚠ CAUTION

1. Verify that the ID of the gaskets is larger than that of the pipe ID and that the gaskets do not protrude into the pipe. Accuracy of the measurement is affected.
2. Gaskets do not prevent flanges from being wetted by process fluids.

2. Insert two studs through the pipe flange holes located away from the transmitter.

3. Place the alignment ring on the orifice plate. See Figure 5.

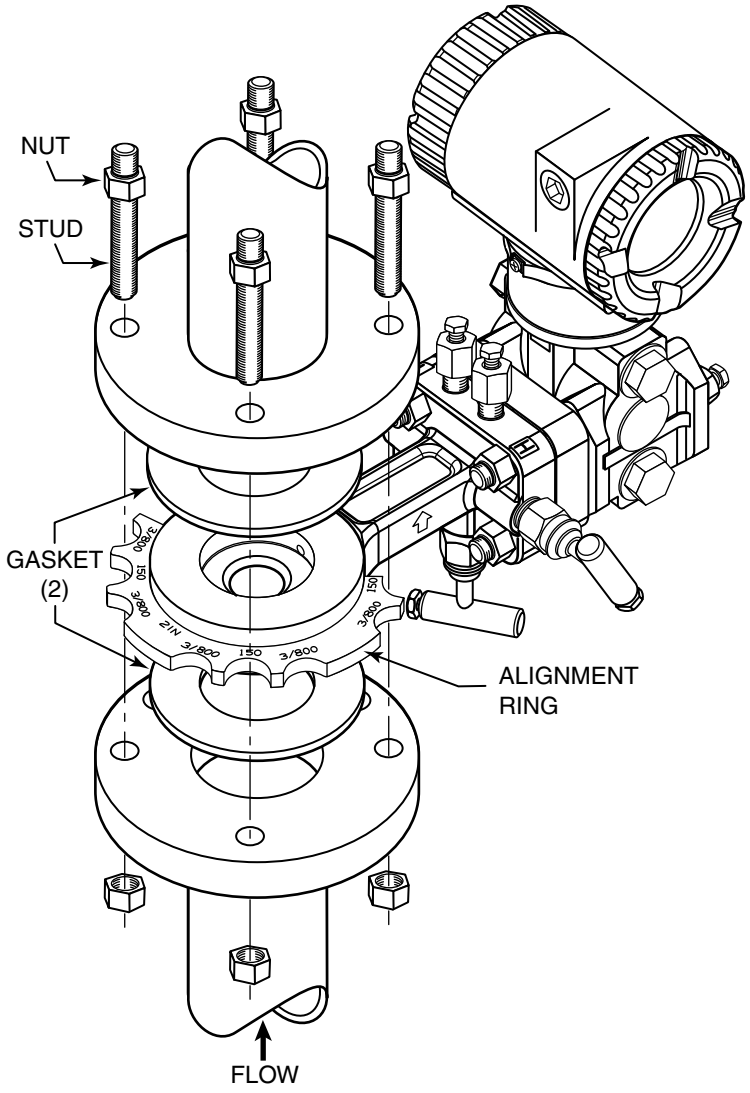

Figure 5. Compact Orifice Installation

4. Insert the orifice plate between the flanges so that the alignment ring indentations marked with the appropriate flange rating contact the installed studs. See Figure 6.

— NOTE

On the ANSI alignment ring, the marking `3/600` refers to both ANSI Class 300 and ANSI Class 600 flanges.

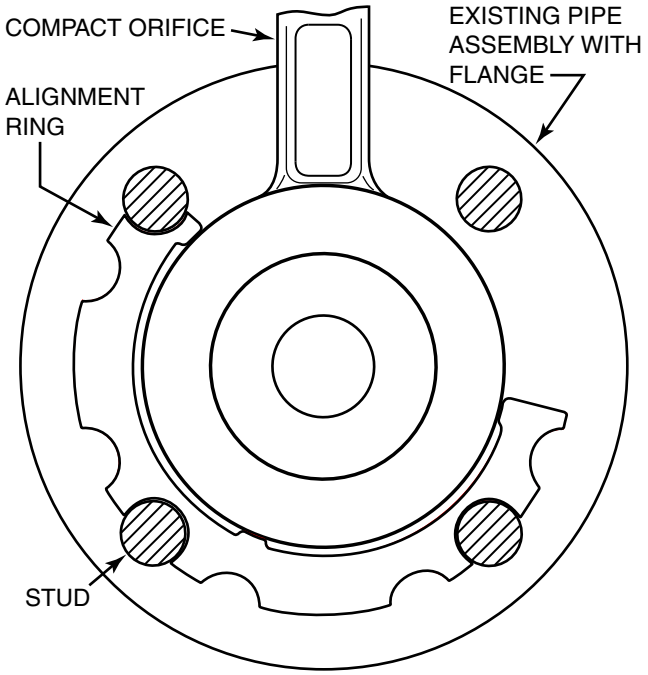

Figure 6. Use of Alignment Ring

5. Visually inspect for concentricity (centering and alignment) of mating flanges.
6. Insert other studs and nuts (hand tight). Ensure that three of the studs are in contact with the alignment ring.
7. Tighten nuts in accordance with conventional flange nut tightening practice (that is, incremental and alternate tightening of bolts).

Putting Your Transmitter Into Operation

The following procedure explains how to sequence the valves in your bypass manifold to ensure that your transmitter is not overranged.

NOTE

This procedure assumes that the process shutoff valves are open.

1. Make sure that both upstream and downstream manifold valves are closed.
2. Make sure that the bypass valve is open.
3. Slowly open the upstream manifold valve.
4. Close the bypass valve.
5. Slowly open the downstream manifold valve.

Taking Your Transmitter Out of Operation

The following procedure explains how to sequence the valves in your bypass manifold to ensure that your transmitter is not overranged.

NOTE

This procedure assumes that the process shutoff valves are open.

1. Close the downstream manifold valve.
2. Close the upstream manifold valve.
3. Open the bypass valve.
4. Carefully open the vent screw to release any residual pressure before disconnecting lines.

⚠ WARNING

When venting pressure from the transmitter, wear suitable protective equipment to prevent possible injury from process material, temperature, or pressure.

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