Product Data Sheet
00813-0100-4485, Rev CA
January 2011

Rosemount DP Flowmeters and Primary Elements

- *Multivariable capabilities allow for real time fully compensated mass and energy flow*
- *Fully-Integrated Wireless Flowmeters allow for easy installation*
- *Minimize permanent pressure loss and save energy with Annubar® Technology*
- *Reduce straight pipe requirements to two diameters upstream and downstream from flow disturbances with Conditioning Orifice Plate Technology*
- *Improve accuracy and repeatability in small line sizes with Integral Orifice Plate Technology*

Contents

A.P.O. - ELMOS v.o.s., Pražská 90, 509 01 Nová Paka, Tel.: +420 493 504 261, Fax: +420 493 504 257, E-mail: apo@apoelmos.cz, Internet: www.apoelmos.cz

DP Flowmeter Selection Guide

Rosemount integrated DP Flowmeters arrive fully assembled, configured, and leak tested for out-of-the-box installation.

Rosemount 3051SF Flowmeters enable best-in-class flow measurement utilizing advanced functionality

- Up to 0.80% mass flow rate accuracy
- Multivariable capabilities allow for real time fully compensated mass and energy flow
- Advanced diagnostics predict and prevent abnormal process conditions
- Installation ready wireless flow solution
- Ultra for Flow measures %-of-reading performance over 14:1 flow turndown
- 10-year stability, 12-year warranty

Rosemount 3051CF Flowmeters combine the proven 3051C pressure transmitter and the latest primary element technology

- Up to 1.65% volumetric flow accuracy at 8:1 turndown
- Available with HART®, FOUNDATION™ fieldbus, and Profibus Protocols
- 5-year stability

Rosemount 2051CF Flowmeters combine the 2051C pressure transmitter and the latest primary element technology

- Up to 2.00% volumetric flow accuracy at 5:1 turndown
- Available with HART, and FOUNDATION fieldbus Protocols
- 2-year stability

Rosemount Annubar Primary Element Technology

- Energy savings gained through minimal permanent pressure loss
- Innovative T-shape design that increases accuracy to ±0.75% of flow rate
- Variety of sensor materials for optimal compatibility with the process fluid
- Handles applications where conditions exceed the structural limitations of other primary elements
- Symmetrical sensor design allows bi-directional flow measurement

Rosemount Conditioning Orifice Plate Technology

- Reduce straight pipe requirements to two diameters upstream and downstream from flow disturbances
- Discharge coefficient uncertainty of ±0.5%
- Integral thermowell enables fully compensated mass flow with a single pipe penetration
- Reduce installation costs compared to traditional orifice plates with the compact design
- Conditioning orifice plate is based on AGA, ASME and ISO industry standards
- Available in various plate styles providing installation flexibility

Rosemount Integral Orifice Plate Technology

- Improves accuracy and repeatability in 1/2-in., 1-in., and 1 1/2-in. line sizes
- Self-centering plate design eliminates installation errors that are magnified in small line sizes
- Precision honed pipe sections allow accuracy of up to ±0.75% of flow rate
- Installation flexibility with numerous process connections
- Integral thermowell enables fully compensated mass flow

Rosemount 3051SF DP Flowmeters

Rosemount 3051SF Flowmeters integrate industry leading transmitters with industry leading primary elements. Capabilities include:

- Flowmeters are factory configured to meet your application needs (Configuration Data Sheet required)
- MultiVariable capabilities allow scalable flow compensation (Measurement Types 1-7)
- HART 4-20, Wireless, and FOUNDATION fieldbus protocols
- Ultra for Flow for improved flow performance across wider flow ranges
- Integral temperature measurement (Option Code T)
- Advanced Diagnostics (Option Code DA2)
- Direct or remote mount configurations available

Additional Information
Specifications: page 26
Dimensional Drawings: page 124.

Rosemount 3051SFA Annubar Flowmeter

- Annubar flowmeters reduce permanent pressure loss by creating less blockage in the pipe
- Ideal for large line size installations when cost, size and weight of the flowmeter are concerns

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFA	Annubar Flowmeter	•	•	
Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressures w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential & Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure & Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential & Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential & Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure & Temperature	—	•	★
D	Differential Pressure	•	—	★
Fluid Type				
Standard				**Standard**
L	Liquid	•	•	★
G	Gas	•	•	★
S	Steam	•	•	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Line Size		**D**	**1-7**	
Standard				**Standard**
020	2-in. (50 mm)	•	•	★
025	2 1/2-in. (63.5 mm)	•	•	★
030	3-in. (80 mm)	•	•	★
035	3 1/2-in. (89 mm)	•	•	★
040	4-in. (100 mm)	•	•	★
050	5-in. (125 mm)	•	•	★
060	6-in. (150 mm)	•	•	★
070	7-in. (175 mm)	•	•	★
080	8-in. (200 mm)	•	•	★
100	10-in. (250 mm)	•	•	★
120	12-in. (300 mm)	•	•	★
Expanded				
140	14-in. (350 mm)	•	•	
160	16-in. (400 mm)	•	•	
180	18-in. (450 mm)	•	•	
200	20-in. (500 mm)	•	•	
240	24-in. (600 mm)	•	•	
300	30-in. (750 mm)	•	•	
360	36-in. (900 mm)	•	•	
420	42-in. (1066 mm)	•	•	
480	48-in. (1210 mm)	•	•	
600	60-in. (1520 mm)	•	•	
720	72-in. (1820 mm)	•	•	
780	78-in. (1950 mm)	•	•	
840	84-in. (2100 mm)	•	•	
900	90-in. (2250 mm)	•	•	
960	96-in. (2400 mm)	•	•	
Pipe I.D. Range				
Standard				**Standard**
C	Range C from the Pipe I.D. table	•	•	★
D	Range D from the Pipe I.D. table	•	•	★
Expanded				
A	Range A from the Pipe I.D. table	•	•	
B	Range B from the Pipe I.D. table	•	•	
E	Range E from the Pipe I.D. table	•	•	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12-in. (300 mm)	•	•	
Pipe Material / Mounting Assembly Material				
Standard				**Standard**
C	Carbon steel (A105)	•	•	★
S	316 Stainless Steel	•	•	★
0(1)	No Mounting (Customer Supplied)	•	•	★
Expanded				
G	Chrome-Moly Grade F-11	•	•	
N	Chrome-Moly Grade F-22	•	•	
J	Chrome-Moly Grade F-91	•	•	
Piping Orientation				
Standard				**Standard**
H	Horizontal Piping	•	•	★
D	Vertical Piping with Downwards Flow	•	•	★
U	Vertical Piping with Upwards Flow	•	•	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Annubar Type				**D**	**1-7**	
Standard						**Standard**
P	Pak-Lok			•	•	★
F	Flanged with opposite side support			•	•	★
Expanded						
L	Flange-Lok			•	•	
G	Gear-Drive Flo-Tap			•	•	
M	Manual Flo-Tap			•	•	
Sensor Material						
Standard						**Standard**
S	316 Stainless Steel			•	•	★
Expanded						
H	Alloy C-276			•	•	
Sensor Size						
Standard						**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)			•	•	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)			•	•	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)			•	•	★
Mounting Type						
Standard						**Standard**
T1	Compression/Threaded Connection			•	•	★
A1	150# RF ANSI			•	•	★
A3	300# RF ANSI			•	•	★
A6	600# RF ANSI			•	•	★
D1	DN PN16 Flange			•	•	★
D3	DN PN40 Flange			•	•	★
D6	DN PN100 Flange			•	•	★
Expanded						
A9[(2)]	900# RF ANSI			•	•	
AF[(2)]	1500# RF ANSI			•	•	
AT[(2)]	2500 # RF ANSI			•	•	
R1	150# RTJ Flange			•	•	
R3	300# RTJ Flange			•	•	
R6	600# RTJ Flange			•	•	
R9[(2)]	900# RTJ Flange			•	•	
RF[(2)]	1500# RTJ Flange			•	•	
RT[(2)]	2500# RTJ Flange			•	•	
Opposite Side Support or Packing Gland						
Standard						**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)			•	•	★
	Opposite Side Support – Required for Flanged Models					
C	NPT Threaded Opposite Support Assembly – Extended Tip			•	•	★
D	Welded Opposite Support Assembly – Extended Tip			•	•	★
Expanded						
	Packing Gland – Required for Flo-Tap Models					
	Packing Gland Material	*Rod Material*	*Packing Material*			
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	•	•	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	•	•	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	•	•	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	•	•	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	•	•	

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Isolation Valve for Flo-Tap Models				**D**	**1-7**	
Standard						**Standard**
0[1]	Not Applicable or Customer Supplied			•	•	★
Expanded						
1	Gate Valve, Carbon Steel			•	•	
2	Gate Valve, Stainless Steel			•	•	
5	Ball Valve, Carbon Steel			•	•	
6	Ball Valve, Stainless Steel			•	•	
Temperature Measurement						
Standard						**Standard**
T[3]	Integral RTD – not available with Flanged model greater than class 600#			•	•	★
0[4]	No Temperature Sensor			•	•	★
Expanded						
R[3]	Remote Thermowell and RTD			•	•	
Transmitter Connection Platform						
Standard						**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600			•	•	★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600			•	•	★
7	Remote-mount NPT Connections ($^1/_2$-in. FNPT)			•	•	★
Expanded						
6	Direct-mount, High Temperature 5-valve Manifold – not available with Flanged model greater than class 600			•	•	
8	Remote-mount SW Connections ($^1/_2$-in.)			•	•	
Differential Pressure Range						
Standard						**Standard**
1	0 to 25 in H_2O (0 to 62.3 mbar)			•	•	★
2	0 to 250 in H_2O (0 to 623 mbar)			•	•	★
3	0 to 1000 in H_2O (0 to 2.5 bar)			•	•	★
Static Pressure Range						
Standard						**Standard**
A[5]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)			—	•	★
E[6]	Absolute 0 to 3626 psia (0 to 250 bar)			—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)			—	•	★
K[6]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)			—	•	★
Transmitter Output						
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus protocol (requires PlantWeb housing)			•	—	★
X[7]	Wireless (Requires wireless options and Wireless Plantweb housing)			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	$^1/_2$-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	$^1/_2$-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	$^1/_2$-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box housing with output for remote display and interface	Aluminum	$^1/_2$-14 NPT	•	—	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

2F	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[8]	Wireless PlantWeb housing	Aluminum	1/2-14 NPT	•	—	★
5J[8]	Wireless PlantWeb housing	SST	1/2-14 NPT	•	—	★
7J[7][9]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class				**D**	**1-7**	
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
5	Classic MV: 1.15% flow rate accuracy, 8:1 flow turndown, 5-yr. stability			—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D						
1	Ultra: up to 0.95% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty			•	—	★
2	Classic: up to 1.4% flow rate accuracy, 8:1 flow turndown, 5-year stability			•	—	★
3[10]	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability. limited 12-year warranty			•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★
Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1[11]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Pressure Testing				
Expanded				
P1[12]	Hydrostatic Testing with Certificate	•	•	
PX[12]	Extended Hydrostatic Testing	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 level D (section 11.4)	•	•	
Material Testing				
Expanded				
V1	Dye Penetrant Exam	•	•	

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Material Examination		**D**	**1-7**	
Expanded				
V2	Radiographic Examination	•	•	
Flow Calibration				
Expanded				
W1	Flow Calibration (Average K)	•	•	
WZ	Special Calibration	•	•	
Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Surface Finish				
Standard				**Standard**
RL	Surface finish for Low Pipe Reynolds Number in Gas & Steam	•	•	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	•	•	★
Material Traceability Certification				
Standard				**Standard**
Q8[13]	Material Traceability Certificate per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2[14]	ANSI / ASME B31.1	•	•	
J3[14]	ANSI / ASME B31.3	•	•	
Material Conformance				
Expanded				
J5[15]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Standard				**Standard**
J6	European Pressure Directive (PED)	•	•	★
Expanded				
J1	Canadian Registration	•	•	
Installed in Flanged Pipe Spool Section				
Expanded				
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
Instrument Connections for Remote Mount Option				
Standard				**Standard**
G2	Needle Valves, Stainless Steel	•	•	★
G6	OS&Y Gate Valve, Stainless Steel	•	•	★
Expanded				
G1	Needle Valves, Carbon Steel	•	•	
G3	Needle Valves, Alloy C-276	•	•	
G5	OS&Y Gate Valve, Carbon Steel	•	•	
G7	OS&Y Gate Valve, Alloy C-276	•	•	
Special Shipment				
Standard				**Standard**
Y1	Mounting Hardware Shipped Separately	•	•	★
Attach To				
Expanded				
H1	Attach to Transmitter	•	•	
Special Dimensions				
Expanded				
VM	Variable Mounting	•	•	
VT	Variable Tip	•	•	
VS	Variable length Spool Section	•	•	

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Certificate for Transmitter	•	•	★
QP	Calibration Certificate & Tamper Evident Seal	•	•	★
Quality Certification For Safety		**D**	**1-7**	
Standard				**Standard**
QS[18][24]	Prior-use Certificate of FMEDA data	•	—	★
QT[17][18][24]	Safety certified to IEC 61508 with certificate of FMEDA data	•	—	★
Product Certifications				
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[16]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[16]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[16]	ATEX and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[16]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[16]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard Approvals				
Standard				**Standard**
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options				
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-Filled (PTFE) O-ring	•	•	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	•	•	★
Digital Display[17]				
Standard				**Standard**
M5	PlantWeb LCD display (Requires PlantWeb housing)	•	•	★
M7[18][19][20]	Remote mount LCD display and interface, PlantWeb housing,no cable; SST bracket	•	•	★
M8[18][19]	Remote mount LCD display and interface, PlantWeb housing,50 ft. (15 m) cable; SST bracket	•	•	★
M9[18][19]	Remote mount LCD display and interface, PlantWeb housing,100 ft. (31 m) cable; SST bracket	•	•	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★
Manifold for Remote Mount Option				
Standard				**Standard**
F2	3-Valve Manifold, Stainless Steel	•	•	★
F6	5-Valve Manifold, Stainless Steel	•	•	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
F1	3-Valve Manifold, Carbon Steel	•	•	
F3	3-Valve Manifold, Alloy C-276	•	•	
F5	5-Valve Manifold, Carbon Steel	•	•	
F7	5-Valve Manifold, Alloy C-276	•	•	
PlantWeb Control Functionality		**D**	**1-7**	
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2(22)	Advanced HART Diagnostic Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01(23)	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	—	•	★
Alarm Limit(18)(24)				
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1(18)(24)(25)	Hardware Adjustments (zero, span, alarm, security)	•	—	★
D4	External Ground Screw Assembly	•	•	★
DA(18)(24)(25)	Hardware Adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	—	★
Conduit Plug				
Standard				**Standard**
DO	316 SST Conduit Plug *(standard for all 3051SF Models)*	•	•	★
Conduit Electrical Connector				
Standard				**Standard**
GE(26)	M12, 4-pin, Male Connector (*eurofast*®)	•	•	★
GM(26)	A size Mini, 4-pin, Male Connector (*minifast*®)	•	•	★
Typical Model Number: 3051SFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3				

(1) Provide the "A" dimension for Flanged, Flange-Lok, and Threaded Flo-Tap models. Provide the "B" dimension for Flange Flo-Tap models.

(2) Available in remote mount applications only.

(3) Temperature Measurement Option code T or R is required for Measurement Type codes 1, 3, 5, and 7.

(4) Required for Measurement Type codes 2, 4, 6, and D.

(5) Required for Measurement Type codes 3, 4, 7, and D.

(6) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(7) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(8) Only available with output code X.

(9) Available with output code A only.

(10) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(11) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(12) Applies to assembled flowmeter only, mounting not tested.

(13) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(14) Not available with Transmitter Connection Platform 6.

(15) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(16) Not available with M20 or G ½ conduit entry size.

(17) Not available with housing code 7J.

(18) Not available with output code X.

(19) Not available with output code F, option code DA2, or option code QT.

(20) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(21) Not available with Housing code 5A, 5J, or 7J. External ground screw assembly (option code D4) is included with the T1 option. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with Output Protocol code F.

(25) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(26) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Rosemount 3051SFC Compact Orifice Flowmeter

- Compact Conditioning flowmeters reduce straight piping requirements to 2D upstream and 2D downstream from a flow disturbance
- Simple installation of Compact flowmeters between any existing raised-face flanges

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFC	Compact Orifice Flowmeter	•	•	
Transmitter Feature Board Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressure w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential & Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure & Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential & Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential & Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure & Temperature	—	•	★
D	Differential Pressure	•	—	★
Primary Element Technology				
Standard				**Standard**
C	Conditioning Orifice Plate	•	•	★
P	Orifice Plate	•	•	★
Material Type				
Standard				**Standard**
S	316 SST	•	•	★
Line Size				
Standard				**Standard**
005(1)	1/2-in. (15 mm)	•	•	★
010(1)	1-in. (25 mm)	•	•	★
015(1)	1 1/2-in. (40 mm)	•	•	★
020	2-in. (50 mm)	•	•	★
030	3-in. (80 mm)	•	•	★
040	4-in. (100 mm)	•	•	★
060	6-in. (150 mm)	•	•	★
080	8-in. (200 mm)	•	•	★
100	10-in. (250 mm)	•	•	★
120	12-in. (300 mm)	•	•	★
Primary Element Style				
Standard				**Standard**
N	Square Edged	•	•	★
Primary Element Type				
Standard				**Standard**
040	0.40 Beta Ratio (β)	•	•	★
065(2)	0.65 Beta Ratio (β)	•	•	★
Temperature Measurement				
Standard				**Standard**
T(4)	Integral RTD	—	•	★
0(3)	No Temperature Sensor	•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded						
R[4]	Remote Thermowell and RTD			•	•	
Transmitter Connection Platform				**D**	**1-7**	
Standard						**Standard**
3	Direct-mount, 3-valve Integral Manifold, SST			•	•	★
7	Remote-mount, 1/4-in. NPT Connections			•	•	★
Differential Pressure Range						
Standard						**Standard**
1	0 to 25 inH_2O (0 to 62.3 mbar)			•	•	★
2	0 to 250 inH_2O (0 to 623 mbar)			•	•	★
3	0 to 1000 inH_2O (0 to 2.5 bar)			•	•	★
Static Pressure Range						
Standard						**Standard**
A[5]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)			—	•	★
E[6]	Absolute 0 to 3626 psia (0 to 250 bar)			—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)			—	•	★
K[6]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)			—	•	★
Transmitter Output						
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F[7]	FOUNDATION fieldbus protocol			•	—	★
X[8][9]	Wireless			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	1/2-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	1/2-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	1/2-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★
2F	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[10]	Wireless PlantWeb housing	Aluminum	1/2-14 NPT	•	—	★
5J[10]	Wireless PlantWeb housing	SST	1/2-14 NPT	•	—	★
7J[8][11]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box housing with output for remote display and interface	Aluminum	G1/2	•	—	

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Performance Class				
Standard				**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6		•	•	
3	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 10-yr stability, limited 12-yr warranty	•	•	★
5	Classic MV: 1.10% flow rate accuracy, 8:1 flow turndown, 5-yr stability	—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D		•	•	
1	Ultra: 0.90% flow rate accuracy, 8:1 flow turndown, 10-yr stability, limited 12-yr warranty	•	—	★
2	Classic: 1.40% flow rate accuracy, 8:1 flow turndown, 5-yr stability	•	—	★
3(12)	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 10-yr stability, limited 12-yr warranty	•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency, and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★
Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1(13)	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Installation Accessories				
Standard				**Standard**
A	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
C	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
D	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
G	DIN Alignment Ring (PN 16)	•	•	★
H	DIN Alignment Ring (PN 40)	•	•	★
J	DIN Alignment Ring (PN 100)	•	•	★
Expanded				
B	JIS Alignment Ring (10K)	•	•	
R	JIS Alignment Ring (20K)	•	•	
S	JIS Alignment Ring (40K)	•	•	
Remote Adapters				
Standard				**Standard**
E	Flange adapters 316 SST (1/2-in. NPT)	•	•	★
High Temperature Applications				
Expanded				
T	Graphite Valve Packing (Tmax = 850 °F)	•	•	
Flow Calibration				
Expanded				
WC	Discharge Coefficient Verification (3 point)	•	•	
WD	Discharge Coefficient Verification (full 10 point)	•	•	
Pressure Testing				
Expanded				
P1	Hydrostatic Testing with Certificate	•	•	

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Special Cleaning				
Expanded				
P2	Cleaning for Special Processes	•	•	
PA	Cleaning per ASTM G93 Level D (section 11.4)	•	•	
Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Data Certificate for Transmitter	•	•	★
QP	Calibration Certificate and Tamper Evident Seal	•	•	★
Quality Certification for Safety		**D**	**1-7**	
Standard				**Standard**
QS[14][15]	Prior-use certificate of FMEDA data	•	—	★
QT[14][15][18]	Safety Certified to IEC 61508 with certificate of FMEDA data	•	—	★
Material Traceability Certifications				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2	ANSI / ASME B31.1	•	•	
J3	ANSI / ASME B31.3	•	•	
J4	ANSI / ASME B31.8	•	•	
Material Conformance				
Expanded				
J5[16]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Expanded				
J1	Canadian Registration	•	•	
Product Certifications				
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, E6, E1, I5, I6, and I1)	•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Shipboard Approvals				
Standard				
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options		**D**	**1-7**	
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital Display[18]				
Standard				**Standard**
M5	PlantWeb LCD display	•	•	★
M7[15][19][20]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	•	★
M8[15][19]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15m) cable, SST bracket	•	•	★
M9[15][19]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31m) cable, SST bracket	•	•	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★
Manifold for Remote Mount Option				
Standard				**Standard**
F2	3-Valve Manifold, SST	•	•	★
F6	5-Valve Manifold, SST	•	•	★
PlantWeb Control Functionality				
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2[22]	Advanced HART Diagnostic Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01[23]	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	•	•	★
Alarm Limit[14][15]				
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1[14][15][24]	Hardware Adjustments (zero, span, alarm, security).	•	—	★
D4	External ground screw assembly	•	•	★
DA[14][15][24]	Hardware adjustments (zero, span, alarm, security) and external ground screw assembly	•	—	★
Conduit Plug				
Standard				**Standard**
DO	316 SST Conduit Plug	•	•	★
Conduit Electrical Connector				
Standard				**Standard**
ZE[25]	M12, 4-pin, Male Connector (eurofast)	•	•	★
ZM	A size Mini, 4-pin, Male Connector (minifast)	•	•	★
Typical Model Number: 3051SFC 1 C S 060 N 065 T 3 2 J A 1A 3				

(1) Not available for Primary Element Technology code C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Required for Measurement Type codes 2, 4, 6, and D.

(4) Only available with Transmitter Feature Board Measurement Type: 1, 3, 5, 7.

(5) Required for Measurement Type codes 3, 4, 7, and D.

(6) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(7) Requires PlantWeb housing.

(8) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(9) Requires wireless options and wireless PlantWeb housing.

(10) Only available with output code X.

(11) Available with output code A only.

(12) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(13) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(14) Not available with Output Protocol code F.

(15) Not available with output code X.

(16) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(17) Not available with M20 or G ½ conduit entry size.

(18) Not available with housing code 7J.

(19) Not available with output code F, option code DA2, or option code QT.

(20) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(21) Not available with Housing code 00, 5A, 5J, or 7J. External ground screw assembly (option code D4) is included with the T1 option. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(25) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Rosemount 3051SFP Integral Orifice Flowmeter

- Precision honed pipe section for increased accuracy in small line sizes
- Self-centering plate design prevents alignment errors that magnify measurement inaccuracies in small line sizes

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFP	Integral Orifice Flowmeter	•	•	
Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressures w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential and Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure and Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential and Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential and Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure and Temperature	—	•	★
D	Differential Pressure	•	—	★
Body Material				
Standard				**Standard**
S	316 SST	•	•	★
Line Size				
Standard				**Standard**
005	1/2-in. (15 mm)	•	•	★
010	1-in. (25 mm)	•	•	★
015	1 1/2-in. (40 mm)	•	•	★
Process Connection				
Standard				**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	•	•	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	•	•	★
P1	Pipe Ends: NPT threaded	•	•	★
P2	Pipe Ends: Beveled	•	•	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	•	•	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	•	•	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	•	•	★
W1	Pipe Ends: Flanged, ANSI Class 150, weld-neck	•	•	★
W3	Pipe Ends: Flanged, ANSI Class 300, weld-neck	•	•	★
W6	Pipe Ends: Flanged, ANSI Class 600, weld-neck	•	•	★
Expanded				
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	•	•	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	•	•	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	•	•	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	•	•	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	•	•	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	•	•	
P9	Special Process Connection	•	•	
Orifice Plate Material				
Standard				**Standard**
S	316 SST	•	•	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
H	Alloy C-276	•	•	
M	Alloy 400	•	•	
Bore Size Option		**D**	**1-7**	
Standard				**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. pipe	•	•	★
0109	0.109-in. (2.77 mm) for 1/2-in. pipe	•	•	★
0160	0.160-in. (4.06 mm) for 1/2-in. pipe	•	•	★
0196	0.196-in. (4.98 mm) for 1/2-in. pipe	•	•	★
0260	0.260-in. (6.60 mm) for 1/2-in. pipe	•	•	★
0340	0.340-in. (8.64 mm) for 1/2-in. pipe	•	•	★
0150	0.150-in. (3.81 mm) for 1-in. pipe	•	•	★
0250	0.250-in. (6.35 mm) for 1-in. pipe	•	•	★
0345	0.345-in. (8.76 mm) for 1-in. pipe	•	•	★
0500	0.500-in. (12.70 mm) for 1-in. pipe	•	•	★
0630	0.630-in. (16.00 mm) for 1-in. pipe	•	•	★
0800	0.800-in. (20.32 mm) for 1-in. pipe	•	•	★
0295	0.295-in. (7.49 mm) for 1 1/2-in. pipe	•	•	★
0376	0.376-in. (9.55 mm) for 1 1/2-in. pipe	•	•	★
0512	0.512-in. (13.00 mm) for 1 1/2-in. pipe	•	•	★
0748	0.748-in. (19.00 mm) for 1 1/2-in. pipe	•	•	★
1022	1.022-in. (25.96 mm) for 1 1/2-in. pipe	•	•	★
1184	1.184-in. (30.07 mm) for 1 1/2-in. pipe	•	•	★
Expanded				
0010	0.010-in. (0.25 mm) for 1/2-in. pipe	•	•	
0014	0.014-in. (0.36 mm) for 1/2-in. pipe	•	•	
0020	0.020-in. (0.51 mm) for 1/2-in. pipe	•	•	
0034	0.034-in. (0.86 mm) for 1/2-in. pipe	•	•	
Transmitter Connection Platform				
Standard				**Standard**
D3	Direct-mount, 3-valve Manifold, SST	•	•	★
D5	Direct-mount, 5-valve Manifold, SST	•	•	★
R3	Remote-mount, 3-valve Manifold, SST	•	•	★
R5	Remote-mount, 5-valve Manifold, SST	•	•	★
Expanded				
D4	Direct-mount, 3-valve Manifold, Alloy C-276	•	•	
D6	Direct-mount, 5-valve Manifold, Alloy C-276	•	•	
D7	Direct-mount, High Temperature, 5-valve Manifold, SST	•	•	
R4	Remote-mount, 3-valve Manifold, Alloy C-276	•	•	
R6	Remote-mount, 5-valve Manifold, Alloy C-276	•	•	
Differential Pressure Range				
Standard				**Standard**
1	0 to 25 inH_2O (0 to 62.3 mbar)	•	•	★
2	0 to 250 inH_2O (0 to 623 mbar)	•	•	★
3	0 to 1000 inH_2O (0 to 2.5 bar)	•	•	★
Static Pressure Range				
Standard				**Standard**
A(2)	None	•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)	—	•	★
E(3)	Absolute 0 to 3626 psia (0 to 250 bar)	—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)	—	•	★
K(3)	Gage -14.2 to 3626 psig (-0.979 to 250 bar)	—	•	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output				**D**	**1-7**	
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus (Requires PlantWeb housing)			•	—	★
X[4]	Wireless (Requires wireless options and wireless PlantWeb housing)			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	1/2-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	1/2-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	1/2-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box Housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★
2F	Junction Box Housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box Housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[5]	Wireless PlantWeb Housing	Aluminum	1/2–14 NPT	•	—	★
5J[5]	Wireless PlantWeb Housing	SST	1/2–14 NPT	•	—	★
7J[4][6]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box Housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class						
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3[7]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
5	Classic MV: 1.25% flow rate accuracy, 8:1 flow turndown, 5-year stability			—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D						
1	Ultra: 1.05% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
2	Classic: 1.50% flow rate accuracy, 8:1 flow turndown, 5-year stability			•	•	★
3[7]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★
Expanded				
WN	High-Gain, Remote Antenna	•	—	

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

SmartPower™				
Standard				
1[8]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Transmitter / Body Bolt Material		**D**	**1-7**	
Expanded				
G[9]	High temperature Option (850 °F (454 °C))	•	•	
Temperature Sensor				
Standard				**Standard**
T[10]	Thermowell and RTD	•	•	★
Optional Connection				
Standard				**Standard**
G1	DIN 19213 Transmitter Connection	•	•	★
Pressure Testing				
Expanded				
P1[11]	Hydrostatic Testing with Certificate	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	•	•	
Material Testing				
Expanded				
V1	Dye Penetrant Exam	•	•	
Material Examination				
Expanded				
V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)	•	•	
Flow Calibration				
Expanded				
WD[12]	Discharge Coefficient Verification	•	•	
WZ[12]	Special Calibration	•	•	
Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Material Traceability Certification				
Standard				**Standard**
Q8	Material certification per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2[13]	ANSI / ASME B31.1	•	•	
J3[13]	ANSI / ASME B31.3	•	•	
J4[13]	ANSI / ASME B31.8	•	•	
Materials Conformance				
Expanded				
J5[14]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Standard				**Standard**
J6	European Pressure Directive (PED)	•	•	★
Expanded				
J1	Canadian Registration	•	•	
Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Data Certificate for Transmitter	•	•	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Quality Certification for Safety				
Standard				**Standard**
QS[15][16]	Prior-use Certificate of FMEDA data	•	—	★
QT[15][16][18]	Safety-certified to IEC 61508 with Certificate of FMEDA data	•	—	★
Product Certifications		**D**	**1-7**	
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard Approvals				
Standard				**Standard**
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options				
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital Display[18]				
Standard				**Standard**
M5	PlantWeb LCD display (Requires PlantWeb housing)	•	•	★
M7[15][19][20]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	—	★
M8[15][20]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	•	—	★
M9[15][20]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	•	—	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★
PlantWeb Control Functionality				
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2[22]	Advanced HART Diagnostics Suite	•	—	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01[23]	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	—	•	★
Alarm Limit[15][16]		**D**	**1-7**	
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1[15][16][24]	Hardware Adjustments (zero, span, alarm, security)	•	—	★
D4	External ground screw assembly	•	•	★
DA[15][16][24]	Hardware adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	—	★
Conduit Plug				
DO	316 SST Conduit Plug			
Conduit Electrical Connector				
Expanded				
GE [25]	M12, 4-pin, Male Connector (*eurofast*®)	•	•	
GM[25]	A size Mini, 4-pin, Male Connector (*minifast*®)	•	•	
Typical Model Number: 3051SFP 1 S 010 W3 S 0150 D3 1 J A 1A 3 M5				

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Required for Measurement Type codes 3, 4, 7, and D.

(3) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(4) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(5) Only available with output code X.

(6) Only available with output code A.

(7) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(8) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(9) Not available with $1^1/_2$-in. (38 mm) line size.

(10) Thermowell material is the same as the body material.

(11) Does not apply to Process Connection codes T1 and S1.

(12) Not available for bore sizes 0010, 0014, 0020, or 0034.

(13) Not available with DIN Process Connection codes D1, D2, or D3.

(14) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(15) Not available with output code X.

(16) Not available with Output Protocol code F.

(17) Not available with M20 or G ½ conduit entry size.

(18) Not available with housing code 7J.

(19) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(20) Not available with output code F, option code DA2, or option code QT.

(21) Not available with Housing code 5A, 5J, or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(25) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

3051SF Series Specifications

3051SF PERFORMANCE SPECIFICATIONS

Performance assumptions include: measured pipe I.D, transmitter is trimmed for optimum flow accuracy, and performance is dependent on application parameters.

Table 4. MultiVariable Flow Performance - Flow Reference Accuracy (Measurement Type 1)(1)(2)

3051SFA Annubar Flowmeter			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3		±1.15% of Flow Rate	±0.80% of Flow Rate
3051SFC Compact Orifice Flowmeter - Conditioning Option C			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.10% of Flow Rate	±0.75% of Flow Rate
	β =0.65	±1.45% of Flow Rate	±1.15% of Flow Rate
3051SFC Compact Orifice Flowmeter - Orifice Option P(3)			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.45% of Flow Rate	±1.30% of Flow Rate
	β =0.65	±1.45% of Flow Rate	±1.30% of Flow Rate
3051SFP Integral Orifice Flowmeter			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β <0.1	±2.65% of Flow Rate	±2.60% of Flow Rate
	0.1< β <0.2	±1.60% of Flow Rate	±1.40% of Flow Rate
	0.2< β <0.6	±1.25% of Flow Rate	±0.95% of Flow Rate
	0.6< β <0.8	±1.80% of Flow Rate	±1.60% of Flow Rate

(1) Measurement Types 2 - 4 assume that the unmeasured variables are constant. Additional uncertainty will depend on the variation in the unmeasured variables.

(2) Range 1 flowmeters experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(3) For line size less than 2 in. (50 mm) or greater than 8 in. (200 mm), add an additional 0.5% uncertainty.

Table 5. Flow Performance - Flow Reference Accuracy (Measurement Type D)(1)(2)(3)

3051SFA Annubar Flowmeter				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3		±1.4% of Flow Rate	±0.95% of Flow Rate	±0.80% of Flow Rate
3051SFC Compact Orifice Flowmeter – Conditioning Option C				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.4% of Flow Rate	±0.9% of Flow Rate	±0.75% of Flow Rate
	β =0.65	±1.65% of Flow Rate	±1.25% of Flow Rate	±1.15% of Flow Rate
3051SFC Compact Orifice Flowmeter – Orifice Option P(4)				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.80% of Flow Rate	±1.35% of Flow Rate	±1.30% of Flow Rate
	β =0.65	±1.80% of Flow Rate	±1.35% of Flow Rate	±1.30% of Flow Rate
3051SFP Integral Orifice Flowmeter				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β <0.1	±2.70% of Flow Rate	±2.65% of Flow Rate	±2.60% of Flow Rate
	0.1< β <0.2	±1.80% of Flow Rate	±1.45% of Flow Rate	±1.40% of Flow Rate
	0.2< β <0.6	±1.50% of Flow Rate	±1.05% of Flow Rate	±0.95% of Flow Rate
	0.6< β <0.8	±2.00% of Flow Rate	±1.70% of Flow Rate	±1.60% of Flow Rate

(1) For Measurement Types 5 - 7, refer to the Reference Accuracy specification for the 3051SMV with Measurement Type P.

(2) These flow measurement accuracies assume a constant density, viscosity, and expansibility factor.

(3) Range 1 flowmeters experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(4) For line size less than 2 in. (50 mm) or greater than 8 in. (200 mm), add an additional 0.5% uncertainty.

3051SF Dynamic Performance

Total Time Response at 75 °F (24 °C), includes dead time(1)

3051SF_D	3051SF_1, 2, 5, or 6	3051SF_3, 4, or 7
DP Ranges 2-5: 100 ms Range 1: 255 ms Range 0: 700 ms	DP Range 1: 310 ms DP Range 2: 170 ms DP Range 3: 155 ms AP & GP: 240 ms	DP Ranges 2-5: 145 ms DP Range 1: 300 ms DP Range 0: 745 ms

(1) For FOUNDATION fieldbus (output code F), add 52 ms to stated values (not including segment macro-cycle). For option code DA2, add 45 ms (nominal) to stated values.

Dead Time(1)

3051SF_D	3051SF_1-7
45 ms (nominal)	DP: 100 ms AP & GP: 140 ms RTD Interface: 1 s

(1) For option code DA2, dead time is 90 milliseconds (nominal).

Update Rate(1)

3051SF_D	3051SF_1-7	
22 updates per sec.	DP: 22 updates per sec. AP & GP: 11 updates per sec. RTD Interface: 1 update per sec.	Calculated Variables: Mass / Volumetric Flow Rate: 22 updates per sec. Energy Flow Rate: 22 updates per sec. Totalized Flow: 1 update per sec.

(1) Does not apply to Wireless (output code X). See"Wireless Self-Organizing Networks" on page 31 for wireless update rate.

Mounting Position Effects

Models		Ultra, Ultra for Flow, Classic and Classic MV
3051SF_3, 4, 7, or D		Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be zeroed Span: no effect
3051SF_1, 2, 5, or 6	DP Sensor:	Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be zeroed Span: no effect
	GP/AP Sensor:	Zero shifts to ±2.5 inH_2O (6,22 mbar), which can be zeroed Span: no effect

Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

For Housing Style codes 1J, 1K, 1L, 2J, and 2M:
Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15mm displacement peak amplitude / 60-500 Hz 2g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt change in voltage at the transmitter terminals

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and NAMUR NE-21.(1)(2)

(1) NAMUR NE-21 does not apply to wireless output code X.

(2) 3051SMV and 3051SF_1, 2, 3, 4, 5, 6, 7 requires shielded cable for both temperature and loop wiring.

Transient Protection (Option T1)

Meets IEEE C62.41.2-2002, Location Category B
- 6 kV crest (0.5 μs - 100 kHz)
- 3 kA crest (8 × 20 microseconds)
- 6 kV crest (1.2 × 50 microseconds)

Meets IEEE C37.90.1-2002 Surge Withstand Capability
- SWC 2.5 kV crest, 1.0 MHz wave form

3051SF FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Flowmeter with Coplanar Sensor Module

Range	DP Sensor (3051SF_3, 4, or 7)	
	Lower (LRL)	**Upper (URL)**
1	0 inH_2O (0 mbar)	25 inH_2O (62,3 mbar)
2	0 inH_2O (0 bar)	250 inH_2O (0,62 bar)
3	0 inH_2O (0 bar)	1000 inH_2O (2,49 bar)

Flowmeter with MultiVariable Sensor Module

Range	DP Sensor (3051SF1, 2, 5, or 6)	
	Lower (LRL)	**Upper (URL)**
1	0 inH_2O (0 mbar)	25.0 inH_2O (62,3 mbar)
2	0 inH_2O (0 bar)	250.0 inH_2O (0,62 bar)
3	0 inH_2O (0 bar)	1000.0 inH_2O (2,49 bar)
Range	**Static Pressure Sensor (GP/AP)**	
	Lower (LRL)	**Upper (URL)[1]**
3	GP[2]: -14.2 psig (0,98 bar) AP: 0.5 psia (34,5 mbar)	GP: 800 psig (55,16 bar) AP: 800 psia (55,16 bar)
4	GP[2]: -14.2 psig (0,98 bar) AP: 0.5 psia (34,5 mbar)	GP: 3626 psig (250 bar) AP: 3626 psia (250 bar)

(1) For SP Range 4 with DP Range 1, the URL is 2000 psi (137,9 bar).

(2) Inert Fill: Minimum pressure = 1.5 psia (0,10 bar) or -13.2 psig (-0,91 bar).

Process Temperature RTD Interface (3051SF_1, 3, 5 or 7)[1]

Lower (LRL)	Upper (URL)
-328 °F (-200 °C)	1562 °F (850 °C)

(1) Transmitter is compatible with any Pt 100 RTD sensor. Examples of compatible RTDs include Rosemount Series 68 and 78 RTD Temperature Sensors.

Minimum Span Limits

Transmitter with Coplanar Sensor Module (Single Variable)

Range	DP Sensor (3051SF_D, 3, 4 or 7)	
	Ultra & Ultra for Flow	**Classic**
1	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)
2	1.3 inH_2O (3,11 mbar)	2.5 inH_2O (6,23 mbar)
3	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)

Transmitter with MultiVariable Sensor Module

Range	DP Sensor (3051SF_1, 2, 5, or 6)	
	Ultra for Flow	**Classic MV**
1	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)
2	1.3 inH_2O (3,11 mbar)	2.5 inH_2O (6,23 mbar)
3	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)
Range	**Static Pressure Sensor (GP/AP)**	
	Ultra for Flow	**Classic MV**
3	4.0 psi (276 mbar)	8.0 psi (522 mbar)
4	18.13 psi (1,25 bar)	36.26 psi (2,50 bar)

Process Temperature RTD Interface (3051SF_1, 3, 5 or 7)

Minimum Span = 50 °F (28 °C)

Service

3051SF_5, 6, 7, or D (Direct Process Variable Output):

Liquid, gas, and steam applications

3051SF_1, 2, 3, or 4 (Mass and Energy Flow Output):

Some fluid types are only supported by certain measurement types

Fluid Compatibility with Pressure and Temperature Compensation • Available — Not available

Ordering Code	Measurement Type	Fluid Types			
		Liquids	Saturated Steam	Superheated Steam	Gas and Natural Gas
1	DP / P/ T (Full Compensation)	•	•	•	•
2	DP / P	•	•	•	•
3	DP / T	•	•	—	—
4	DP only	•	•	—	—

4–20 mA/HART

Zero and Span Adjustment

Zero and span values can be set anywhere within the range. Span must be greater than or equal to the minimum span.

Output

Two-wire 4–20 mA is user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Power Supply

External power supply required.

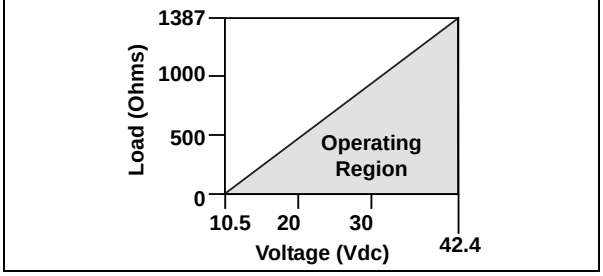
- 3051SF_D: 10.5 to 42.4 Vdc with no load
- 3051SF_D with Advanced HART Diagnostics Suite: 12 to 42.4 Vdc with no load
- 3051SF_1-7: 12 to 42.4 Vdc with no load

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

3051SF_D

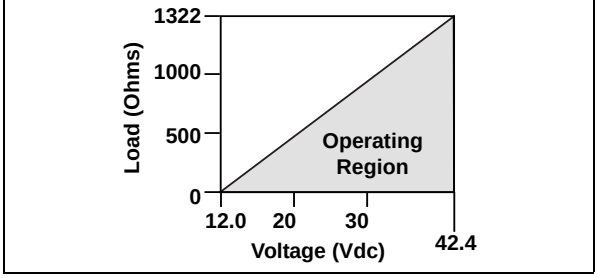
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

3051SF_1-7 and 3051SF_D with HART Diagnostics (option code DA2)

Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 12.0)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

Advanced HART Diagnostics Suite (Option Code DA2)

The 3051SF provides Abnormal Situation Prevention indication for a breakthrough in diagnostic capability. The 3051SF ASP Diagnostics Suite for HART includes Statistical Process Monitoring (SPM), variable logging with time stamp and advanced process alerts. The enhanced EDDL graphic display provides an intuitive and user-friendly interface to better visualize these diagnostics.

The integral SPM technology calculates the mean and standard deviation of the process variable 22 times per second and makes them available to the user. The 3051SF uses these values and highly flexible configuration options for customization to detect many user-defined or application specific abnormal situations (e.g. detecting plugged impulse lines and fluid composition change). Variable logging with time stamp and advanced process alerts capture valuable process and sensor data to enable quick troubleshooting of application and installation issues.

FOUNDATION fieldbus

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

FOUNDATION fieldbus Parameters

Schedule Entries	14 (max.)
Links	30 (max.)
Virtual Communications Relationships (VCR)	20 (max.)

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

2 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feedforward. Auto-tune capability allows for superior tuning for optimized control performance.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Software Upgrade in the Field

Software for the 3051SF with FOUNDATION fieldbus is easy to upgrade in the field using the FOUNDATION fieldbus Common Device Software Download procedure.

PlantWeb Alerts

Enable the full power of the PlantWeb digital architecture by diagnosing instrumentation issues, communicating advisory, maintenance, and failure details, and recommending a solution.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	20 milliseconds
PID with Auto-tune	35 milliseconds
Input Selector	20 milliseconds
Arithmetic	20 milliseconds
Signal Characterizer	20 milliseconds
Integrator	20 milliseconds
Output Splitter	20 milliseconds
Control Selector	20 milliseconds

Fully Compensated Mass Flow Block (Option Code H01)

Calculates fully compensated mass flow based on differential pressure with external process pressure and temperature measurements over the fieldbus segment. Configuration for the mass flow calculation is easily accomplished using the Rosemount Engineering Assistant.

ASP Diagnostics Suite for FOUNDATION fieldbus (Option Code D01)

The 3051SF ASP Diagnostics Suite for FOUNDATION fieldbus provides Abnormal Situation Prevention indication and enhanced EDDL graphic displays for easy visual analysis.

The integral Statistical Process Monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second and makes them available to the user. The 3051SF uses these values and highly flexible configuration options for customization to detect many user-defined or application specific abnormal situations (e.g. detecting plugged impulse lines and fluid composition change).

Wireless Self-Organizing Networks

Output

WirelessHART, 2.4 GHz DSSS.

Local Display

The optional five-digit LCD can display user-selectable information such as primary variable in engineering units, percent of range, sensor module temperature, and electronics temperature. Display updates at up to once per minute.

Update Rate

WirelessHART, user selectable 8 sec. to 60 min.

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with polybutadine terephthalate (PBT) enclosure. Ten-year life at one minute update rate.(1)

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits of -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Overpressure Limits

Transmitters withstand the following limits without damage:

Coplanar Sensor Module (Single Variable)

Range	DP(1)
	3051SF_3, 4, 7, or D
1	2000 psi (137,9 bar)
2	3626 psi (250,0 bar)
3	3626 psi (250,0 bar)

(1) The overpressure limit of a DP Sensor with the P9 option is 4500 psig (310,3 bar). The overpressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

Coplanar MultiVariable Sensor Module (3051SF_1, 2, 5, or 6)

Static Pressure	Differential Pressure		
	Range 1	Range 2	Range 3
Range 3 GP/AP	1600 psi (110,3 bar)	1600 psi (110,3 bar)	1600 psi (110,3 bar)
Range 4 GP/AP	2000 psi (137,9 bar)	3626 psi (250 bar)	3626 psi (250 bar)

Static Pressure Limits

Coplanar Sensor Module

Operates within specifications between static line pressures of:

Range	DP Sensor(1)
	3051SF_3, 4, 7, or D
1	0.5 psia to 2000 psig (0,03 to 137,9 bar)
2	0.5 psia to 3626 psig (0,03 to 150 bar)
3	0.5 psia to 3626 psig (0,03 to 150 bar)

(1) The static pressure limit of a DP Sensor with the P9 option is 4500 psig (310,3 bar). The static pressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

Coplanar MultiVariable Sensor Module (3051SF_1, 2, 5, or 6)

Operates within specifications between static line pressures of 0.5 psia (0,03 bar) and the values in the table below:

Static Pressure	Differential Pressure		
	Range 1	Range 2	Range 3
Range 3 GP/AP	800 psi (57,91 bar)	800 psi (57,91 bar)	800 psi (57,91 bar)
Range 4 GP/AP	2000 psi (137,9 bar)	3626 psi (250 bar)	3626 psi (250 bar)

Burst Pressure Limits

Coplanar Sensor Module

10000 psig (689,5 bar)

Temperature Limits

Ambient

-40 to 185 °F (-40 to 85 °C)
With LCD display(1): -40 to 175 °F (-40 to 80 °C)
With option code P0: -20 to 185 °F (-29 to 85 °C)

(1) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Storage

-50 to 185 °F (-46 to 85 °C)
With LCD display: -40 to 185 °F (-40 to 85 °C)
With Wireless Output: -40 to 185 °F (-40 to 85 °C)

Process Temperature Limits

For 3051SFA Temperature Limits, see page 93.
For 3051SFC Temperature Limits, see page 105.
For 3051SFP Temperature Limits, see page 113.

At atmospheric pressures and above:

Humidity Limits

0–100% relative humidity

Turn-On Time(1)

When power is applied to the transmitter during startup, performance will be within specifications per the time period described below:

Transmitter	Turn-On Time (Typical)
3051S, 3051SF_D	2 seconds
Diagnostics	5 seconds
3051SMV, 3051SF_1-7	5 seconds

(1) Does not apply to wireless option code X.

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping(1)

Analog output response time to a step change is user-selectable from 0 to 60 seconds for one time constant. For 3051SF_1-7, each variable can be individually adjusted. Software damping is in addition to sensor module response time.

(1) Does not apply to wireless option code X.

Failure Mode Alarm

HART 4-20 mA (output option code A)

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven offscale to alert the user. Rosemount standard (default), NAMUR, and custom alarm levels are available (see Alarm Configuration below).

High or low alarm signal is software-selectable or hardware-selectable via the optional switch (option D1).

Alarm Configuration

	High Alarm	Low Alarm
Default	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant(1)	≥ 22.5 mA	≤ 3.6 mA
Custom levels(2)	20.2 - 23.0 mA	3.4 - 3.8 mA

(1) Analog output levels are compliant with NAMUR recommendation NE 43, see option codes C4 or C5.

(2) Low alarm must be 0.1 mA less than low saturation and high alarm must be 0.1 mA greater than high saturation.

PHYSICAL SPECIFICATIONS

Safety-Certified Transmitter Failure Values(1)

Safety accuracy: 2.0%(2)
Safety response time: 1.5 seconds

(1) Does not apply to wireless option code X.

(2) A 2% variation of the transmitter mA output is allowed before a safety trip. Trip values in the DCS or safety logic solver should be derated by 2%.

Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit. HART interface connections fixed to terminal block for Output code A and X.

Process Connections

Coplanar Sensor Module	
Standard	1/4-18 NPT on 2 1/8-in. centers

Process-Wetted Parts

For 3051SFA wetted parts, see “Annubar Sensor Material” on page 94.
For 3051SFC wetted parts, see “Material of Construction” on page 105.
For 3051SFP wetted parts, see “Material of Construction” on page 113.

Process Isolating Diaphragms

Coplanar Sensor Module
316L SST (UNS S31603), Alloy C-276 (UNS N10276), Alloy 400 (UNS N04400), Tantalum (UNS R05440), Gold-Plated Alloy 400, Gold-plated 316L SST

Drain/Vent Valves

316 SST, Alloy C-276, or Alloy 400/K-500 material
(Drain vent seat: Alloy 400, Drain vent stem: Alloy K-500)

Process Flanges and Adapters

Plated carbon steel
SST: CF-8M (Cast 316 SST) per ASTM A743
Cast C-276: CW-12MW per ASTM A494
Cast Alloy 400: M-30C per ASTM A494

Non-Wetted Parts

Electronics Housing

Low-copper aluminum alloy or CF-8M (Cast 316 SST)
NEMA 4X, IP 66, IP 68 (66 ft (20 m) for 168 hours)
Note: IP 68 not available with Wireless Output.

Paint for Aluminum Housing

Polyurethane

Coplanar Sensor Module Housing

SST: CF-3M (Cast 316L SST)

Bolts

Plated carbon steel per ASTM A449, Type 1
Austenitic 316 SST per ASTM F593
ASTM A453, Class D, Grade 660 SST
ASTM A193, Grade B7M alloy steel
ASTM A193, Class 2, Grade B8M SST
Alloy K-500

Sensor Module Fill Fluid

Silicone or inert halocarbon

Cover O-rings

Nitirile Butadiene (NBR)

Wireless Antenna

PBT/ polycarbonate (PC) integrated omnidirectional antenna

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT enclosure

3051SF Measurement Type 1-7 Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

Models with Differential Pressure Ranges = 2 through 5 and/or Static Pressure Range 4 or options P0 and P9.

QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV,

Module H Conformity Assessment — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006 and EN 61326-2-3:2006

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D; dust-ignition proof for Class II and Class III, Division 1, Groups E, F, and G; T_a = 85 °C; hazardous locations; enclosure Type 4X, conduit seal not required.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC when connected in accordance with Rosemount drawing 03151-1206;
T_a = 70 °C;
Non-incendive for Class I, Division 2, Groups A, B, C, and D Enclosure Type 4X
For entity parameters see control drawing 03151-1206.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, CSA Enclosure Type 4X; conduit seal not required. Dual Seal. T5 (T_a = -40 °C to 85 °C).

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D, T3C; when connected in accordance with Rosemount drawings 03151-1207; Dual Seal.
For entity parameters see control drawing 03151-1207.

Measurement Canada Approvals

D3 Accuracy Approval to the Electricity and Gas Inspection Act for the purchase and sale of Natural Gas.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: Baseefa 08ATEX0064X ⟨Ex⟩ II 1G
Ex ia IIC T4 (-60 °C ≤ T_{amb} ≤ +70 °C)
CE 1180

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)

If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

N1 ATEX Type n
Certificate No.: Baseefa 08ATEX0065X ⟨Ex⟩ II 3 G
Ex nA nL IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)
Ui = 45 Vdc max
U_O = 30 V (RTD Connection)
IP66
CE

Special conditions for safe use (x)

If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of EN 60079-15:2005. This must be taken into account during installation.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
IP66
CE 1180

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure.

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X Ⓔx II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V
CE 1180

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6
TC19070 With RTD and LCD Display
TC19071 With LCD
TC19072 RTD without LCD Display
TC19073 Without LCD

Brazil Certifications

E2 INMETRO Flameproof
Certificate number: NCC 5886/09X
BR-Ex d IIC T5/T6 Gb IP66W
T6 (-50 °C to 65 °C)
T5 (-50 °C to 80 °C)

Special conditions for safe use (x)

1. Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
2. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. The 3051SMV does not comply with the requirements of IEC 60079-1 Clause 5.2, Table 2 for all joints. Contact Emerson Process Management for information on the dimensions of flameproof joints.

I2 INMETRO Intrinsic Safety
Certificate No. NCC 5870/09X
BR-Ex ia IIC T4 (-60 °C ≤ T_a ≤ 70 °C) Ga IP66W

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)

If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

China Certifications

E3 China Flameproof
NEPSI Certificate No.: GYJ091001
Ex d IIC T5/T6
T6 (-50 °C to 65 °C)
T5 (-50 °C to 80 °C)

NOTE
Refer to Appendix B of the 3051S MultiVariable Reference Manual (document number 00809-0100-4803) for Special Conditions for Safe Use.

I3 China Intrinsic Safety
NEPSI Certificate No.: GYJ091002X
Ex ia IIC T4 (-60 °C to 70 °C)

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

NOTE
Refer to Appendix B of the 3051S MultiVariable Reference Manual (document number 00809-0100-4803) for Special Conditions for Safe Use.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECExBAS08.0025X
Ex ia IIC T4(-60 °C ≤ T_a ≤ 70 °C)
IP66

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)
If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

N7 IECEx Type n
Certificate No.: IECExBAS08.0026X
Ex nAnL IIC T4 (-40 °C ≤ T_a ≤ 70 °C)
Ui = 45 Vdc MAX
U_O = 30 V (RTD Connection)
IP66

Special conditions for safe use (x)
If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of EN 60079-15:2005. This must be taken into account during installation.

E7 IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of E1, I1, N1, and ND
K4 Combination of E4 and I4
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, E6, I1, and I6
KB Combination of E5, E6, I5, and I6
KC Combination of E5, E1, I5, and I1
KD Combination of E5, E6, E1, I5, I6, and I1

3051SF Measurement Type D Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Mumbai, India
Emerson Process Management, Emerson FZE — Dubai, United Arab Emirates

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; (also with P9 option)

Pressure Transmitters — QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

HART & FOUNDATION Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D, T5 (T_a = 85 °C); Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G, T5 (T_a = 85 °C); hazardous locations; enclosure Type 4X, conduit seal not required when installed according to Rosemount drawing 03151-1003.

I5/IE Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D, T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F); Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) when connected in accordance with Rosemount drawing 03151-1006; Non-Incendive for Class I, Division 2, Groups A, B, C, and D; T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) Enclosure Type 4X
For entity parameters see control drawing 03151-1006.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, when installed per Rosemount drawing 03151-1013, CSA Enclosure Type 4X; conduit seal not required; Dual Seal.

I6/IF Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03151-1016; Dual Seal.
For entity parameters see control drawing 03151-1016.

European Certifications

I1/IA ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
CE 1180

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The apparatus, excluding the Types 3051 S-T and 3051 S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of EN 60079-11. This must be considered during installation.
2. The terminal pins of the Types 3051 S-T and 3051 S-C must be protected to IP20 minimum.

N1 ATEX Type n
Certificate No.: BAS01ATEX3304X ⟨Ex⟩ II 3 G
Ex nL IIC T4 (T_a = -40 °C TO 70 °C)
Ui = 45 Vdc max
Ci = 11.4 nF (Transmitter Output Option A)
Ci = 0 (Transmitter Output Option F)
Li = 0
For remote display, Ci = 0, Li = 60 µH
IP66
CE

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500V insulation test required by Clause 6.8.1 of EN 60079-15. This must be taken into account when installing the apparatus.

NOTE
RTD Assembly is not included with the 3051SFx Type n Approval.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 volts max
IP66
CE 1180

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V
CE 1180

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6

Certificate	Description
TC15682	Coplanar with Junction Box Housing
TC15683	Coplanar with PlantWeb Housing
TC15684	Coplanar with PlantWeb Housing and LCD Display
TC15685	In-Line SST with Junction Box Housing
TC15686	In-Line Alloy C-276 with Junction Box Housing
TC15687	In-Line SST with PlantWeb Housing
TC15688	In-Line Alloy C-276 with PlantWeb Housing
TC15689	In-Line SST with PlantWeb Housing and LCD Display
TC15690	In-Line Alloy C-276 with PlantWeb Housing and LCD Display
TC17102	Remote Display
TC17099	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and LCD Display
TC17100	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and Remote Display
TC17101	3051SFA/C/P SST/Alloy C-276 with Junction Box Housing

China Certifications

E3 China Flameproof, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ091035
Certificate No. (manufactured in Beijing, China): GYJ06366
Certificate No. (manufactured in Singapore): GYJ06364
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071086
Ex d IIB+H_2 T3~T5
DIP A21 T_A T3~T5 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

I3 China Intrinsic Safety, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ081078
Certificate No. (manufactured in Beijing, China): GYJ06367
Certificate No. (manufactured in Singapore): GYJ06365
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071293
Ex ia IIC T4
DIP A21 T_A T4 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

E2 INMETRO Flameproof
Certificate number: CEPEL-EX-140/2003X
(manufacturing in Chanhassen, MN and Singapore)

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
I_i = 300 mA	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 38 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display
L_i = 0	SuperModule Platform / FOUNDATION fieldbus
L_i = 2.4 µH	HART / Quick Connect / HART Diagnostics
L_i = 58.2 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

N3 China Type n - Energy Limited
NEPSI Certificate No.: GYJ101112X
Ex nL IIC T5 (-40 °C ≤ Ta ≤ 70 °C)
IP66

Loop / Power	Transmitter Output
U_i = 30 V	HART / FOUNDATION fieldbus
I_i = 300 mA	HART / FOUNDATION fieldbus
P_i = 1.0 W	HART
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 11.4 nF	HART
C_i = 0 nF	FOUNDATION fieldbus
L_i = 0 µH	HART(1) / FOUNDATION fieldbus

(1) For remote meter option (M7, M8, M9), L_i = 60 µH.

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

Brazil Certifications

I2 INMETRO Intrinsic Safety

Certificate number: CEPEL-EX-0722/05X
(manufacturing in Chanhassen, MN and Singapore)
Certificate number: CEPEL-EX-1414/07X
(manufacturing in Brazil)
INMETRO Marking: BR-Ex ia IIC T4 IP66W

Special conditions for safe use (x)

The apparatus, excluding the Types 3051S-T and 3051S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of IEC60079-11. This must be considered during installation.

Certificate number: CEPEL-EX-1413/07X
(manufacturing in Brazil)
INMETRO Marking: BR-Ex d IIC T5/T6 IP66W

Special conditions for safe use (x)

1. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For ambient temperature above 60 ºC, cable wiring must have minimum isolation temperature of 90 ºC, to be in accordance to equipment operation temperature.
3. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
4. Where electrical entry is via conduit, the required sealing device must be assembled immediately close to enclosure.

IECEx Certifications

E7 IECEx Flameproof and Dust (each listed separately)

IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T5 or T6 Ga/Gb
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Dust
Certificate No. IECExBAS09.0014X
Ex tD A20 IP66 T105 °C (-20 °C ≤ T_a ≤ 85 °C)
Vmax = 42.4 V
A = 22 mA
IP66

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

I7/IG IECEx Intrinsic Safety
Certificate No.: IECExBAS04.0017X
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
IP66

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µ H	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The 3051S HART 4-20 mA, 3051S FOUNDATION fieldbus, and 3051S FISCO are not capable of withstanding the 500V test as defined in clause 6.4.12 of IEC 60079-11. This must be taken into account during installation.
2. The terminal pins of the Types 3051S-T and 3051S-C must be protected to IP20 minimum.

N7 IECEx Type n
Certificate No.: IECExBAS04.0018X
Ex nC IIC T4 (-40 °C ≤ T_a ≤ +70 °C)
IP66
Special conditions for safe use (x)
The apparatus is not capable of withstanding the 500 V insulation test required by Clause 8 of IEC 60079-15:1987.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of E1, I1, N1, and ND
K2 Combination of E2 and I2
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, I1, E6, and I6
KB Combination of E5, I5, I6, and E6
KC Combination of E5, E1, I5, and I1
KD Combination of E5, I5, E6, I6, E1, and I1

3051SF Wireless Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Mumbai, India

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC Approvals

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference and must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; *(also with P9 option)*
Pressure Transmitters — QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

Radio and Telecommunications Terminal Equipment Directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive.

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe, Non-Incendive, and Dust Ignition-proof.
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
Non-Incendive for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C
For use with Rosemount SmartPower options 00753-9220-0001 only.
Enclosure Type 4X / IP66

CSA - Canadian Standards Association

Process Sealing

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

I6 CSA Intrinsically Safe
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C
Enclosure Type 4X / IP66
For use with Rosemount SmartPower options 00753-9220-0001 only.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C)
IP66
For use with Rosemount SmartPower options 00753-9220-0001 only.

Special conditions for safe use (x)

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

CE 1180

CE ①

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10mW e.i.r.p.
Italy	If used outside of own premises, general authorization is required.
Norway	May be restricted in the geographical area within a radius of 20 km from the center of Ny-Alesund.
Romania	Use on a secondary basis. Individual license required.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECEx BAS 04.0017X
Ex ia IIC T4 (Ta = -60 °C to 70 °C)
For use with Rosemount SmartPower options 00753-9220-0001 only.
IP66

Special conditions for safe use (x)

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Rosemount 3051CF Flowmeter Series

Rosemount 3051CF Flowmeters combine the proven 3051C pressure transmitter and the latest primary element technology: Annubar Averaging Pitot Tube, Compact Conditioning Orifice Plate, and Integral Orifice Plate.

- Flowmeters are factory configured to meet your application needs (Configuration Data Sheet required)
- 4-20 mA HART, FOUNDATION fieldbus, and Profibus PA protocols
- Integral temperature measurement (T option)
- Direct or remote mount configurations available

Additional Information
Specifications: page 57
Certifications: page 63
Dimensional Drawings: page 132

Rosemount 3051CFA Annubar Flowmeter

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFA	Annubar Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	2 1/2-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	
600	60-in. (1520 mm)	

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

720	72-in. (1820 mm)	
780	78-in (1950 mm)	
840	84-in. (2100 mm)	
900	90-in. (2250 mm)	
960	96-in (2400 mm)	
Pipe I.D. Range (See "Pipe I.D. Range Code" on page 162)		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12 inches	
Pipe Material / Mounting Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0	No Mounting (Customer Supplied)	★
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Expanded		
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Expanded		
H	Alloy C-276	
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression or Threaded Connection	★
A1	150# RF ANSI	★
A3	300# RF ANSI	★
A6	600# RF ANSI	★
D1	DN PN16 Flange	★
D3	DN PN40 Flange	★
D6	DN PN100 Flange	★

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
A9(1)	900# RF ANSI			
AF(1)	1500# RF ANSI			
AT(1)	2500 # RF ANSI			
R1	150# RTJ Flange			
R3	300# RTJ Flange			
R6	600# RTJ Flange			
R9(1)	900# RTJ Flange			
RF(1)	1500# RTJ Flange			
RT(1)	2500# RTJ Flange			
Opposite Side Support or Packing Gland				
Standard				**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)			★
	Opposite Side Support – Required for Flanged Models			
C	NPT Threaded Opposite Support Assembly – Extended Tip			★
D	Welded Opposite Support Assembly – Extended Tip			★
Expanded				
	Packing Gland – Required for Flo-Tap Models			
	Packing Gland Material	*Rod Material*	*Packing Material*	
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	
Isolation Valve for Flo-Tap Models				
Standard				**Standard**
0	Not Applicable or Customer Supplied			★
Expanded				
1	Gate Valve, Carbon Steel			
2	Gate Valve, Stainless Steel			
5	Ball Valve, Carbon Steel			
6	Ball Valve, Stainless Steel			
Temperature Measurement				
Standard				**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#			★
0	No Temperature Sensor			★
Expanded				
R	Remote Thermowell and RTD			
Transmitter Connection Platform				
Standard				**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600			★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600			★
7	Remote-mount NPT Connections ($^1/_2$-in. NPT)			★
Expanded				
6	Direct-mount, high temperature 5-valve Manifold – not available with Flanged model greater than class 600			
8	Remote-mount SW Connections ($^1/_2$-in.)			
Differential Pressure Range				
Standard				**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)			★
2	0 to 250 in H_2O (0 to 623 mbar)			★
3	0 to 1000 in H_2O (0 to 2,5 bar)			★

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W[2]	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	1.6% flow rate accuracy, 8:1 flow turndown, 5-yr. stability		★

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1[3]	Hydrostatic Testing with Certificate	
PX[3]	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★
Material Traceability Certification		
Standard		**Standard**
Q8[4]	Material Traceability Certification per EN 10474:2004 3.1	★
Code Conformance[5]		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Installed in Flanged Pipe Spool Section		
Expanded		
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	
Instrument Connections for Remote Mount Options		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Special Dimensions		
Expanded		
VM	Variable Mounting	
VT	Variable Tip	
VS	Variable length Spool Section	
PlantWeb Control Functionality		
Standard		**Standard**
A01[7]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[7]	FOUNDATION fieldbus Diagnostics Suite	★
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7[8]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1[8]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6[8]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8[8]	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD[8]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[8]	ATEX Type n	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M4(9)	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS(11)	Prior-use certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1(10)	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Expanded		
F1	3-Valve Manifold, Carbon Steel	
F3	3-Valve Manifold, Alloy C-276	
F5	5-Valve Manifold, Carbon Steel	
F7	5-Valve Manifold, Alloy C-276	
Low Power Output		
Standard		**Standard**
C2(11)	0.8-3.2 Vdc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4(11)(12)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(11)(12)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5(13)	External Ground Screw Assembly	★
Typical Model Number: 3051CFA D L 060 D C H P S 2 T1 0 0 0 3 2 A A 1		

(1) Available in remote mount applications only.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Applies to assembled flowmeter only, mounting not tested.

(4) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(5) Not available with Transmitter Connection Platform 6.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) Not available with Low Power code M.

(9) Available only with output code W - Profibus PA.

(10) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(11) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(12) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(13) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 3051CFC Compact Flowmeter

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFC	Compact Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Primary Element Style		
Standard		**Standard**
N	Square Edged	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio	★
065(2)	0.65 Beta Ratio	★
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	
Transmitter Connection Platform		
Standard		**Standard**
3	Direct-mount, Integral 3-valve Manifold	★
7	Remote-mount, 1/4-in. NPT Connections	★
Differential Pressure Range		
Standard		**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W(3)	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	Up to ±1.75% flow rate accuracy, 8:1 flow turndown, 5-year stability		★

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
AB	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AC	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AD	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
DG	DIN Alignment Ring (PN16)	★
DH	DIN Alignment Ring (PN40)	★
DJ	DIN Alignment Ring (PN100)	★
Expanded		
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
FE	Flange Adapters 316 SST (1/2-in NPT)	★
High Temperature Application		
Expanded		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC(4)	Flow Calibration Certification (3 point)	
WD(4)	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[5]	Prior-use Certificate of FMEDA data	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7[7]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1[7]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6[7]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8[7]	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD[7]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[7]	ATEX Type n	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M4[8]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1[9]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

PlantWeb Control Functionality		
Standard		**Standard**
A01[10]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[10]	FOUNDATION fieldbus Diagnostic Suite	★
Low Power Output		
Standard		**Standard**
C2[11]	0.8-3.2 Vdc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4[11][12]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[11][12]	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5[13]	External Ground Screw Assembly	★
Typical Model Number: 3051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

(1) Not available for Primary Element Technology C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(4) Not available with Primary Element Technology P.

(5) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Not available with Low Power code M.

(8) Available only with output code W - Profibus PA.

(9) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(10) Only valid with FOUNDATION fieldbus Output Code F.

(11) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(12) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(13) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 3051CFP Integral Orifice Flowmeter

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFP	Integral Orifice Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Body Material		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	★
P1	Pipe Ends: NPT Threaded	★
P2	Pipe ends: Beveled	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★
Expanded		
H	Alloy C-276	
M	Alloy 400	
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★
0260	0.260-in. (6.60 mm) for 1/2-in. Pipe	★
0340	0.340-in. (8.64 mm) for 1/2-in. Pipe	★

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

0150	0.150-in. (3.81 mm) for 1-in. Pipe		★
0250	0.250-in. (6.35 mm) for 1-in. Pipe		★
0345	0.345-in. (8.76 mm) for 1-in. Pipe		★
0500	0.500-in. (12.70 mm) for 1-in. Pipe		★
0630	0.630-in. (16.00 mm) for 1-in. Pipe		★
0800	0.800-in. (20.32 mm) for 1-in. Pipe		★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe		★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe		★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe		★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe		★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe		★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe		★
Expanded			
0010	0.010-in. (0.25 mm) for 1/2-in. Pipe		
0014	0.014-in. (0.36 mm) for 1/2-in. Pipe		
0020	0.020-in. (0.51 mm) for 1/2-in. Pipe		
0034	0.034-in. (0.86 mm) for 1/2-in. Pipe		
Transmitter Connection Platform			
Standard			**Standard**
D3	Direct-mount, 3-Valve Manifold, SST		★
D5	Direct-mount, 5-Valve Manifold, SST		★
R3	Remote-mount, 3-Valve Manifold, SST		★
R5	Remote-mount, 5-Valve Manifold, SST		★
Expanded			
D4	Direct-mount, 3-Valve Manifold, Alloy C-276		
D6	Direct-mount, 5-Valve Manifold, Alloy C-276		
D7	Direct-mount, High Temperature, 5-Valve Manifold, SST		
R4	Remote-mount, 3-Valve Manifold, Alloy C-276		
R6	Remote-mount, 5-Valve Manifold, Alloy C-276		
Differential Pressure Ranges			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W[(2)]	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±1.75% flow rate accuracy, 8:1 flow turndown, 5-year stability		★

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Transmitter Body / Bolt Material		
Expanded		
GT[3]	High Temperature (850 °F / 454 °C)	
Temperature Sensor		
Expanded		
RT[4]	Thermowell and RTD	
Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Pressure Testing		
Expanded		
P1[5]	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
WD[6]	Discharge Coefficient Verification	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[7]	ANSI/ASME B31.1	
J3[7]	ANSI/ASME B31.3	
J4[7]	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[8]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[9]	Prior-use Certificate of FMEDA data	★

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7(10)	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1(10)	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6(10)	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8(10)	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD(10)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1 and E8)	★
N1(10)	ATEX Type n	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M4(11)	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1(12)	Transient terminal block	★
PlantWeb Control Functionality		
Standard		**Standard**
A01(13)	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01(13)	FOUNDATION fieldbus Diagnostic Suite	★
Low Power Output		
Standard		**Standard**
C2(14)	0.8-3.2 Vdc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4(14)(15)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(14)(15)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5(16)	External Ground Screw Assembly	★
Typical Model Number: 3051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Not available with $1^1/_2$-in. (38 mm) line size.

(4) Thermowell Material is the same as the body material.

(5) Does not apply to Process Connection codes T1 and S1.

(6) Not available for bore sizes 0010, 0014, 0020, or 0034.

(7) Not available with DIN Process Connection codes D1, D2, or D3.

(8) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(9) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(10) Not available with Low Power code M.

(11) Available only with output code W - Profibus PA.

(12) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(13) Only valid with FOUNDATION fieldbus Output Code F.

(14) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(15) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(16) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

3051CF Specifications

3051CF PERFORMANCE SPECIFICATIONS

This product data sheet covers both HART, FOUNDATION fieldbus and Profibus PA protocols unless specified.

For zero-based spans, reference conditions, silicone oil fill, glass-filled PTFE o-rings, SST materials, Coplanar flange (3051C) or $^1/_2$ in.- 14 NPT (3051T) process connections, digital trim values set to equal range points.

Conformance To Specification (±3σ (Sigma))

Technology leadership, advanced manufacturing techniques and statistical process control ensure specification conformance to at least ±3σ.

Flow Performance - Flow Reference Accuracy(1)

3051CFA Annubar Flowmeter		
Ranges 2-3		±1.80% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β =0.4	±1.75% of Flow Rate at 8:1 flow turndown
	β =0.65	±1.95% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter – Orifice Type Option P(2)		
Ranges 2-3	β =0.4	±2.00% of Flow Rate at 8:1 flow turndown
	β =0.65	±2.00% of Flow Rate at 8:1 flow turndown
3051CFP Integral Orifice Flowmeter		
Ranges 2-3	β <0.1	±3.00% of Flow Rate at 8:1 flow turndown
	0.1<β <0.2	±1.95% of Flow Rate at 8:1 flow turndown
	0.2<β <0.6	±1.75% of Flow Rate at 8:1 flow turndown
	0.6<β <0.8	±2.15% of Flow Rate at 8:1 flow turndown

(1) Range 1 flowmeters may experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(2) For smaller line sizes, see Rosemount Compact Orifice.

Total Performance

Total Performance is based on combined errors of reference accuracy, ambient temperature effect, and static pressure effect.

For ±50 °F (28 °C) temperature changes, up to 1000 psi (6,9 MPa) line pressure (CD only), from 1:1 to 5:1 rangedown.

Models	Total Performance
3051CF	
Ranges 2-5	±0.15% of span

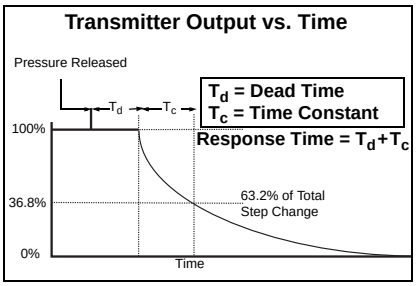
Long Term Stability

Models	Long Term Stability
3051CF	
Ranges 2-5	±0.125% of URL for 5 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6,9 MPa) line pressure.
3051CF Low/Draft Range	
Ranges 0-1	±0.2% of URL for 1 year

Dynamic Performance

	4 - 20 mA HART[1] 1-5 Vdc HART Low Power	FOUNDATION fieldbus and Profibus PA protocols[3]	Typical HART Transmitter Response Time
Total Response Time (T_d + T_c) [2]:			
3051CF, Ranges 2-5:	100 ms	152 ms	
Range 1:	255 ms	307 ms	
Range 0:	700 ms	N/A	
3051T:	100 ms	152 ms	
3051L:	See Instrument Toolkit®	See Instrument Toolkit	
Dead Time (Td)	45 ms (nominal)	97 ms	
Update Rate	22 times per second	22 times per second	

(1) Dead time and update rate apply to all models and ranges; analog output only
(2) Nominal total response time at 75 °F (24 °C) reference conditions.
(3) Transducer block response time, Analog Input block execution time not included.



Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21 mm displacement peak amplitude / 60-2000 Hz 3g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt.

RFI Effects

±0.1% of span from 20 to 1000 MHz and for field strength up to 30 V/m.

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and Namur NE-21.

Transient Protection (Option Code T1)

Meets IEEE C62.41, Category Location B

6 kV crest (0.5 μs - 100 kHz)
3 kV crest (8 × 20 microseconds)
6 kV crest (1.2 × 50 microseconds)

NOTE
Calibrations at 68 °F (20 °C) per ASME Z210.1 (ANSI)

3051CF FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Table 9. 3051CD, 3051CG, 3051CF, and 3051L Range and Sensor Limits

Range	Minimum Span		Range and Sensor Limits
			Lower (LRL)
	3051CF	Upper (URL)	3051CD Differential 3051CF Flowmeters
0	0.1 inH_2O (0,25 mbar)	3.0 inH_2O (7,47 mbar)	-3.0 inH_2O (-7,47 mbar)
1	0.5 inH_2O (1,2 mbar)	25 inH_2O (62,3 mbar)	-25 inH_2O (-62,1 mbar)
2	2.5 inH_2O (6,2 mbar)	250 inH_2O (0,62 bar)	-250 inH_2O (-0,62 bar)
3	10 inH_2O (24,9 mbar)	1000 inH_2O (2,49 bar)	-1000 inH_2O (-2,49 bar)
4	3 psi (0,20 bar)	300 psi (20,6 bar)	-300 psi (-20,6 bar)
5	20 psi (1,38 bar)	2000 psi (137,9 bar)	- 2000 psi (-137,9 bar)

4-20 mA HART (Output Code A)

Output

Two-wire 4-20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4-20 mA signal, available to any host that conforms to the *HART* protocol.

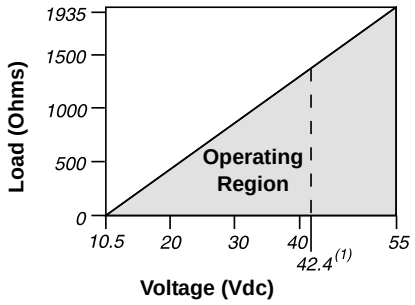
Power Supply

External power supply required. Standard transmitter (4-20 mA) operates on 10.5 to 55 Vdc with no load.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

Zero and Span Adjustment Requirements

Zero and span values can be set anywhere within the range limits stated in Table 9.

Span must be greater than or equal to the minimum span stated in Table 9.

Indication

Optional two line LCD display

FOUNDATION fieldbus (Output code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional two line LCD display

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds
Input Selector	30 milliseconds
Arithmetic	35 milliseconds
Signal Characterizer	40 milliseconds
Integrator	35 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

Contains hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

Configures the local display.

2 Analog Input Blocks

Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average or first “good.”

Arithmetic Block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

FOUNDATION fieldbus Diagnostics Suite (Option Code D01)

The 3051C FOUNDATION fieldbus Diagnostics provide Abnormal Situation Prevention (ASP) indication. The integral statistical process monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second. The 3051C ASP algorithm uses these values and highly flexible configuration options for customization to many user-defined or application specific abnormal situations. The detection of plugged impulse lines is the first available predefined application.

Profibus PA (Output Code W)

Profile Version

3.02

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Output Update Rate

Four times per second

Standard Function Blocks

Analog Input (AI Block)

The AI function block processes the measurements and makes them available to the host device. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement.

Physical Block

The physical block defines the physical resources of the device including type of memory, hardware, electronics and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

Indication

Optional two line LCD display

Local Operator Interface

Optional external configuration buttons

1-5 Vdc HART Low Power (Output Code M)

Output

Three wire 1-5 Vdc or 0.8-3.2 Vdc (Option Code C2) user-selectable output. Also user selectable for linear or square root output configuration. Digital process variable superimposed on voltage signal, available to any host conforming to the *HART* protocol. Low-power transmitter operates on 6-12 Vdc with no load.

Power Consumption

3.0 mA, 18-36 mW

Minimum Load Impedance

100 kΩ (V_{out} wiring)

Indication

Optional 5-digit LCD display

Overpressure Limits

Rosemount 3051CD/CG/CF

- Range 0: 750 psi (51,7 bar)
- Range 1: 2000 psig (137,9 bar)
- Ranges 2-5: 3626 psig (250 bar)
  4500 psig (310,3 bar) for option code P9

Rosemount 3051CA

- Range 1: 750 psia (51,7 bar)
- Range 2: 1500 psia (103,4 bar)
- Range 3: 1600 psia (110,3 bar)
- Range 4: 6000 psia (413,7 bar)

Rosemount 3051TG/TA

- Range 1: 750 psi (51,7 bar)
- Range 2: 1500 psi (103,4 bar)
- Range 3: 1600 psi (110,3 bar)
- Range 4: 6000 psi (413,7 bar)
- Range 5: 15000 psi (1034,2 bar)

For 3051L or Level Flange Option Codes FA, FB, FC, FD, FP, and FQ, limit is 0 psia to the flange rating or sensor rating, whichever is lower.

Table 10. 3051L and Level Flange Rating Limits

Standard	Type	CS Rating	SST Rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
ANSI/ASME	Class 600	1480 psig	1440 psig
At 100 °F (38 °C), the rating decreases with increasing temperature, per ANSI/ASME B16.5.			
DIN	PN 10-40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
DIN	PN 25/40	40 bar	40 bar
At 248 °F (120 °C), the rating decreases with increasing temperature, per DIN 2401.			

Static Pressure Limit

Rosemount 3051CD Only

Operates within specifications between static line pressures of 0.5 psia and 3626 psig (4500 psig (310, 3 bar) for Option Code P9).

Range 0: 0.5 psia and 750 psig (3, 4 bar and 51, 7 bar)

Range 1: 0.5 psia and 2000 psig (3, 4 bar and 137, 9 bar)

Burst Pressure Limits

3051CF

10000 psig (69 MPa)

3051T Inline

Ranges 1-4: 11000 psi (75,8 MPa)

Range 5: 26000 psig (179 MPa)

Failure Mode Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.9 ≤ I ≤ 20.8	I ≥ 21.75 mA	I ≤ 3.75 mA
M	0.97 ≤ V ≤ 5.2	V ≥ 5.4 V	V ≤ 0.95 V

NAMUR-Compliant Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.8 ≤ I ≤ 20.5	I ≥ 22.5 mA	I ≤ 3.6 mA

Output Code F and W

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

Temperature Limits

For 3051CFA Temperature Limits, see page 93.
For 3051CFC Temperature Limits, see page 105.
For 3051CFP Temperature Limits, see page 113.

Table 11. 3051 Transmitter Temperature Limits

3051CF	
Silicone Fill Sensor(1)	
with Coplanar Flange	–40 to 250 °F (–40 to 121 °C)(2)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

Humidity Limits

0–100% relative humidity

Turn-On Time

Performance within specifications less than 2.0 seconds (10.0 s for Profibus protocol) after power is applied to the transmitter

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping

4-20 mA HART

Analog output response to a step input change is user-selectable from 0 to 36 seconds for one time constant. This software damping is in addition to sensor module response time.

FOUNDATION fieldbus

Transducer block: 0.4 seconds fixed

AI Block: User configurable

Profibus PA

AI Block only: User configurable

3051CF PHYSICAL SPECIFICATIONS

Electrical Connections

1/2–14 NPT, PG 13.5, G1/2, and M20 × 1.5 (CM20) conduit. *HART* interface connections fixed to terminal block.

Process Connections

For 3051CFA, see “Annubar Sensor Material” on page 102.

For 3051CFC, see “Material of Construction” on page 109.

For 3051CFP, see “Material of Construction” on page 113.

Process-Wetted Parts

Drain/Vent Valves

316 SST, Alloy C-276, or Alloy 400 material (Alloy 400 not available with 3051L)

Process Flanges and Adapters

Plated carbon steel, SST cast CF-8M (cast version of 316 SST, material per ASTM-A743), C-Type cast alloy CW12MW, or cast alloy M30C

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process Isolating Diaphragms

Isolating Diaphragm Material	3051CD 3051CG
316L SST	•
Alloy C-276	•
Alloy 400	•
Tantalum	•
Gold-plated Alloy 400	•
Gold-plated SST	•

Non-Wetted Parts

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST). Enclosure Type 4X, IP 65, IP 66, IP 68

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST, material per ASTM-A743)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)
Alloy K-500

Sensor Module Fill Fluid

Silicone oil (D.C. 200) or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 3051T)

Process Fill Fluid (3051L only)

Sylthern XLT, D.C. Silicone 704,
D.C. Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water

Paint

Polyurethane

Cover O-rings

Nitirile Butadiene (NBR)

3051CF Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Daman, India

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 an Emerson Process Management representative.

ATEX Directive (94/9/EC)
All 3051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)
3051CA4; 3051CG2, 3, 4, 5; 3051CD2, 3, 4, 5
(also with P9 option)
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV
Module H Conformity Assessment

All other 3051Pressure Transmitters
— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)
All 3051 Pressure Transmitters meet all of the requirements of EN61326 and NAMUR NE-21

Ordinary Location Certification for Factory Mutual
As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

3051CF HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 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. Dust-Ignition-Proof for Class III, Division 1.
Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 97ATEX1089X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 ($-60 \leq T_a \leq +70$ °C)
Dust Rating: Ex tD A20 T80 °C ($-20 \leq T_a \leq 40$ °C) IP66
CE 1180

TABLE 12. Input Parameters

U_i = 30V
I_i = 200 mA
P_i = 0.9W
C_i = 0.012 µF

TABLE 13. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 00ATEX3105X ⟨Ex⟩ II 3 GD
U_i = 55 Vdc max
Ex nA nL T5 (–40°C ≤ T_{amb} ≤ 70 °C)
Dust rating: Ex tD A22 T80 °C (–20 ≤ T_a ≤ 40 °C) IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II 1/2 GD
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Dust rating: Ex tD A20/A21 T90 °C, IP66
CE 1180
Vmax = 55 V dc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 70 °C)
IP66

TABLE 14. Input Parameters

U_i = 30V
I_i = 200 mA
P_i = 0.9W
C_i = 0.012 µF

TABLE 15. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
TC15850	3051C/D/1 4–20 mA HART — no display
TC15851	3051C/D/1 4–20 mA HART — with display
TC15854	3051T/G/1 4–20 mA HART, SST, Silicon — no display
TC15855	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — no display
TC15856	3051T/G/1 4–20 mA HART, SST, Silicon — with display
TC15857	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — with display

I4 TIIS Intrinsic Safety
Ex ia IIC T4

Certificate	Description
TC16406	3051CD/CG

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E8** combination
K6 **C6**, **I1**, and **E8** combination
K8 **E8** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

3051CF FOUNDATION FIELDBUS AND PROFIBUS PA PROTOCOLS

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 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. Dust-Ignition-Proof for Class III, Division 1.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code:T4 (Ta = 60 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
Ex td A20 IP66 T 70 °C (-20 ≤ T_a ≤ 40 °C)
CE 1180

TABLE 16. Input Parameters

U_i = 30V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

TABLE 17. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by clause 6.3.12 of EN 60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

IA ATEX FISCO Intrinsic Safety
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

TABLE 18. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 98ATEX3356X ⟨Ex⟩ II 3 GD
U_i = 40 Vdc max
Ex nL IIC T5 (T_a = –40°C to 70 °C)
Dust rating: Ex tD A22 T80 °C (T_{amb} = –20 to 40 °C) IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of EN 60079-15. This must be taken into account when installing the apparatus.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II 1/2 GD
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Dust rating: Ex tD A20/21 T90 °C, IP66
CE 1180
Vmax = 55 V dc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 60 °C)
IP66

TABLE 19. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF
L_i = 0 µH

TABLE 20. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
TC15852	3051C/D/1 FOUNDATION Fieldbus — no display
TC15853	3051C/D/1 FOUNDATION Fieldbus — with display
TC15858	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — no display
TC15859	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — no display
TC15860	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — with display
TC15861	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — with display

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E8** combination
K6 **C6**, **I1**, and **E8** combination
K8 **E8** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

Rosemount 2051CF Flowmeter Series

Rosemount 2051CF Flowmeters combine the 2051 Pressure transmitter and the latest primary element technology: Annubar Averaging Pitot Tube, Compact Conditioning Orifice Plate and Integral Orifice Plate.

Additional Information
Specifications: page 80
Product Certifications: page 84
Dimensional Drawings: page 140
Installation and Flowmeter Orientation: page 163

Rosemount 2051CFA Annubar Flowmeter

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFA	Annubar Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	2 1/2-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Pipe I.D. Range (See “Pipe I.D. Range Code” on page 162)		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12 inches	

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pipe Material / Mounting Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0[(1)]	No Mounting (Customer Supplied)	
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression or Threaded Connection	★
A1	150# RF ANSI	★
A3	300# RF ANSI	★
A6	600# RF ANSI	★
D1	DN PN16 Flange	★
D3	DN PN40 Flange	★
D6	DN PN100 Flange	★
Expanded		
R1	150# RTJ Flange	
R3	300# RTJ Flange	
R6	600# RTJ Flange	
Opposite Side Support or Packing Gland		
Standard		**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)	★
	Opposite Side Support – Required for Flanged Models	
C	NPT Threaded Opposite Support Assembly – Extended Tip	★
D	Welded Opposite Support Assembly – Extended Tip	★
Isolation Valve for Flo-Tap Models		
Standard		**Standard**
0[(1)]	Not Applicable or Customer Supplied	★
Temperature Measurement		
Standard		**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#	★
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Connection Platform			
Standard			**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600		★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600		★
7	Remote-mount NPT Connections ($^1/_2$-in. FNPT)		★
Expanded			
8	Remote-mount SW Connections ($^1/_2$-in.)		
Differential Pressure Range			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material(2)		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	$^1/_2$-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	$^1/_2$-14 NPT	★
K(3)	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G$^1/_2$	
M(3)	SST	G$^1/_2$	
Transmitter Performance Class			
Standard			**Standard**
1	2.0% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1(4)	Hydrostatic Testing with Certificate	
PX(4)	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Material Traceability Certification		
Standard		**Standard**
Q8[5]	Material Traceability Certification per EN 10474:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Instrument Connections for Remote Mount Options		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Product Certifications		
Standard		**Standard**
E1[3]	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I1[3]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[3]	IECEx Intrinsic Safety	★
IA[7]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[7]	FM FISCO Intrinsically Safe	★
IF[7]	CSA FISCO Intrinsically Safe	★
IG[7]	IECEx FISCO Intrinsically Safe	★
K1[3]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[3]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[3]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[3]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[3]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[3]	ATEX Type n	★
N7[3]	IECEx Type n	★
ND[3]	ATEX Dust	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M5	LCD Display	★
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS(8)	Prior-use certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1(9)	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Expanded		
F1	3-Valve Manifold, Carbon Steel	
F5	5-Valve Manifold, Carbon Steel	
Hardware Adjustments		
Standard		**Standard**
D4	Zero and Span Hardware Adjustments	★
Alarm Limit		
Standard		**Standard**
C4(8)(10)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(8)(10)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5(11)	External Ground Screw Assembly	★
Typical Model Number: 2051CFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3		

(1) Provide the "A" dimension for Flanged (page 141) and Pak-Lok (page 140).

(2) Material specified is cast as follows: CF-8M is the cast version of 316 SST, CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.

(3) Not available with Low Power Output Code M.

(4) Applies to assembled flowmeter only, mounting not tested.

(5) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) Not available with Output Protocol code F.

(9) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(10) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(11) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 2051CFC
Compact Flowmeter

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFC	Compact Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Primary Element Style		
Standard		**Standard**
N	Square Edged	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio	★
065(2)	0.65 Beta Ratio	★
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	
Transmitter Connection Platform		
Standard		**Standard**
3	Direct-mount, Integral 3-valve Manifold	★
7	Remote-mount, 1/4-in. NPT Connections	★
Differential Pressure Range		
Standard		**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material(3)		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K(4)	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M(4)	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
AB	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AC	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AD	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
DG	DIN Alignment Ring (PN16)	★
DH	DIN Alignment Ring (PN40)	★
DJ	DIN Alignment Ring (PN100)	★
Expanded		
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
FE	Flange Adapters 316 SST (1/2-in NPT)	★
High Temperature Application		
Expanded		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC	Flow Calibration Certification (3 point)	
WD	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[5]	Prior-use certificate of FMEDA data	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Product Certifications		
Standard		**Standard**
E1[4]	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[4]	IECEx Flameproof, Dust Ignition-proof	★
I1[4]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[4]	IECEx Intrinsic Safety	★
IA[7]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[7]	FM FISCO Intrinsically Safe	★
IF[7]	CSA FISCO Intrinsically Safe	★
IG[7]	IECEx FISCO Intrinsically Safe	★
K1[4]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[4]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[4]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[4]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[4]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[4]	ATEX Type n	★
N7[4]	IECEx Type n	★
ND[4]	ATEX Dust	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Digital Display		
Standard		**Standard**
M5	LCD Display	★

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transient Protection		
Standard		**Standard**
T1[8]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Alarm Limit		
Standard		**Standard**
C4[9][10]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[9][10]	NAMUR Alarm and Saturation Levels, Low Alarm	★
Hardware Adjustments		
Standard		**Standard**
D4	Zero and Span Hardware Adjustments	★
Ground Screw		
Standard		**Standard**
V5[11]	External Ground Screw Assembly	★
Typical Model Number: 2051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

(1) Not available for Primary Element Technology C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Material specified is cast as follows: CF-8M is the cast version of 316 SST, CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.

(4) Not available with Low Power Output Code M.

(5) Not available with Output Protocol code F.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(9) Not available with FOUNDATION fieldbus (Output Code F).

(10) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(11) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 2051CFP Integral Orifice Flowmeter

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFP	Integral Orifice Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	★
P1	Pipe Ends: NPT Threaded	★
P2	Pipe ends: Beveled	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★
0260	0.260-in. (6.60 mm) for 1/2-in. Pipe	★
0340	0.340-in. (8.64 mm) for 1/2-in. Pipe	★
0150	0.150-in. (3.81 mm) for 1-in. Pipe	★
0250	0.250-in. (6.35 mm) for 1-in. Pipe	★
0345	0.345-in. (8.76 mm) for 1-in. Pipe	★
0500	0.500-in. (12.70 mm) for 1-in. Pipe	★
0630	0.630-in. (16.00 mm) for 1-in. Pipe	★

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

0800	0.800-in. (20.32 mm) for 1-in. Pipe		★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe		★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe		★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe		★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe		★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe		★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe		★
Expanded			
0010	0.010-in. (0.25 mm) for 1/2-in. Pipe		
0014	0.014-in. (0.36 mm) for 1/2-in. Pipe		
0020	0.020-in. (0.51 mm) for 1/2-in. Pipe		
0034	0.034-in. (0.86 mm) for 1/2-in. Pipe		
Transmitter Connection Platform			
Standard			**Standard**
D3	Direct-mount, 3-Valve Manifold, SST		★
D5	Direct-mount, 5-Valve Manifold, SST		★
R3	Remote-mount, 3-Valve Manifold, SST		★
R5	Remote-mount, 5-Valve Manifold, SST		★
Differential Pressure Ranges			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART protocol		★
F	FOUNDATION fieldbus protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material(2)		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K(3)	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M(3)	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Temperature Sensor		
Expanded		
RT(4)	Thermowell and RTD	
Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Pressure Testing		
Expanded		
P1(5)	Hydrostatic Testing with Certificate	

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
WD[6]	Discharge Coefficient Verification	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[7]	ANSI/ASME B31.1	
J3[7]	ANSI/ASME B31.3	
J4[7]	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[8]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[9]	Prior-use Certificate of FMEDA data	★
Product Certifications		
Standard		**Standard**
E1[10]	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[10]	IECEx Flameproof, Dust Ignition-proof	★
I1[10]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[10]	IECEx Intrinsic Safety	★
IA[11]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[11]	FM FISCO Intrinsically Safe	★
IF[11]	CSA FISCO Intrinsically Safe	★
IG[11]	IECEx FISCO Intrinsically Safe	★
K1[10]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7(10)	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA(10)	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC(10)	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD(10)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1(10)	ATEX Type n	★
N7(10)	IECEx Type n	★
ND(10)	ATEX Dust	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Digital Display		
Standard		**Standard**
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1(12)	Transient terminal block	★
Alarm Limit		
Standard		**Standard**
C4(13)(14)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(13)(14)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Hardware Adjustments		
Standard		**Standard**
D4	Zero and Span Hardware Adjustments	★
Ground Screw		
Standard		**Standard**
V5(15)	External Ground Screw Assembly	★
Typical Model Number: 2051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Material specified is cast as follows: CF-8M is the cast version of 316 SST, CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.

(3) Not available with Low Power Output Code M.

(4) Thermowell Material is the same as the body material.

(5) Does not apply to Process Connection codes T1 and S1.

(6) Not available for bore sizes 0010, 0014, 0020, or 0034.

(7) Not available with DIN Process Connection codes D1, D2, or D3.

(8) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(9) Not available with Output Protocol code F.

(10) Not available with Low Power Output Code M.

(11) Only valid with FOUNDATION fieldbus Output Code F.

(12) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(13) Not available with FOUNDATION fieldbus (Output Code F).

(14) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(15) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

2051CF Specifications

2051CF PERFORMANCE SPECIFICATIONS

Performance assumptions include: measured pipe I.D, transmitter is trimmed for optimum flow accuracy, and performance is dependent on application parameters.

Table 24. Flow Performance - Flow Reference Accuracy(1)

2051CFA Annubar Flowmeter		
Ranges 2-3		±2.30% of Flow Rate at 5:1 flow turndown
2051CFC Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β =0.4	±2.25% of Flow Rate at 5:1 flow turndown
	β =0.65	±2.45% of Flow Rate at 5:1 flow turndown
2051CFC Compact Orifice Flowmeter – Orifice Type Option P(2)		
Ranges 2-3	β =0.4	±2.50% of Flow Rate at 5:1 flow turndown
	β =0.65	±2.50% of Flow Rate at 5:1 flow turndown
2051CFP Integral Orifice Flowmeter		
Ranges 2-3	β <0.1	±3.10% of Flow Rate at 5:1 flow turndown
	0.1< β <0.2	±2.75% of Flow Rate at 5:1 flow turndown
	0.2< β <0.6	±2.25% of Flow Rate at 5:1 flow turndown
	0.6< β <0.8	±3.00% of Flow Rate at 5:1 flow turndown

(1) Range 1 flowmeters may experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(2) For smaller line sizes, see Rosemount Compact Orifice

2051CF FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Range	2051CF Minimum Span	Range and Sensor Limits
1	0.5 inH_2O (1,2 mbar)	0 to 25 inH_2O (62,3 mbar)
2	2.5 inH_2O (6,2 mbar)	0 to 250 inH_2O (0,62 bar)
3	10 inH_2O (24,9 mbar)	0 to 1000 inH_2O (2,49 bar)

Service

Liquid, gas, and steam applications

Protocols

4–20 mA HART (Output Code A)

Output

Two-wire 4–20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 10.5 to 42.4 Vdc with no load.

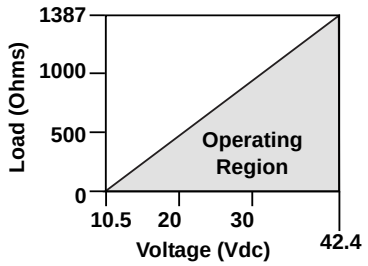
Turn-On Time

Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

FOUNDATION fieldbus (Output Code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Turn-On Time

Performance within specifications less than 20.0 seconds after power is applied to the transmitter.

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

2 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

- Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

1-5 Vdc HART Low Power (Output Code M)

Output

Three wire 1–5 Vdc output, user-selectable for linear or square root output. Digital process variable superimposed on voltage signal, available to any host conforming to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 9 to 28 Vdc with no load.

Power Consumption

3.0 mA, 27–84 mW

Output Load

100 kΩ or greater

Turn-On Time

Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Overpressure Limits

Transmitters withstand the following limits without damage:

2051CF Flowmeters

- Ranges 2–5: 3626 psig (250 bar)
  4500 psig (310,3 bar) for option code P9
- Range 1: 2000 psig (137,9 bar)

Static Pressure Limit

- Operates within specifications between static line pressures of -14.2 psig (0.034 bar) and 3626 psig (250 bar)
- Range 1: 0.5 psia to 2000 psig (34 mbar and 137,9 bar)

Burst Pressure Limits

2051CF

- 10000 psig (689,5 bar)

Temperature Limits

For 2051CFA Temperature Limits, see page 93.
For 2051CFC Temperature Limits, see page 105.
For 2051CFP Temperature Limits, see page 113.

Transmitter Temperature Limits:

Ambient(1)

–40 to 185 °F (–40 to 85 °C)

With LCD display(2): –40 to 175 °F (–40 to 80 °C)

Storage(1)

–50 to 230 °F (–46 to 110 °C)

With LCD display: –40 to 185 °F (–40 to 85 °C)

(1) Limits for silicone fill fluid only.

(2) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Process Temperature Limits

At atmospheric pressures and above.

Table 25. 2051 Process Temperature Limits

2051C	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)
Inert Fill Sensor(1)	–40 to 185 °F (–40 to 85 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

Humidity Limits

0–100% relative humidity

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping

Analog output response to a step input change is user-selectable from 0 to 25.6 seconds for one time constant. This software damping is in addition to sensor module response time.

Failure Mode Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.9 ≤ I ≤ 20.8	I ≥ 21.75 mA	I ≤ 3.75 mA
M	0.97 ≤ V ≤ 5.2	V ≥ 5.4 V	V ≤ 0.95 V

NAMUR-Compliant Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.8 ≤ I ≤ 20.5	I ≥ 22.5 mA	I ≤ 3.6 mA

Output Code F

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

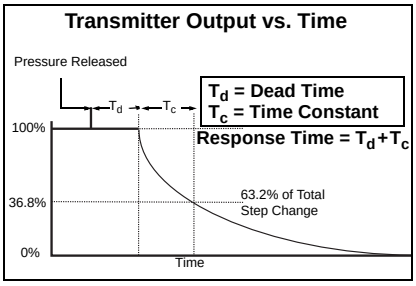
Long Term Stability

Models	**Standard**	**Performance Option, P8**
2051CF		
Range 1 (CF)	±0.2% of URL for 1 year, Reference Stability	
Ranges 2-5	±0.1% of URL for 2 years, Operating Stability	±0.125% of URL for 5 years, Operating Stability

Dynamic Performance

	4-20 mA HART[1] 1-5 Vdc HART Low Power	**FOUNDATION fieldbus[3]**	**Typical HART Transmitter Response Time**
Total Response Time (T_d + T_c)[2]:			
2051CF, Range 3-5:	115 milliseconds	152 milliseconds	
Range 1:	270 milliseconds	307 milliseconds	
Range 2:	130 milliseconds	152 milliseconds	
Dead Time (Td)	60 milliseconds (nominal)	97 milliseconds	
Update Rate	22 times per second	22 times per second	

(1) Dead time and update rate apply to all models and ranges; analog output only
(2) Nominal total response time at 75 °F (24 °C) reference conditions.
(3) Transmitter fieldbus output only, segment macro-cycle not included.



Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

2051CF PHYSICAL SPECIFICATIONS

Electrical Connections

$^1/_2$–14 NPT, G$^1/_2$, and M20 × 1.5 conduit.

2051CF Process-Wetted Parts

For 2051CFA wetted parts, see “Annubar Sensor Material” on page 94.
For 2051CFC wetted parts, see “Material of Construction” on page 105.
For 2051CFP wetted parts, see “Material of Construction” on page 113.

Process Isolating Diaphragms

316L SST, Alloy C-276, or Tantalum

Non-Wetted Parts for 2051CF

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST).
Enclosure Type 4X, IP 65, IP 66, IP68

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)

Sensor Module Fill Fluid

Silicone oil (D.C. 200) or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 2051T)

Paint

Polyurethane

Cover O-rings

Nitirile Butadiene (NBR)

2051CF Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd — Daman, India

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 an Emerson Process Management representative.

ATEX Directive (94/9/EC)
All 2051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)
2051CG2, 3, 4, 5; 2051CD2, 3, 4, 5 (also with P9 option)
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV
Module H Conformity Assessment

All other 2051 Pressure Transmitters
— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)
All 2051 Pressure Transmitters meet all of the requirements of EN 61326 and NAMUR NE-21.

Ordinary Location Certification for Factory Mutual
As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

2051CF HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 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. Dust-Ignition-Proof for Class III, Division 1.
T5 (Ta = 85 °C), Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

I6 Intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawing 02051-1008. Temperature Code T3C.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 02051-1008.

European Certifications

I1 ATEX Intrinsic Safety
Certification No. Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
IP66 IP68
CE 1180

Table 26. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 10 µH

Table 27. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i =0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n
Certification No. Baseefa08ATEX0130X ⟨Ex⟩ II 3 G
Ex nAnL IIC T4 (–40 ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.
The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

E1 ATEX Flame-Proof
Certification No. KEMA 08ATEX0090X Ⓔx II 1/2 G
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
IP66
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

ND ATEX Dust
Certification No. Baseefa08ATEX0182X Ⓔx II 1 D
Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C ≤ T_a ≤ 85 °C)
IP66 IP68
Vmax = 42.4 Vdc
A = 22 mA
CE 1180

Special Conditions for Safe Use (X):
If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of isolation from earth test and this must be taken into account during installation.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X II 1 G
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
CE 1180

Table 28. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF

Table 29. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No. IECEx KEM 08.0024X II 1/2 G
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

N7 IECEx Type n
Certification No. IECExBAS08.0046X II 3 G
Ex nAnL IIC T4 (–40 ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
CE

Special Conditions for Safe Use (X):

When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Inmetro Certifications

E2 Flame-Proof
BR-Ex d IIC T6/T5

I2 Intrinsic Safety
BR-Ex ia IIC T4

GOST - Russia Certifications

IM Intrinsic Safety
Certificate Pending

EM Flame-Proof
Certificate Pending

China (NEPSI) Certifications

E3 Flame-Proof
Ex d IIC T5/T6

I3 Intrinsic Safety
Ex ia IIC T4

CCOE Certifications

IW Intrinsic Safety
Ex ia IIC T4

EW Flame-Proof
Ex d IIC T5 or T6

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 E1, I1, N1, and ND combination

K4 E4 and I4 combination

K5 E5 and I5 combination

K6 I6 and E6 combination

K7 E7, I7, and N7 combination

KA E1, I1, E6, and I6 combination

KB E5, I5, E6, and I6 combination

KC E1, I1, E5, and I5 combination

KD E1, I1, E5, I5, E6, and I6 combination

2051CF FIELDBUS PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 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. Dust-Ignition-Proof for Class III, Division 1.

T5 (Ta = 85 °C), Factory Sealed, Enclosure Type 4X

I5/IE Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

I6/IF Intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 02051-1008. Temperature Code T3C.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 02051-1008.

European Certifications

I1 ATEX Intrinsic Safety
Certification No. Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 30. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF
L_i = 0 uH

Table 31. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

IA ATEX FISCO Intrinsic Safety
Certification No. Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 32. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n
Certification No. Baseefa08ATEX0130X ⟨Ex⟩ II 3 G
Ex nAnL IIC T4 (T_{amb} = –40 to +70 °C)
U_i = 32 Vdc max
IP66

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of EN60079-15. This must be taken into account when installing the apparatus.

E1 ATEX Flame-Proof
Certification No. KEMA 08ATEX0090X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Ex d IIC T5 (T_{amb} = –50 to 80 °C)
IP66
CE 1180
Vmax = 32 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

ND ATEX Dust
Certification No. Baseefa08ATEX0182X ⟨Ex⟩ II 1 D
Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C ≤ T_a ≤ 85 °C)
IP66 IP68
Vmax = 42.4 Vdc
A = 22 mA
CE 1180

Special Conditions for Safe Use (X):
If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of isolation from earth test and this must be taken into account during installation.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 33. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

Table 34. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

IG IECEx FISCO Intrinsic Safety
Certification No. IECExBAS08.0045X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 35. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No. IECEx KEM 08.0024X II 1/2 GD
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Ex d IIC T5 (T_{amb} = –50 to 80 °C)
IP66
CE 1180
Vmax = 32 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

N7 IECEx Type n
Certification No. IECExBAS08.0046X II 3 G
Ex nAnL IIC T4 (T_{amb} = –40 to +70 °C)
U_i = 32 Vdc max

Special Conditions for Safe Use (X):

The device is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of IEC60079-15. This must be taken into account when installing the device.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Inmetro Certifications

E2 Flame-Proof
Certificate No. CEPEL-EX-1767/09X
BR-Ex d IIC T6/T5

I2 Intrinsic Safety
Certificate No. CEPEL-EX-1768/09X
BR-Ex ia IIC T4

IB FISCO Intrinsic Safety
Certificate No. CEPEL-EX-1768/09X
BR-Ex ia IIC T4

GOST - Russia Certifications

IM Intrinsic Safety
Certificate Pending

EM Flame-Proof
Certificate Pending

China (NEPSI) Certifications

E3 Flame-Proof
Ex d IIC T5/T6

I3 Intrinsic Safety
Ex ia IIC T4

CCOE Certifications

IW Intrinsic Safety
Ex ia IIC T4

EW Flame-Proof
Ex d IIC T5 or T6

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 **E1, I1, N1,** and **ND** combination

K4 **E4** and **I4** combination

K5 **E5** and **I5** combination

K6 **I6** and **E6** combination

K7 **E7, I7,** and **N7** combination

KA **E1, I1, E6,** and **I6** combination

KB **E5, I5, E6,** and **I6** combination

KC **E1, I1, E5,** and **I5** combination

KD **E1, I1, E5, I5, E6,** and **I6** combination

Rosemount 485 Annubar Primary Element

Rosemount 485 Annubar Primary Element utilizes a T-shaped sensor design that offers best in class accuracy and performance.

- Up to 0.75% Flow Rate Accuracy
- Lowest permanent pressure loss of any DP Flowmeter
- Available in 2 to 96-in. (50 - 2400 mm) line sizes

Additional Information
Specifications: page 93
Dimensional Drawings: page 145
Installation and Flowmeter Orientation: page 163

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	DP Flow Primary Type	
485	Annubar Primary Element	
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	2 1/2-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	
600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
780	78-in. (1950 mm)	
840	84-in. (2100 mm)	
900	90-in. (2250 mm)	
960	96-in. (2400 mm)	

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pipe I.D. Range (See "Pipe I.D. Range Code" on page 162)		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Above 12-in. Line Size	
Pipe Material / Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0[(1)]	No mounting (Customer Supplied)	★
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Expanded		
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Expanded		
H	Alloy C-276	
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression/Threaded Connection	★
A1	150# RF ANSI	★
A3	300# RF ANSI	★
A6	600# RF ANSI	★
D1	DN PN16 Flange	★
D3	DN PN40 Flange	★
D6	DN PN100 Flange	★
Expanded		
A9[(2)]	900# RF ANSI	
AF[(2)]	1500# RF ANSI	
AT[(2)]	2500 # RF ANSI	

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

R1	150# RTJ Flange			
R3	300# RTJ Flange			
R6	600# RTJ Flange			
R9(2)	900# RTJ Flange			
RF(2)	1500# RTJ Flange			
RT(2)	2500# RTJ Flange			
Opposite Side Support or Packing Gland				
Standard				**Standard**
0	No opposite side support or Packing Gland (Required for Pak-Lok and Flange-Lok models)			★
	Opposite Side Support – Required for Flanged Models			
C	NPT Threaded Opposite Support Assembly – Extended Tip			★
D	Welded Opposite Support Assembly – Extended Tip			★
	Packing Gland – Required for Flo-Tap Models			
Expanded				
	Packing Gland Material	*Rod Material*	*Packing Material*	
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	
Isolation Valve for Flo-Tap Models				
Standard				**Standard**
0(1)	Not Applicable or Customer Supplied			★
Expanded				
1	Gate Valve, Carbon Steel			
2	Gate Valve, Stainless Steel			
5	Ball Valve, Carbon Steel			
6	Ball Valve, Stainless Steel			
Temperature Measurement				
Standard				**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#			★
0	No Temperature Sensor			★
Expanded				
R	Remote Thermowell and RTD			
Transmitter Connection Platform				
Standard				**Standard**
3	Direct-mount, Integral 3-valve manifold– not available with Flanged model greater than class 600			★
5	Direct -mount, 5-valve Manifold– not available with Flanged model greater than class 600			★
7	Remote-mount NPT Connections			★
Expanded				
6	Direct-mount, High Temperature 5-valve Manifold– not available with Flanged model greater than class 600			
8	Remote-mount SW Connections			

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1(3)	Hydrostatic Testing with Certificate	
PX(3)	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 level D (section 11.4)	

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
WZ	Special Calibration	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds Number in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	★
Material Traceability Certification		
Standard		**Standard**
Q8[(4)]	Material Traceability Certificate per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[(5)]	ANSI/ASME B31.1	
J3[(5)]	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[(6)]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Installed in Flanged Pipe Spool Section		
Expanded		
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	
Instrument Connections for Remote Mount Option		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Attach To		
Expanded		
H1	Attach to Transmitter	

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Dimensions		
Expanded		
VM	Variable Mounting	
VT	Variable Tip	
VS	Variable length Spool Section	
V9	Special Dimension	
Typical Model Number: 485 L 060 D C H P S 2 T1 0 0 0 3		

(1) Provide the "A" dimension for Flanged (page 147), Flange-Lok (page 146), and Threaded Flo-Tap models (page 150). Provide the "B" dimension for Flange Flo-Tap models (page 148).

(2) Available in remote mount applications only.

(3) Applies to flow element only, mounting hardware not tested.

(4) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(5) Not available with Transmitter Connection Platform 6.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

485 SPECIFICATIONS

485 Performance Specifications

Performance Statement Assumptions

Measured pipe I.D. (or Measured pipe cross sectional area)

Discharge Coefficient Factor

±0.75% of flow rate

Repeatability

±0.1%

Line Sizes

- Sensor Size 1: 2-in. to 8-in. (50 to 200 mm)
- Sensor Size 2: 6-in. to 96-in. (150 to 2400 mm)
- Sensor Size 3: 12-in. to 96-in. (300 to 2400 mm)

NOTE
Some mounting types are not available in larger line sizes.

Table 37. Reynolds Number and Probe Width

Sensor Size	Minimum Rod Reynolds Number (R_d)	Probe Width ($_d$) (inches)
1	6500	0.590-in. (14.99 mm)
2	12500	1.060-in. (26.92 mm)
3	25000	1.935-in. (49.15 mm)

$$R_d = \frac{d \times v \times p}{\mu}$$

Where
d = Probe width (feet)
v = Velocity of fluid (ft/sec)
p = Density of fluid (lbm/ft^3)
μ = Viscosity of the fluid (lbm/ft-sec)

Sizing

Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

Flow Turndown

10:1 or better

Annubar Sensor Surface Finish

The front surface of the Annubar primary is textured for high Reynolds number applications (typically gas and steam). The surface texture creates a more turbulent boundary layer on the front surface of the sensor. The increased turbulence produces a more predictable and repeatable separation of flow at the edge of the sensor. The appropriate surface finish will be determined for each application by the Emerson Process Management sizing program, Instrument Toolkit software.

485 Functional Specifications

Service

- Liquid
- Gas
- Steam

Process Temperature Limits

Direct Mount Transmitter

- 500 °F (260 °C)
- 750 °F (398 °C) when used with a direct mount, high temperature 5-valve manifold (Transmitter Connection Platform code 6). Maximum temperature limit for steam processes is 650 °F (343 °C).
- 400 °F (204 °C) when top mounted in steam service

Remote Mount Transmitter
- 1250 °F (677 °C) – Alloy C-276 Sensor Material (For superheated steam applications above 1000 °F (538 °C), it is recommended that the Rosemount 585 with Alloy 800H sensor material is used.)
- 850 °F (454 °C) – Stainless Steel Sensor Material

Pressure and Temperature Limits(1)

Direct Mount Transmitter
- Up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Integral temperature measurement is not available with Flanged mounting type greater than class 600

Remote Mount Transmitter
- Up to 2500# ANSI (6000 psig at 100 °F (416 bar at 38 °C)).

(1) Static pressure selection may effect pressure limitations.

485 Physical Specifications

Temperature Measurement

Integral RTD
- 100 Ohm platinum RTD
- 4-wire RTD (α = 0.00385)

Remote RTD
- 100 Ohm platinum RTD, spring loaded with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing)

Thermowell
- 1/2-in. x 1/2-in NPT, 316 Stainless Steel with 1/2-in. weld couplet (same as specified pipe material).

Housing Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 Stainless Steel
- Alloy C-276

Mounting Material

- Carbon Steel (A105)
- 316 Stainless Steel
- Chrome-Moly Grade F-11
- Chrome-Moly Grade F-22
- Chrome-Moly Grade F-91

Annubar Type

See “485 Dimensional Drawings” on page 145

Pak-Lok Mode (option P)
- Provided with a compression sealing mechanism rated up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- –150 to 850 °F (–101 to 454 °C)
- Not available for steam above 600°F (315°C)

Flanged with Opposite Side Support Model (option F)
- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material
- Flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Alloy C-276: (–150 to 1250 °F (-101 to 677 °C))

Flange–Lok Model (option L)
- Flange–Lok assembly is supplied in 316 SST material.
- Flange-Lok mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- –150 to 850 °F (-101 to 454 °C)
- Not available for steam above 600°F (315°C)

Flo-Tap Models (options G and M)
- Opposite side support is not available
- Threaded connection is not available with Sensor Size 3
- Gear Drive is not available with Sensor Size 1
- Packing gland required
- Packing Gland Material Temperature Limits
  - PTFE: –40 to 400 °F (–40 to 204 °C)
  - Graphite: –150 to 850 °F (-101 to 454 °C)
- Isolation valve included
  - The isolation valve will carry the same pressure rating as the sensor flange and mounting flange specified in the mounting type
  - Isolation vales are not supplied with DIN flanges and must be customer supplied
- For threaded flo-tap models, the isolation valve NPT size is 1 1/4-in. (Sensor Size 1) and 2-in. (Sensor Size 2).

Annubar Type Specification Chart

Option Code	Description	Pak-Lok(1)	Flange-Lok	Flange	Manual and Gear Drive Flo-Tap
T1(1)	Pak-Lok Body	X			
	Threaded connection				X
A1	150# RF ANSI		X	X	X
A3	300# RF ANSI		X	X	X
A6	600# RF ANSI		X	X	X
A9(2)	900# RF ANSI			X	
AF(2)	1500# RF ANSI			X	
AT(2)	2500# RF ANSI			X	
D1	DN PN 16		X	X	X
D3	DN PN 40		X	X	X
D6	DN PN 100		X	X	X
R1	150# RTJ Flange		X	X	X
R3	300# RTJ Flange		X	X	X
R6	600# RTJ Flange		X	X	X
R9(2)	900# RTJ Flange			X	
RF(2)	1500# RTJ Flange			X	
RT(2)	2500# RTJ Flange			X	

(1) Available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)) rating.

(2) Remote mount only.

RTD Temperature Limits

Integral and Remote Mounted Thermowell:
-100 to 900 °F (-73 to 482 °C)

Instrument Connections Temperature Ranges

Table 38. Minimum / Maximum Temperature Range

Code	Description	Temperature
G1	Needle Valves, Carbon Steel	–20 to 500 °F (–29 to 260 °C)
G2	Needle Valves, Stainless Steel	–40 to 600 °F (–40 to 316 °C)
G3	Needle Valves, Alloy C-276	–40 to 600 °F (–40 to 316 °C)
G5	OS&Y Gate Valve, Carbon Steel	–20 to 775 °F (–29 to 413 °C)
G6	OS&Y Gate Valve, Stainless Steel	–40 to 850 °F (–40 to 454 °C)
G7	OS&Y Gate Valve, Alloy C-276	–40 to 1250 °F (–40 to 677 °C)

Flowmeter Installed in Flanged Pipe Spool Section (option codes H3, H4, and H5)

- All pipe spool sections are flanged pipe sections
- The flanged pipe spool section is constructed from the same material as the Pipe Material / Mounting Assembly Material.
- Consult the factory for remote temperature measurement and ANSI ratings above 600# and DIN flanges.
- Available in carbon steel (A105) and 316 stainless steel

Table 39. Flanged Pipe Spool Section Schedule

ANSI	Schedule
150# ANSI	40
300# ANSI	40
600# ANSI	80

Table 40. Flange Pipe Spool Section Length

Nominal Pipe Size	Length
2-in. (50 mm)	10.52-in. (267.2 mm)
3-in. (80 mm)	11.37-in. (288.8 mm)
4-in. (100 mm)	12.74-in. (323.6 mm)
6-in. (150 mm)	14.33-in. (364.0 mm)
8-in. (200 mm)	16.58-in. (421.1 mm)

Rosemount 585 Annubar Primary Element

Rosemount 585 Annubar Primary Element utilizes a solid sensor construction that offers capabilities for severe service applications.

- Main Steam Line mounting hardware available
- Symmetrical sensor design allows bi-directional flow measurement
- Available in 4 to 96-in. (50 - 2400 mm) line sizes

Additional Information
Specifications: page 101
Dimensional Drawings: page 151
Installation and Flowmeter Orientation: page 163

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	DP Flow Primary Type	
585	Severe Service Annubar Primary Element	
Application Type		
Standard		**Standard**
S[(1)(2)]	Severe Service Annubar	★
Expanded		
M[(3)]	Main Steam Line Annubar	
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Annubar Type		
Standard		**Standard**
F	Flanged with Opposite Side Support	★
Expanded		
L	Main Steam Annubar with Opposite Side Support	
G	Gear-Drive Flo-Tap	
Line Size		
Standard		**Standard**
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
840	84-in. (2100 mm)	
960	96-in. (2400 mm)	
Mounting Assembly Material		
Standard		**Standard**
C	Carbon Steel (A105)	★
S	316/316L Stainless Steel	★
Expanded		
L	Carbon Steel (A350 LF2)	
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
0[4]	No Mounting (Customer Supplied)	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Sensor Material		
Standard		**Standard**
S	316/316L Stainless Steel	★
Expanded		
H[5]	Alloy C-276	
W[3][5]	Alloy 800H	
K[5]	PVDF (KYNAR)	
Sensor Size		
Standard		**Standard**
11	Sensor size 11	★
22[6]	Sensor size 22	★
Expanded		
44[2][3]	Sensor size 44	
Mounting Type		
Standard		**Standard**
A	ANSI B16.5 Raised Face Flanges	★
D[7]	DIN Raised Face Flanges	★
Expanded		
R[8]	ANSI B16.5 Ring Type Joint Flanges	
0[3]	Main Steam Packing Gland	
Mounting Pressure Class		
Standard		**Standard**
1	ANSI 150 / DIN PN16	★
3[6]	ANSI 300 / DIN PN40	★
6[6]	ANSI 600 / DIN PN100	★
Expanded		
N[5][6]	ANSI 900	
F[5][6]	ANSI 1500	
T[5][6]	ANSI 2500	
0[3][5][6]	Main Steam Packing Gland	

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Opposite Side Support		
Standard		**Standard**
C[9]	NPT Threaded Opposite Support Assembly	★
D[3]	Welded Opposite Support Assembly	★
Expanded		
E	Flanged Opposite Support Assembly	
0[2]	No Opposite Side Support Required	
Packing Gland/ Packing		
Standard		**Standard**
0[1]	Not Applicable	★
Expanded		
L[2]	SS Packing Gland / Graphite Packing	
T[3]	Main Steam Packing Gland / Graphite Packing	
Insertion Mechanism		
Standard		**Standard**
0[1][3]	Not Applicable	★
Expanded		
C	Alloy Steel Insertion Rods / Nuts	
S	Stainless Steel Insertion Rods / Nuts	
Isolation Valve		
Standard		**Standard**
0[3][1]	Not Applicable or Customer Supplied	★
Expanded		
1	Gate Valve, Carbon Steel	
2	Gate Valve, Stainless Steel	
5	Ball Valve, Carbon Steel	
6	Ball Valve, Stainless Steel	
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor Required	★
Expanded		
R[4][6][9]	Remote RTD ($^1/_2$-in. NPT Aluminum Housing) with Thermowell	
S[4][6][9]	Remote RTD ($^1/_2$-in. NPT Stainless Housing) with Thermowell	
Transmitter Connection Platform		
Standard		**Standard**
3[6][10][11]	Direct-Mount, 3-Valve Manifold	★
Expanded		
4[6][10][11]	Direct-Mount, Dual 3-Valve Manifolds	
6[6][10][12]	High Temperature Direct-Mount 5-Valve Manifold	
7	Remote-Mount $^1/_2$-in. Threaded Connections	
8[3]	Remote-Mount $^1/_2$-in. Welded Connections	
Mounting Flange Bolting materials		
Standard		**Standard**
A	193 Gr B7 Studs w/ A194 Gr 2H Nuts	★
0	No Flange Studs/Nuts Supplied	★
Mounting Flange Gasket Materials		
Standard		**Standard**
1	Spiral Wound, 304SS, Flexible-Graphite Filler	★
0	No Flange Gasket Supplied	★
Expanded		
2	Ring-Joint, ANSI B16.20, Hexagonal, 316L	
3	Spiral Wound, B16.20, 316SS, PTFE Filler	

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Optional Mounting for Rectangular Ducts		
Expanded		
RD	Annubar Mounting for rectangular ducts	
Pressure Testing		
Expanded		
P1[13]	Hydrostatic Testing with Certificate	
PX	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
PA[6][14]	Cleaning per ASTM G93 Level D (section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Weld Exam	
Material Examination		
Expanded		
V2	Radiographic Weld Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection w/ Cert.	★
QC7	Inspection & Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8[5][15]	Material Traceability Certification per EN 10204 :2004 3.1	★
Positive Material Testing		
Expanded		
V4[15]	Positive Material Identification	
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[16]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration Certificate	
Instrument Valves for Remote Mount Option		
Standard		**Standard**
G2	1/2-in. Needle Valves, SS	★
G6	1/2-in. OS&Y Gate Valve, SS	★
Expanded		
G1	1/2-in. Needle Valves, CS	
G3	1/2-in. Needle Valves, Alloy C-276	
G5	1/2-in. OS&Y Gate Valve, CS	

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Instrument Valve Options		
Standard		**Standard**
DV[17]	Double Instrument Valves (4 valves total)	★
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Assemble Mounting Hardware		
Expanded		
WP[18]	Assemble Weldolet to Packing body	
Special Dimensions		
Expanded		
VM	Variable Mounting	
585 Packing Gland Plug		
Expanded		
TP[18]	Packing Gland Plug for Steam Blow Down	
585 Installation Alignment Bar		
Expanded		
A1[18]	Installation Alignment Bar	
Typical Model Number: 585 M S L 120 J H W 44 0 0 0 T 0 0 8 0 0		

(1) Required for Annubar Type F.

(2) Required for Annubar Type G.

(3) Required for Annubar Type L.

(4) Not available with Annubar Type L.

(5) Not available with Annubar Type G.

(6) Not available with Sensor Material K.

(7) Mounting Flange Bolting and Gasket option code 0 must be selected.

(8) Mounting Flange Gasket Material option code 2 or 0 must be selected.

(9) Not available with ANSI 2500 Mounting Pressure Class.

(10) Not available with Mounting Pressure Class N, T, or F.

(11) Not available with Sensor Material W.

(12) Not available with Sensor Material H or W.

(13) Applies to flow element only, mounting not tested.

(14) If selected with Annubar Type F, Mounting Flange Gasket Material option code 3 must be selected.

(15) For pressure retaining parts only, isolation and instrument valves are not included.

(16) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(17) Only available if Instrument Valves for Remote Mount Option are selected.

(18) Only available with Annubar Type L.

585 Specifications

585 PERFORMANCE SPECIFICATIONS

Performance Statement Assumptions
Measured pipe I.D.

Discharge Coefficient Factor
±1.50% of flow rate

Repeatability
±0.10%

Line Sizes
- Sensor Size 11: 4-in. to 24-in. (100 to 600 mm)
- Sensor Size 22: 6-in. to 36-in. (150 to 900 mm)
- Sensor Size 44: 10-in. to 96-in. (250 to 2400 mm)

Table 42. Reynolds Number and Probe Width

Sensor Size	Minimum Rod Reynolds Number (R_d)	Probe Width ($_d$) (inches)
11	6500	0.80-in. (20,32 mm)
22	10000	1.20-in. (30,48 mm)
44	25000	2.28-in. (57,91 mm)

Where

$$R_d = \frac{d \times v \times p}{\mu}$$

d = Probe width (feet)
v = Velocity of fluid (ft/sec)
p = Density of fluid (lbm/ft^3)
μ = Viscosity of the fluid (lbm/ft-sec)

Sizing
Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

Flow Turndown
10:1 or better

585 FUNCTIONAL SPECIFICATIONS

Service
- Liquid
- Gas
- Steam

Process Temperature Limits
Table 43. Direct Mount Transmitter Connection Platform

Transmitter Connection Platform	Temperature Limit
3-valve manifold (Option code 3)	500 °F (260 °C)
5-valve manifold (Option code 6)	750 °F (398 °C)
Note: Specification is 600 °F (315 °C) in steam service	

Table 44. Remote Mount Transmitter Connection Platform

Sensor Material	Temperature Limit
316 Stainless Steel (Option code S)	850 °F (454 °C)
Alloy C-276 (Option code H)	1250 °F (677 °C)
Alloy 800H (Option code W)	1500 °F (816 °C)
PVDF (KYNAR) (Option code K)	250 °F (121 °C)

Pressure and Temperature Limits
Table 45. Main Steam Line Annubar

Mounting Material	Sensor Material	Max. Pressure @ Temp.	Max. Temp.
Chrome-Moly Grade F-11	Alloy 800H	2317 psig @ 1000 °F (160 bar @ 538 °C)	1100 °F (593 °C)
Chrome-Moly Grade F-22	Alloy 800H	2868 psig @ 1000 °F (198 bar @ 538 °C)	1100 °F (593 °C)
Chrome-Moly Grade F-91	Alloy 800H	3788 psig @ 1100 °F (261 bar @ 593 °C)	1200 °F (649 °C)

Table 46. Severe Service Annubar

Annubar Type	Sensor Material	Max. Flange Rating
Flanged (option code F)	316 SST	2500# ANSI
	Alloy C-276	2500# ANSI
	Alloy 800H	2500# ANSI
	PVDF (KYNAR)	150# ANSI
Flanged Flo-Tap (option code G)	316 SST	600# ANSI

585 PHYSICAL SPECIFICATIONS

Temperature Measurement

Remote RTD

- Series 78 with Rosemount 644 housing 100 Ohm platinum RTD
- Spring loaded with 1/2-in. NPT nipple and union

Thermowell

- 1/2-in. NPT x 3/4-in. socket weld
- 316 Stainless Steel and Alloy C-276 Material
- 2.5-in. insertion length provided

Annubar Sensor Material

- 316 Stainless Steel
- Alloy C-276
- Alloy 800H
- PVDF (KYNAR)

Mounting Material

- Carbon Steel (A105)
- 316 Stainless Steel
- Carbon Steel (A350 LF2)
- Chrome-Moly Grade F-11
- Chrome-Moly Grade F-22
- Chrome-Moly Grade F-91

Annubar Type

See “585 Dimensional Drawings” on page 151

Flanged with Opposite Side Support Model (option F)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material
- Flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- SST: –325 to 850 °F (–198 to 454 °C)
- Alloy C-276: –325 to 1250 °F (–198 to 677 °C)
- PVDF (KYNAR): -40 to 250 °F (-40 to 121 °C)
- Alloy 800H: -325 to 1500 °F (-198 to 816 °C)

Main Steam Annubar with Opposite Side Support (option L)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Alloy 800H: -325 to 1500 °F (-198 to 816 °C)
- Only available in sensor size 44

Flanged Flo-Tap Models (option G)

- Opposite side support is not available
- Packing Gland Material Temperature Limits
  - Graphite: –40 to 850 °F (–40 to 454 °C)
- Isolation valve option
  - The isolation valve will carry the same pressure rating as the sensor flange and mounting flange specified in the mounting type
- SST: –325 to 850 °F (–198 to 454 °C)
- Maximum allowable insertion pressure: 1440 psig (99 bar)
- Only available in sensor size 44

Annubar Type Specification Chart

Option Code	Mounting Type/ Pressure Class	Flanged	Main Steam	Gear-Drive Flo-Tap
A1	150# RF ANSI	X		X
A3	300# RF ANSI	X		X
A6	600# RF ANSI	X		X
AN(1)	900# RF ANSI	X		
AF(1)	1500# RF ANSI	X		
AT(1)	2500# RF ANSI	X		
D1	DIN PN 16	X		X
D3	DIN PN 40	X		X
D6	DIN PN 100	X		X
R1	150# RTJ Flange	X		X
R3	300# RTJ Flange	X		X
R6	600# RTJ Flange	X		X
RN(1)	900# RTJ Flange	X		
RF(1)	1500# RTJ Flange	X		
RT(1)	2500# RTJ Flange	X		
00(1)	Main Steam Packing Gland		X	

(1) Remote mount only.

Instrument Connection Temperature Ranges

Table 47. Minimum / Maximum Temperature Range

Code	Description	Temperature
G1	Needle Valves, Carbon Steel	–20 to 550 °F (–29 to 288 °C)
G2	Needle Valves, Stainless Steel	–20 to 1000 °F (–29 to 538 °C)
G3	Needle Valves, Alloy C-276	–20 to 1000 °F (–29 to 538 °C)
G5	OS&Y Gate Valve, Carbon Steel	–20 to 800 °F (–29 to 427 °C)
G6	OS&Y Gate Valve, Stainless Steel	–20 to 850 °F (–29 to 454 °C)

Rosemount 405 Compact Primary Element

Rosemount 405 Compact Primary Element utilizes an easy to install direct mount primary element assembly.

- Available with Conditioning Orifice Plate Technology
- 405P/C orifice primary elements are based on ASME/ISO corner tap design
- Available in 2 to 12-in. (50 - 300 mm) line sizes

Additional Information
Specifications: page 105
Dimensional Drawings: page 154
Installation and Flowmeter Orientation: page 163

Table 48. Rosemount 405 Compact Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
405	Compact Orifice Flowmeter	
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Temperature Measurement		
Standard		**Standard**
N	No Temperature Measurement	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio (β)	★
065(2)	0.65 Beta Ratio (β)	★
Transmitter Connection		
Standard		**Standard**
D3	Coplanar, Direct mount, 3-valve Integral Manifold, SST	★
R3	Remote-mount, 1/4-in. NPT connections	★
Expanded		
A3	Traditional, Direct mount, 3-valve Integral Manifold with adapter plate, SST	

Table 48. Rosemount 405 Compact Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
A	ANSI Alignment Ring (150#)	★
C	ANSI Alignment Ring (300#)	★
D	ANSI Alignment Ring (600#)	★
G	DIN Alignment Ring (PN 16)	★
H	DIN Alignment Ring (PN 40)	★
J	DIN Alignment Ring (PN 100)	★
Expanded		
B	JIS Alignment Ring (10K)	
R	JIS Alignment Ring (20K)	
S	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
E	Flange adapters 316 SST ($^1/_2$-in. NPT)	★
High Temperature Application		
Expanded		
T	Graphite valve packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC	Discharge Coefficient Verification (3 point)	
WD	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Processes	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI / ASME B31.1	
J3	ANSI / ASME B31.3	
J4	ANSI / ASME B31.8	
Materials Conformance		
Expanded		
J5(3)	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Typical Model Number: 405 C S 040 N 040 D3		

(1) Not available for Primary Element Type code C.

(2) For 2-in. (50 mm) line sizes the Beta Ratio is 0.6 for Primary Element Type code C.

(3) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

405 Specifications

405 PERFORMANCE SPECIFICATIONS

Table 49. 405C Conditioning Orifice Technology

Beta Ratio	Cd Uncertainty
$\beta = 0.40$	±0.50%
$\beta = 0.65$(1)	±1.00%

(1) For 0.65 beta and ReD< 10,000 add an additional 0.5% to the Discharge Coefficient Uncertainty.

Table 50. 405P Compact Orifice Technology

Beta	Discharge Coefficient Uncertainty
1/2-in. line size	
0.4 0.65	±2.25%
1-in. to 1 1/2-in. line size	
0.4 0.65	±1.75%
2-in. to 12-in. line size	
0.4 0.65	±1.25%

Line Sizes

- 1/2-in. (15 mm) – not available for the 405C
- 1-in. (25 mm) – not available for the 405C
- 1 1/2-in. (40 mm) – not available for the 405C
- 2-in. (50 mm)
- 3-in. (80 mm)
- 4-in. (100 mm)
- 6-in. (150 mm)
- 8-in. (200 mm)
- 10-in. (250 mm)
- 12-in. (300 mm)

Sizing

Contact an Emerson Process Management sales representative assistance. A “Configuration Data Sheet” is required prior to order for application verification.

405 FUNCTIONAL SPECIFICATIONS

Service

- Liquid
- Gas
- Vapor

Process Temperature Limits

Direct Mount Transmitter

- -40 to 450 °F (-40 to 232 °C)
- Up to 400 °F (204 °C) when top mounted in steam service

Remote Mount Transmitter

- -148 to 850 °F (-100 to 454 °C) – Stainless Steel

Differential Pressure Limits

Maximum differential pressure (DP) up to 800 inH_2O (2 bar).

NOTE
When the temperature is 400-850 °F (204-454 °C), the DP Limit should be 400 inH2O (1 bar).

Maximum Working Pressure

- Pressure retention per ANSI B16.5 600# or DIN PN100

Vibration Limits

Qualified per IEC61298-3 (1998) for field with high vibration level or pipeline with high vibration level (10-60Hz 0.21mm displacement peak amplitude / 60 - 2000Hz 3g).

The weight and length of the transmitter assembly shall not exceed 5.8 lbs and 7.75-in.

Assembly to a transmitter

Select option code C11 for the Rosemount 3051S transmitter (or option code S3 for the Rosemount 3051C or 3095MV transmitters) to factory assemble the Rosemount 405 to a Rosemount pressure transmitter. If the 405 and transmitter are not factory assembled, they may be shipped separately. For a consolidated shipment, inform the Emerson Process Management representative when placing the order.

405 PHYSICAL SPECIFICATIONS

Temperature Measurement

Integral RTD(1)

- 100 Ohm platinum RTD temperature sensor assembly (316 SST Mineral Insulated Cable) with 1/4-in. NPT connection to wafer side and 1/2-in. NPT connection to transmitter RTD sensor is separated from process fluid by 1/16-in. and is pressure retaining rated for ANSI 600#. Complies with IEC-751 Class B accuracy. Meets Intrinsic Safety certification.

(1) Only available with 3051SFC or 3095MFC Compact Orifice Flowmeter models.

Remote RTD(1)

- 100 Ohm platinum with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing) Model 0078D21N00A025T32Ex Connection Head: 00644-4410-0011
- Standard RTD cable is shielded armored cable, length is 12 ft. (3.66 m)
- Remote RTD material is SST Thermowell
- 1/2-in. x 1/2-in. NPT, 316 SST

(1) Only available with 3051SFC, 3095MFC, 3051CFC or 2051CFC Compact Orifice Flowmeter models.

Material of Construction

Body/Plate

- 316/316L SST
- 50 micro-inch Ra surface finish

Manifold Head/Valves

- 316 SST

Flange Studs and Nuts

- Customer supplied
- Available as a spare part

Transmitter Connection Studs and Nuts

- Studs– A193 Grade B8M.
- Nuts– A194 Grade 8M.

Gasket and O-rings

- Gaskets are customer supplied.
- Durlon 8500 fiber gaskets are recommended. Consult an Emerson Process Management representative for use with other gaskets.
- Available as a spare part

NOTE
Gaskets and O-rings should be replaced when the 405 is disassembled.

Transmitter Connections

Direct Mount

- Available with 3051SMV, 3051S, 3051, 2051 and 3095 transmitters, ranges 1, 2, and 3.

Remote Mount

- Available with 1/4-in. NPT (standard) or 1/2-in. NPT (option code E) connections

Orifice Type

- Square edged

Orifice Pressure Taps

- Corner

Alignment Rings

Mounts between the following flange configurations:

ASME B16.5 (ANSI)	DIN	JIS
Class 150	PN16 (option code G)	10k (option code B)
Class 300	PN40 (option code H)	20k (option code R)
Class 600	PN100 (option code H)	40k (option code S)

ANSI 150 - 600# alignment ring is included as standard when ordering for up to 8-in. line size. For the 10-in. and 12-in. line size, the alignment ring must be ordered (Installation Accessories).

Typical Orifice Hole Sizes

For 405C, beta is calculated by: $\beta = d_C$ / Pipe ID, where the calculated bore is equal to 2 x typical orifice hole size ($d_C = 2d$). The tables below show the diameter of the typical orifice holes.

Table 51. β = 0.4 (measurement in inches (mm))(1)

Line Size	405C	405P
1/2-in. (15 mm)	Not Available	0.249 (6.325)
1-in. (25 mm)	Not Available	0.420 (10.668)
1 1/2-in. (40 mm)	Not Available	0.644 (16.358)
2-in. (50 mm)	0.413 (10.490)	0.827 (21.006)
3-in. (80 mm)	0.614 (15.596)	1.227 (31.166)
4-in. (100 mm)	0.805 (20.447)	1.610 (40.894)
6-in. (150 mm)	1.971 (50.063)	3.942 (100.127)
8-in. (200 mm)	2.594 (65.888)	5.188 (131.775)
10-in. (250 mm)	3.257 (82.728)	6.513 (165.43)
12-in. (300 mm)	3.900 (99.060)	7.800 (198.120)

(1) Tolerance = ±0.002-in.

Table 52. β = 0.65 (measurement in inches (mm))(1)

Line Size	405C	405P
1/2-in. (15 mm)	Not Available	0.404 (10.262)
1-in. (25 mm)	Not Available	0.682 (17.323)
1 1/2-in. (40 mm)	Not Available	1.047 (26.594)
2-in. (50 mm)	0.620 (15.748)(2)	1.344 (34.138)
3-in. (80 mm)	0.997 (25.324)	1.994 (50.648)
4-in. (100 mm)	1.308 (33.223)	2.617 (66.472)
6-in. (150 mm)	1.213 (30.810)	2.426 (61.620)
8-in. (200 mm)	1.596 (40.538)	3.192 (81.077)
10-in. (250 mm)	2.004 (50.902)	4.008 (101.80)
12-in. (300 mm)	2.400 (60.960)	4.800 (121.92)

(1) Tolerance = ±0.002-in.

(2) For 2-in. (50 mm) line size, the Beta (β) = 0.60.

Table 53. 405 Weight (measurement in lb. (kg))

Line Size	Direct Mount (D3)	Remote Mount (R3)
1/2-in. (15 mm)	3.50 (1.73)	7.5 (3.70)
1-in. (25 mm)	4.25 (2.10)	8.25 (4.07)
1 1/2-in. (40 mm)	4.75 (2.34)	8.75 (4.32)
2-in. (50 mm)	5.00 (2.47)	9.00 (4.44)
3-in. (80 mm)	7.00 (3.45)	11.00 (5.43)
4-in. (100 mm)	9.50 (4.69)	13.50 (6.67)
6-in. (150 mm)	13.00 (6.41)	17.00 (8.40)
8-in. (200 mm)	18.25 (9.00)	22.25 (10.99)
10-in. (250 mm)	23.50 (11.59)	27.50 (13.58)
12-in. (300 mm)	29.50 (14.55)	33.50 (16.54)

Rosemount 1595 Conditioning Orifice Plate

Rosemount 1595 Conditioning Orifice combines a flow conditioner with an orifice plate into a highly accurate primary element.

- Requires only 2 diameters of straight pipe run upstream and downstream from a flow disturbance
- Suitable for most gas, liquid, and steam applications
- Available in 2 to 24-in. (50 - 600 mm) line sizes

Additional Information
Specifications: page 109
Dimensional Drawings: page 156
Installation and Flowmeter Orientation: page 163

TABLE 54. Rosemount 1595 Conditioning Orifice Plate Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1595	Conditioning Orifice Plate	
Plate Type		
Standard		**Standard**
P	Paddle, Square Edged	★
U[(1)(2)]	Universal, Square Edged	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
030	3-in. (76 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
Flange Rating		
Standard		**Standard**
A1	ANSI Class 150 Raised Face (*Note: Not compatible with standard ASME B16.36 Orifice Flanges)*	★
A3	ANSI Class 300 Raised Face	★
A6	ANSI Class 600 Raised Face	★
A9	ANSI Class 900 Raised Face	★
AF	ANSI Class 1500 Raised Face	★
AT	ANSI Class 2500 Raised Face	★
D1[(1)]	DIN PN 10 (only available with Plate Type P)	★
D2[(1)]	DIN PN 16 (only available with Plate Type P)	★
D3[(1)]	DIN PN 25 (only available with Plate Type P)	★
D4[(1)]	DIN PN40 (only available with Plate Type P)	★
D5[(1)]	DIN PN 63 (only available with Plate Type P)	★
D6[(1)]	DIN PN 100 (only available with Plate Type P)	★
Expanded		
R3[(1)]	ANSI Class 300 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)	
R6[(1)]	ANSI Class 600 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)	

TABLE 54. Rosemount 1595 Conditioning Orifice Plate Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

R9[1]	ANSI Class 900 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
RF[1]	ANSI Class 1500 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
RT[1]	ANSI Class 2500 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
Material Type				
Standard				**Standard**
S	316/316L Stainless Steel			★
Expanded				
M	Alloy 400			
H	Alloy C-276			
Orifice Plate Thickness		**Plate Type P**	**Plate Type U**	
Standard				**Standard**
A	0.125-in.	Line Sizes 2 to 4-in. (50 to 100 mm)	Line size 2 to 6-in. (50 to 150 mm)	★
B	0.250-in.	Line Sizes 6 to 12-in. (150 to 300 mm)	Line size 8 to 12-in. (200 to 300 mm)	★
Expanded				
C	0.375-in.	Line Sizes 14 to 20-in. (350 to 500 mm)	N/A	
D	0.500-in.	Line Size 24-in. (600 mm)	N/A	
Beta Ratio				
Standard				**Standard**
020	0.20 Beta Ratio			★
040	0.40 Beta Ratio			★
065	0.65 Beta Ratio (0.60 beta ratio for Line Size option 020 only)			★

Options (Include with selected model number)

Flow Calibration		
Standard		**Standard**
WC	Flow Calibration Certification (3 points)	★
Expanded		
WD	Discharge Coefficient Verification (full 10 points)	
Plate Holder		
Expanded		
PH[1]	Plate Holder for Universal Type Orifice Plate for use with RTJ flange or section	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
Special Inspection		
Standard		**Standard**
QC1	Visual and dimensional Inspection with certification	★
QC7	Inspection and performance certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Certification per ISO 10474 3.1-B and EN 10204 3.1	★
Code Conformance		
Expanded		
J5[3]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Typical Model Number: 1595 P 060 A3 S A 040		

(1) Currently available up to 12-in. (300 mm) line size.

(2) For use with a plate holder device in RTJ type flanges or orifice fittings.

(3) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

1595 Specifications

1595 PERFORMANCE SPECIFICATIONS

Flow Coefficient Uncertainty

Table 55. Discharge Coefficient Uncertainty

Beta Ratio(1)	Cd Uncertainty(2)
β = 0.20	±0.50%
β = 0.40	±0.50%
β = 0.65	±1.00% (applicable for Beta > 0.4)

(1) For 0.65 beta and ReD< 10,000 add an additional 0.5% to the Discharge Coefficient Uncertainty.

(2) When using the Calibration Factor (Fc) supplied.

Sizing

Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

Pressure Tap Orientation

Orient the 1595 Conditioning Orifice Plate so that the pressure taps are centered between any 2 (of 4) orifice bore holes. In addition, the pressure taps should be located at 90° to the plane of the last upstream elbow under these conditions:

- with less than 6 upstream pipe diameters
- with a 0.65 Beta

The 1595 Conditioning Orifice Plate can be used with the following pressure taps:

- Corner pressure taps - all beta sizes
- Flange pressure taps - all beta sizes
- Radius pressure taps (D and D/2) - 0.4 beta size or smaller

Centering Requirements

The 1595 should be installed so that it is centered in the pipes as recommended by ISO-5167.

1595 FUNCTIONAL SPECIFICATIONS

Service and Flow Range

Liquid, gas or steam turbulent flow, for pipe Reynold's Numbers greater than 5,000. For pipe Reynold's Numbers less than 10,000 add an additional +0.5% uncertainty to the discharge coefficient uncertainty.

Pipe Sizes

2 to 24-in. (50 to 600 mm). Contact Emerson Process Management for other pipe sizes.

Operating Limits

For line sizes 2-in. (50 mm) to 24-in. (600 mm)

Temperature Range: –320 to 1200 °F (–196 to 649 °C)

- – 320 to 800 °F (–196 to 427 °C) and differential pressure up to 800 inH_20
- 800 to 1200 °F (427 to 649 °C) and differential pressure up to 400 inH_20

Maximum Working Pressure

- Flange rating per ANSI B16.5 and DIN EN 1092-1.

1595 PHYSICAL SPECIFICATIONS

Material of Construction

Table 56. 1595 Materials of Construction

Code	Description	ASTM	UNS	DIN (W.-Nr.)
S	316/316L SST	A240 Gr 316/316L	S31600 / S31603	1.4401/1.4404 (1.4436/1.4435)
H	Alloy C-276	B575 Gr N10276	N10276	2.4819
M	Alloy 400	B127 Gr N04400	N04400	2.4360

Flange Mounting Hardware

- The 1595 can be used with the Rosemount 1496 Flange Union. See "Rosemount 1496 Orifice Flange Union" on page 118 for more information regarding the Rosemount 1496.

Orifice Type

- Paddle, square-edge
- Universal, square-edge

Typical Orifice Hole Sizes

Beta is calculated by: β = d_C / Pipe ID, where the calculated bore is equal to 2 x typical orifice hole size (d_C = 2d). The table below shows the diameter of each of the four orifice holes.

Table 57. Typical Orifice Hole Sizes (Measurement in inches (millimeters)

Line Size	Pipe ID	Beta (β) = 0.20 d	Beta (β) = 0.40 d	Beta (β) = 0.65 d
2-in. (50 mm)	2.067-in. (52.502 mm)	0.207 (5.26)	0.413 (10.49)	0.620 (15.75)(1)
3-in. (76 mm)	3.068-in. (77.927 mm)	0.307 (7.80)	0.614 (15.60)	0.997 (25.32)
4-in. (100 mm)	4.026-in. (102.26 mm)	0.403 (10.25)	0.805 (20.45)	1.309 (32.22)
6-in. (150 mm)	6.065-in. (154.051 mm)	0.607 (15.42)	1.213 (30.81)	1.971 (50.06)
8-in. (200 mm)	7.981-in. (202.717 mm)	0.798 (20.27)	1.596 (40.54)	2.594 (65.89)
10-in. (250 mm)	10.02-in. (254.51 mm)	1.002 (25.45)	2.004 (50.90)	3.257 (82.73)
12-in. (300 mm)	12.00-in. (304.80 mm)	1.200 (30.48)	2.400 (60.96)	3.900 (99.06)
14-in. (350 mm)	13.124-in. (333.35 mm)	1.312 (33.32)	2.625 (66.68)	4.265 (108.33)
16-in. (400 mm)	15.000-in. (381.00 mm)	1.500 (38.10)	3.000 (76.20)	4.875 (123.83)
18-in. (450 mm)	16.876-in. (428.65 mm)	1.688 (42.88)	3.375 (85.73)	5.485 (139.32)
20-in. (500 mm)	18.812-in. (477.82 mm)	1.881 (47.78)	3.762 (95.55)	6.114 (155.30)
24-in. (600 mm)	22.624-in. (574.65 mm)	2.262 (57.45)	4.525 (114.94)	7.353 (186.77)

(1) For 2-in. (50.8 mm) line size, the beta (β) is 0.60.

Rosemount 1195 Integral Orifice Primary Element

1195 Integral Orifice Primary Element

Rosemount 1195 Integral Orifice Primary Element utilizes a self centering orifice plate design to eliminate installation error.

- Enables highly accurate flow measurement in small line sizes
- Available with a variety of process connections
- Available in 1/2 to 1 1/2-in. (15 - 40 mm) line sizes

Additional Information
Specifications: page 113
Dimensional Drawings: page 160
Installation and Flowmeter Orientation: page 163

Table 58. Rosemount 1195 Integral Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1195	Integral Orifice Primary Flow Element	
Body Material		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (not available with thermowell and RTD)	★
S1(1)	Socket Weld Body (not available with thermowell and RTD)	★
P1	Pipe Ends: NPT threaded	★
P2	Pipe Ends: Beveled	★
D1	Pipe Ends: Flanged, RF, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, RF, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, RF, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
P9	Special Process Connection	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★

Table 58. Rosemount 1195 Integral Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
H	Alloy C-276	
M	Alloy 400	
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★
0260	0.260-in. (6.60 mm) for 1/2-in. Pipe	★
0340	0.340-in. (8.64 mm) for 1/2-in. Pipe	★
0150	0.150-in. (3.81 mm) for 1-in. Pipe	★
0250	0.250-in. (6.35 mm) for 1-in. Pipe	★
0345	0.345-in. (8.76 mm) for 1-in. Pipe	★
0500	0.500-in. (12.70 mm) for 1-in. Pipe	★
0630	0.630-in. (16.00 mm) for 1-in. Pipe	★
0800	0.800-in. (20.32 mm) for 1-in. Pipe	★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe	★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe	★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe	★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe	★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe	★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe	★
Expanded		
0010	0.010-in. (0,25 mm) for 1/2-in. Pipe	
0014	0.014-in. (0,36 mm) for 1/2-in. Pipe	
0020	0.020-in. (0,51 mm) for 1/2-in. Pipe	
0034	0.034-in. (0,86 mm) for 1/2-in. Pipe	
Transmitter / Body Bolt Material		
Standard		**Standard**
C	316 SST (1 1/2-in. transmitter studs)	★
Expanded		
G(2)	High temperature (850 °F (454 °C))	

Options (Include with selected model number)

Temperature Sensor		
Expanded		
S(3)	Thermowell and RTD (SST Temperature Housing)	
T(3)	Thermowell and RTD (Aluminum Temperature Housing)	
Assemble to Transmitter		
Expanded		
S4(4)	Factory assembly – Attach to transmitter and manifold	
Optional Bore Calculation		
Standard		**Standard**
BC	Bore Calculation	★
Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Adapters for Remote Mounting		
Standard		**Standard**
G2	1/2–14 NPT Remote Adapters – SST	★
Expanded		
G3	1/2–14 NPT Remote Adapters – Alloy C-276	

Table 58. Rosemount 1195 Integral Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pressure Testing		
Expanded		
P1[5]	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)	
Flow Calibration		
Expanded		
WD[6]	Discharge Coefficient Verification	
WZ[6]	Special Calibration	
Special Inspection		
Standard		**Standard**
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[7]	ANSI / ASME B31.1	
J3[7]	ANSI / ASME B31.3	
J4[7]	ANSI / ASME B31.8	
Materials Conformance		
Expanded		
J5[8]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Hardware Adjustments and Ground Screw		
Expanded		
A1	External Ground Screw for Temperature Connection Head	
A2	Cover Clamp and External Ground Screw for Temperature Connection Head	
Typical Model Number: 1195 S 010 W3 S 0150 C		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Not available with Assemble to Transmitter code S4.

(3) Thermowell material is the same as the body material.

(4) Not available with Process Connection code S1.

(5) Does not apply to Process Connection codes T1 and S1.

(6) Not available for bore sizes 0010, 0014, 0020, or 0034.

(7) Not available with DIN Process Connection codes D1, D2, or D3.

(8) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

1195 Specifications

1195 PERFORMANCE SPECIFICATIONS

Table 59. Discharge Coefficient Uncertainty(1)

Beta (β)(2)	Discharge Coefficient Uncertainty
β < 0.1	±2.50%
0.1 < β < 0.2	±1.25%
0.2 < β < 0.6	±0.75%
0.6 < β < 0.8	±1.50%

(1) Without associated straight run piping, discharge coefficient uncertainty can add up to 1.5% - 5% additional error. Consult the factory for additional information.

(2) $\beta = \frac{\text{Orifice Plate Bore}}{\text{body I.D.}}$

Line Sizes

- 1/2-in. (15 mm)
- 1-in. (25 mm)
- 1 1/2-in. (40 mm)

Sizing

Contact a Emerson Process Management sales representative for assistance. A “Configuration Data Sheet” is required prior to order for application verification.

1195 FUNCTIONAL SPECIFICATIONS

Service

- Liquid
- Gas
- Steam

Process Temperature Limits

Standard (direct/remote mount):

- –40 to 450 °F (–40 to 232 °C)

Extended (remote mount only with option code T):

- –148 to 850 °F (–100 to 454 °C)

Maximum Working Pressure

- Pressure retention per ANSI B16.5 600# or DIN PN100

Table 60. 1195 Pressure Limits

Line Size	Process Connection Code	Maximum Working Pressure @ 100 °F(1)(2)
1/2-in. (15 mm)	S1 or P2	3000 psig (207 bar)
	T1 or P1	1500 psig (103 bar)
1-in. (25 mm)	S1 or P2	2000 psig (138 bar)
	T1 or P1	1500 psig (103 bar)
1 1/2-in. (40 mm)	S1 or P2	1500 psig (103 bar)
	T1 or P1	1500 psig (103 bar)
All	Flanged	Meets flange primary pressure rating per ANSI B16.5 (EN-1092-1 for DIN flanges)

(1) For pressure ratings at temperatures less than -20 °F (-29 °C) or above 100 °F (38 °C) consult an Emerson Process Management representative.

(2) Transmitter static pressure range may limit maximum working pressure. Refer to Static Pressure Ranges specification.

1195 PHYSICAL SPECIFICATIONS

Material of Construction

Orifice Plate

- 316/316L SST
- Alloy C-276
- Alloy 400

Body

- 316 SST (CF8M), material per ASTM A351

Pipe Material (If Applicable)

- A312 Gr 316/316L, B622 UNS N10276, Alloy C-276

Flange

- A182 Gr 316/316L, SB-564 UNS N10276, Alloy C-276
- Flange pressure limits are per ANSI B16.5
- Flange face finish per ANSI B16.5, 125 to 250 RMS

Body Bolts/Studs

- ASTM A193 Gr B8M studs
- ASTM A193 Gr B8M Class 2 body studs provided for high temperature option code G

Transmitter Connection Studs

- ASTM A193 Gr B8M studs

Gaskets/O-rings

- Glass filled PTFE
- Inconel® X-750 provided for high temperature option code G
- Gaskets and O-rings must be replaced each time the 3051SFP is disassembled for installation or maintenance.

Orifice Type

Square edge–orifice bore sizes

- 0.066-in. and larger

Quadrant edge–orifice bore sizes
(for 1/2-in. (15 mm) line size only)

- 0.034-in. (0.86 mm)
- 0.020-in. (0.51 mm)
- 0.014-in. (0.35 mm)
- 0.010-in. (0.25 mm)

NOTE
Integral orifice bodies contain corner tapped pressure ports.

Pipe Lengths

Upstream and downstream associated piping sections are available on the 1195. The table below lists the standard overall length (lay length) as a function of end connections and line size.

Transmitter Connections

2 1/8-in. (54 mm) center-to-center. Other transmitter spacing can be accommodated using the optional remote adapters and customer-supplied impulse piping. DIN 19213 connections are available

Table 61. Overall Length Dimension

	Line Size		
Overall Length Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
Beveled/Threaded pipe ends	18.27 (464.1)	28.98 (736.1)	40.35 (1024.9)
RF slip-on, RTJ slip-on, RF-DIN slip on	18.43 (468.2)	29.14 (740.2)	40.51 (1029.0)
RF 150#, weld neck	21.94 (557.2)	33.25 (844.5)	45.12 (1146.0)
RF 300#, weld neck	22.32 (566.9)	33.77 (857.7)	45.60 (1158.2)
RF 600#, weld neck	22.81 (579.4)	34.26 (870.3)	46.23 (1174.3)
Dimensions are in inches (millimeters).			

Table 62. Torque Values of Standard Bolts

Stud & Nut Torque Specifications(1)	
Transmitter Bolts	**Torque**
All Line sizes and gasket types	32 lb-ft (44 N-m)
Manifold Bolts	
All Line sizes and gasket types	32 lb-ft (44 N-m)
Orifice Body Bolts(2)	
1/2-in. (15 mm) Line size (all gasket types)	60 lb-ft (82 N-m)
1-in. (25 mm) Line size (all gasket types)	60 lb-ft (82 N-m)
1 1/2-in. (40 mm) Line size (PTFE gasket)	60 lb-ft (82 N-m)
1 1/2-in. (40 mm) Line size (X-750 metal gasket)	75 lb-ft (102 N-m)

(1) Studs and nuts should be tightened to specification in two to three steps alternating between sides.

(2) Never reuse gaskets. Always replace gaskets after disassembly to ensure proper seal.

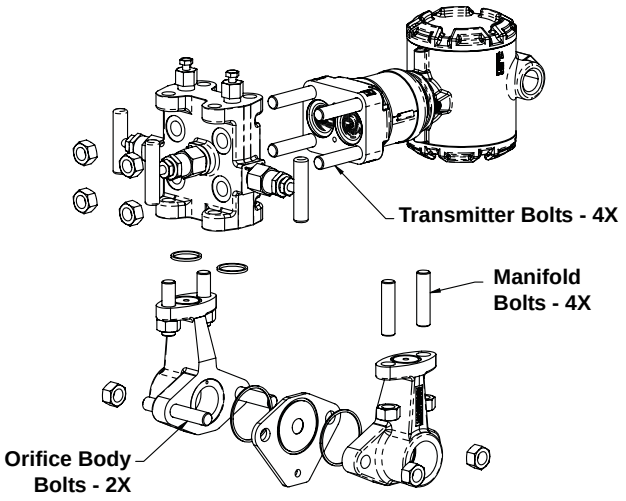


Table 63. Weight (The following weights are approximate.)

Line Size	**1195 Only**		**With Flanged Piping(1)**	
	lb	**kg**	**lb**	**kg**
1/2-in. (15 mm)	4.0	1.8	8	3.6
1-in. (25 mm)	6.0	2.7	12	5.4
1 1/2-in. (40 mm)	8.0	3.6	25	11.3

(1) As supplied with standard lengths, ANSI Class 150 flanges.

Rosemount 1495 Orifice Plate

Standard configuration is with a square-edged concentric bore in both paddle and universal type plates. Also available with a spiral finish. Final inspection reports illustrating plate thickness, concentricity, outside dimensions, inside dimensions, roundness, and flatness are available.

- Bore calculations are available if the Configuration Data Sheet (CDS) is completed and Option BC is selected.

1495 ORDERING INFORMATION

Table 64. Rosemount 1495 Orifice Plate Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1495	Orifice Plate Primary	
Orifice Plate Type		
Standard		**Standard**
PC	Paddle, Concentric	★
PG	Paddle, Concentric, Spiral finish	★
UC	Universal, Concentric	★
Line Size		
Standard		**Standard**
020	2 in. (DN50)	★
025	2 1/2 in. (DN65)	★
030	3 in. (DN80)	★
040	4 in. (DN100)	★
060	6 in. (DN150)	★
080	8 in. (DN200)	★
100	10 in. (DN250)	★
120	12 in. (DN300)	★
140	14 in. (DN350)	★
160	16 in. (DN400)	★
180	18 in. (DN450)	★
200	20 in. (DN500)	★
240	24 in. (DN600)	★
Flange Rating		
Standard		**Standard**
A1	Flange ANSI Class 150 Raised Face	★
A3	ANSI Class 300 Raised Face	★
A6	ANSI Class 600 Raised Face	★
A9	ANSI Class 900 Raised Face	★
AF	ANSI Class 1500 Raised Face	★
AT[(1)]	ANSI Class 2500 Raised Face	★
D1	DIN PN10	★
D2	DIN PN16	★
D3	DIN PN25	★
D4	DIN PN40	★
D5	DIN PN63[(2)]	★
D6	DIN PN100	★
Expanded		
R3	Flange ANSI Class 300 Ring Joint	
R6	Flange ANSI Class 600 Ring Joint	
R9	Flange ANSI Class 900 Ring Joint	

Table 64. Rosemount 1495 Orifice Plate Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

RF	Flange ANSI Class 1500 Ring Joint	
RT	Flange ANSI Class 2500 Ring Joint	
Orifice Plate Material Type		
Standard		**Standard**
S	316/316L Stainless Steel	★
T	DIN 1.4571 (316Ti Stainless Steel)	★
L	304/304L Stainless Steel	★
Expanded		
H	Alloy C-276	
M	Alloy 400	
Plate Thickness		
Standard		**Standard**
A	0.125-in. (3.2 mm) – default for line size 2 to 6-in. (50 to 150 mm)	★
B	0.250-in. (6.35 mm) – default for line size 8 to 14-in. (200 to 350 mm)	★
C	0.375 in. (9.53 mm) - default for line size 16 to 20-in. (400 to 500 mm)	★
D	0.500-in. (12.7 mm) – default for line size 24-in. (600 mm)	★
E(3)	Plate Thickness per DIN 19206	★
Bore		
Standard		**Standard**
XXXXX	Bore (XXXXX = XX.XXX)	★

Options (Include with selected model number)

Bore Calculation		
Standard		**Standard**
BC	Bore Calculation	★
Drain / Vent Hole		
Standard		**Standard**
DV(4)	Drain / Vent Hole	★
Plate Holder		
Standard		**Standard**
PH(5)	Plate Holder for RTJ Flanges	★
Alternate Bore Type		
Standard		**Standard**
TC	Conical Entrance Bore	★
TE(4)	Eccentric Bore	★
TS(4)	Segmental Bore	★
TQ	Quandrant Edged Bore	★
RO(6)	Restriction Orifice Plate	★
Alternate Pipe Schedule		
Standard		**Standard**
FA(7)	Schedule 5S	★
FB(7)	Schedule 10	★
FC(7)	Schedule 10S	★
FD(7)	Schedule 20	★
FE(7)	Schedule 30	★
FF(7)	Schedule 40	★
FG(7)	Schedule 40S	★
FH(7)	Schedule Standard (STD)	★
FI(7)	Schedule 60	★

Table 64. Rosemount 1495 Orifice Plate Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

FJ(7)	Schedule 80	★
FK(7)	Schedule 80S	★
FL(7)	Schedule Extra Strong (XS)	★
FM(7)	Schedule 100	★
FN(7)	Schedule 120	★
FP(7)	Schedule 140	★
FQ(7)	Schedule 160	★
FR(7)	Schedule Double Extra Strong (XXS)	★
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
Special Inspection		
Standard		**Standard**
QC1	Visual & dimensional inspection with certificate	★
QC7	Inspection & performance certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certificate per and EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J5(8)	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Typical Model Number: 1495 PC 040 A3 S A 02125		

(1) Available in line sizes from 2-12 in.

(2) Previously PN64.

(3) Standard Plate Thickness:
DN50 - 65 = 3 mm
DN80 – 450 = 4 mm
DN500 - 600 = 6 mm

(4) This option requires pipe I.D. to be specified. Please select alternate pipe schedule option or specify on order.

(5) Integral Plate Holder (material matches plate material) for line sizes to 3-in., requires minimum $^1/_4$-in plate thickness. Screw Type Plate Holder in 304SS for line sizes 4-in. and larger.

(6) A standard beveled orifice plate is provided with the "RO" option code.

(7) These options should only be selected if options DV, TE, or TS are selected. These options are not available with flange rating D1-D6.

(8) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

Rosemount 1496 Orifice Flange Union

Standard flange styles are raised face (RF) weld neck, RF slip-on, or RF threaded for paddle type orifice plates, and ring type joint (RTJ) weld neck for universal type plates with plate holders. All flange unions are supplied with studs, nuts, jackscrews, gaskets, and pipe plugs. Table 68 lists standard pipe schedules.

- Meets ASME B16.36
- Meets DIN 19214 part 1
- Threaded tap connection provided 180-degrees apart

The following options are available.

- Socket weld tap connections
- High temperature flange gaskets for temperatures greater than 500 °F (260 °C)
- Stainless Steel flange bolting per ASTM A193 Grade B8M/A194 Grade 8M

1496 ORDERING INFORMATION

Table 65. Rosemount 1496 Orifice Flange Union Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1496	Orifice Flange Union	
Flange Union Type		
Standard		**Standard**
WN	Raised Face, Weld Neck	★
TH	Raised Face, Threaded	★
SO	Raised Face, Slip-On	★
DN	Raised Face, Weld Neck, DIN 19214 Part 1	★
Expanded		
RJ	Ring Joint, Weld Neck	
Line Size		
Standard		**Standard**
020	2 in. (DN50)	★
025	2½-in. (DN65)	★
030	3 in. (DN80)	★
040	4 in. (DN100)	★
060	6 in. (DN150)	★
080	8 in. (DN200)	★
100	10 in. (DN250)	★
120	12 in. (DN300)	★
140	14 in. (DN350)	★
160	16 in. (DN400)	★
180	18 in. (DN450)	★
200	20 in. (DN500)	★
240	24 in. (DN600)	★
Flange Rating		
Standard		**Standard**
A3	ANSI Class 300	★
A6	ANSI Class 600	★
A9	ANSI Class 900	★
AF	ANSI Class 1500	★
AT(1)	ANSI Class 2500	★
D1	DIN PN10	★
D2	DIN PN16	★
D3	DIN PN25	★

Table 65. Rosemount 1496 Orifice Flange Union Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

D4	DIN PN40	★
D5	DIN PN63[2]	★
D6	DIN PN100	★
Expanded		
R3	Ring-Type Joint (RTJ) Class 300	
R6	Ring-Type Joint (RTJ) Class 600	
R9	Ring-Type Joint (RTJ) Class 900	
RF	Ring-Type Joint (RTJ) Class 1500	
RT	Ring-Type Joint (RTJ) Class 2500	
Flange Union Material Type		
Standard		**Standard**
C	Carbon Steel	★
S	316/316L Stainless Steel	★
T	DIN 1.4571 (316Ti Stainless Steel)	★
L	304/304L Stainless Steel	★
Expanded		
H	Alloy C-276	
M	Alloy 400	

Options (Include with selected model number)

Alternate Pipe Schedule / Wall Thickness[3]		
Standard		**Standard**
FA[4]	Schedule 5S	★
FB[4]	Schedule 10	★
FC[4]	Schedule 10S	★
FD[4]	Schedule 20	★
FE[4]	Schedule 30	★
FF[4]	Schedule 40	★
FG[4]	Schedule 40S	★
FH[4]	Schedule Standard (STD)	★
FI[4]	Schedule 60	★
FJ[4]	Schedule 80	★
FK[4]	Schedule 80S	★
FL[4]	Schedule Extra Strong (XS)	★
FM[4]	Schedule 100	★
FN[4]	Schedule 120	★
FP[4]	Schedule 140	★
FQ[4]	Schedule 160	★
FR[4]	Schedule Double Extra Strong (XXS)	★
High Temperature Gaskets		
Standard		**Standard**
G1[5]	High Temperature Gaskets (spiral wound gaskets)	★
Alternate Bolting Material		
Standard		**Standard**
SS[6]	316SS Studs/Nuts	★
Alternate Pressure Tap Type		
Standard		**Standard**
ST	Socketweld Pressure Taps (not available with Flange Union Type code DN)	★

Table 65. Rosemount 1496 Orifice Flange Union Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Cleaning		
Expanded		
P2	Cleaned for Special Services	
Special Inspection		
Standard		**Standard**
QC1	Visual & dimensional inspection with certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certificate per and EN 10204 :2004 3.1	★
Code Conformance		
Expanded		
J5(7)	Materials conforming to NACE MR01-75	
Country Certification		
Standard		**Standard**
J1	Canadian Registration	★
Expanded		
J6	Conformance to European Pressure Equipment Directive (PED) 97/23/EC	
Typical Model Number: 1496 WN 040 A3 S		

(1) Available in line sizes from 2-12 in.

(2) Previously PN64.

(3) Default pipe schedules are listed in Table 68 on page 122 for the 1496 Orifice Flange Unions.

(4) These options are not available with flange type DN. These options should only be selected if the required pipe schedule is different from the default pipe schedule, as shown in Table 68 on page 122. Standard wall thickness for DIN weldneck flanges is per ISO EN 1092-1 (2002). Consult the factory if a different wall thickness is required.

(5) Not available with Flange Union Type code RJ.

(6) Stainless steel bolting (ASTM A193 GR B8M Class 2) is classified as "low strength bolting" by the various ASME B31 piping codes and may not be suitable for all applications requiring code conformance.

(7) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

1495/1496 Specifications

1495/1496 FUNCTIONAL SPECIFICATIONS

Service and Flow Range

Liquid, gas or vapor turbulent flow, for pipe Reynold's Numbers greater than the following(1):

AGA-3: 4,000
ASME MFC-3M(2): 5,000 and 170 β^2 D (whichever is higher)
ISO-5167(2): 5,000 and 170 β^2 D (whichever is higher)

(1) For flange tap applications.

(2) D = pipe I.D. in mm. β = Beta Ratio

Orifice Plate Operating Limitations

Table 66. Temperature Limit (Based on flange rating per ANSI B16.5.)

ANSI Flange Rating	Applicability	Gasket Description	Temperature Rating
300#	Default	Durlon 8500, Compressed Sheet Gasket	-100 °F to 700 °F (-73 °C to 371 °C)
	If "P2" option	Durlon 9000, Compressed Sheet Gasket	-350 °F to 520 °F (-212 °C to 271°C)
	If "G1" option	Flexitallic CGI, Spiral Wound Gasket with Thermiculite 735 Filler	-350 °F to 1000 °F (-212 °C to 538 °C)
600#, 900#, 1500#, 2500#	Default	Flexitallic CGI, Spiral Wound Gasket with Thermiculite 735 Filler	-350 °F to 1000 °F (-212 °C to 538 °C)
	If "P2" option	Flexitallic CGI, Spiral Wound Gasket with PTFE Filler	-300 °F to 500 °F (-184 °C to 260 °C)
	If "G1" option	Flexitallic CGI, Spiral Wound Gasket with Thermiculite 735 Filler	-350 °F to 1000 °F (-212 °C to 538 °C}

Maximum Working Pressure:

Based on flange rating per ANSI B16.5.

Service and Flow Range

Liquid, gas or vapor turbulent flow, for pipe Reynold's Numbers within ISO 5167, AGA Report No. 3/ API 14.3.2, and ASME MFC-3M specifications.

Pipe Sizes

2-in. to 24-in. (50 mm to 600 mm). Contact Emerson Process Management for pipe sizes less than 2-in. (50 mm) or greater than 24-in. (600 mm).

•

Operating Limits

1495 Temperature Range:

- –320 to 1200 °F (–196 to 649 °C)

Table 67. 1496 Temperature Range:

1496 Material	Temperature Rating
Carbon Steel (ASTM A105)	-29 °C to -29°C
316/316L Stainless Steel (ASTM A182)	-198 °C to 538 °C
304/304L Stainless Steel (ASTM A182)	-254 °C to 538 °C
Alloy C-276 (ASTM B462 UNS N10276)	-198 °C to 677°C
Alloy 400 (ASTM B564 UNS N04400)	-198 °C to 482 °C
Carbon Steel (A350-LF2)	-46 °C to 538 °C
DIN 1.4571 (316Ti Stainless Steel)	-198 °C to 538 °C
Alloy C4 (ASTM B574 UNS N06455)	-198 °C to 427 °C

1495/1496 PHYSICAL SPECIFICATIONS

Standard Pipe Schedules

Table 68. Default Pipe Schedules for 1496 Orifice Flange Unions [(1)(2)]

Nominal Pipe Size[(3)]	ANSI 300# (WN, TH, SO)	ANSI 600# (WN, RJ)	ANSI 900# (WN, RJ)	ANSI 1500# (WN, RJ)	ANSI 2500# (WN, RJ)
2 (51)	Standard	Standard	XS	XS	160
2½- (64)	Standard	Standard	XS	XS	
3 (76)	Standard	Standard	XS		
4 (102)	Standard	Standard	XS		
6 (152)	Standard	Standard	XS		
8 (203)	Standard	Standard			
10 (254)	Standard	XS			
12 (305)	Standard	XS			
14 (356)	Standard				
16 (406)	Standard				
18 (457)	Standard				
20 (508)	Standard				
24 (610)	XS				

(1) If no default schedule provided - customer must specify pipe schedule.

(2) Standard wall thickness for DIN weldneck flanges is per ISO EN 1092-1 (2002). Consult factory if different wall thickness is required.

(3) Size in inches (millimeters).

NOTE
It is strongly encouraged to use the ordering codes to specify desired pipe schedule.

Table 69. Dimensions of Pipe Inner Diameter[(1)]

Nominal Pipe Size	Schedule					
	5S	10	10S	20	30	40
2 (51)	2.245 (57.02)	2.157 (54.79)	2.157 (54.79)	–	–	2.067 (52.501)
2½- (64)	2.709 (68.81)	2.635 (66.93)	2.635 (66.93)	–	–	2.469 (62.71)
3 (76)	2.224 (56.49)	3.26 (82.80)	3.26 (82.80)	–	–	3.068 (77.93)
4 (102)	4.334 (110.08)	4.26 (108.20)	4.26 (108.20)	–	–	4.026 (102.26)
6 (152)	6.407 (162.74)	6.357 (161.47)	6.357 (161.47)	–	–	6.065 (154.05)
8 (203)	8.407 (213.54)	8.329 (211.56)	8.329 (211.56)	8.125 (206.38)	8.071 (205)	7.981 (202.72)
10 (254)	10.482 (266.24)	10.42 (264.67)	10.42 (264.67)	10.25 (260.35)	10.136 (257.45)	10.20 (254.51)
12 (305)	12.438 (315.93)	12.39 (314.71)	12.39 (314.71)	12.25 (311.15)	12.09 (307.09)	11.938 (303.23)
14 (356)	–	13.5 (342.90)	13.624 (346.05)	13.376 (339.75)	13.25 (336.55)	13.124 (333.35)
16 (406)	–	15.5 (393.70)	15.624 (396.85)	15.376 (390.55)	15.25 (387.35)	15.0 (381.0)
18 (457)	–	17.5 (444.50)	17.624 (447.65)	17.376 (441.35)	17.126 (435.00)	16.976 (431.19)
20 (508)	–	19.5 (495.30)	19.564 (496.93)	19.25 (488.95)	19.0 (482.60)	18.814 (477.88)
24 (610)	–	23.5 (596.90)	23.5 (596.90)	23.25 (590.55)	22.876 (581.05)	22.626 (574.70)
Nominal Pipe Size	**Schedule**					
	40S	**Standard**	**60**	**80**	**80S**	**XS**
2 (51)	2.067 (52.501)	2.067 (52.50)	–	1.939 (49.25)	1.939 (49.25)	1.939 (49.25)
2½- (64)	2.469 (62.71)	2.469 (62.71)	–	2.323 (59.0)	2.323 (59.0)	2.323 (59.0)
3 (76)	3.068 (77.93)	3.068 (77.93)	–	2.90 (73.66)	2.90 (73.66)	2.90 (73.66)
4 (102)	4.026 (102.26)	4.026 (102.26)	–	3.826 (97.18)	3.826 (97.18)	3.826 (97.18)
6 (152)	6.065 (154.05)	6.065 (154.05)	–	5.761 (146.33)	5.761 (146.33)	5.761 (146.33)
8 (203)	7.981 (202.72)	7.981 (202.72)	7.813 (198.45)	7.625 (193.68)	7.625 (193.68)	7.625 (193.68)
10 (254)	10.02 (254.51)	10.20 (259.08)	9.75 (247.65)	9.564 (242.94)	9.75 (247.65)	9.75 (247.65)
12 (305)	12.0 (304.8)	12.00 (304.80)	11.626 (41.30)	11.376 (288.95)	11.75 (298.45)	11.75 (298.45)
14 (356)	–	13.250 (336.55)	12.814 (325.48)	12.50 (317.50)	–	13.0 (330.20)
16 (406)	–	15.250 (387.35)	14.688 (373.08)	14.314 (363.58)	–	15.0 (381.0)
18 (457)	–	17.250 (438.15)	16.5 (419.10)	16.126 (409.60)	–	17.0 (425.0)
20 (508)	–	19.252 (488.95)	18.376 (466.75)	17.938 (455.63)	–	19.0 (482.60)
24 (610)	–	23.250 (590.55)	22.064 (560.43)	21.564 (547.73)	–	23.0 (584.20)

Table 69. Dimensions of Pipe Inner Diameter(1)

Nominal Pipe Size	Schedule					
	100	120	140	160	XXS	
2 (51)	–	–	–	1.689 (42.9)	1.503 (38.18)	
2½- (64)	–	–	–	2.125 (53.98)	1.771 (44.98)	
3 (76)	–	–	–	2.624 (66.65)	2.30 (58.42)	
4 (102)	–	3.624 (92.005)	–	3.438 (87.33)	3.152 (80.06)	
6 (152)	–	5.501 (139.73)	–	5.189 (131.80)	4.897 (124.38)	
8 (203)	7.437 (188.90)	7.189 (157.15)	7.001 (177.83)	6.813 (173.05)	6.875 (174.63)	
10 (254)	9.314 (236.58)	9.064 (230.23)	8.75 (222.25)	8.50 (215.90)	–	
12 (305)	11.064 (281.03)	10.75 (273.05)	10.5 (266.70)	10.126 (257.20)	–	
14 (356)	12.126 (308.00)	11.814 (300.08)	11.5 (37.50)	11.188 (284.18)	–	
16 (406)	13.938 (354.03)	13.564 (344.53)	13.124 (333.35)	12.814 (325.48)	–	
18 (457)	15.688 (398.27)	15.25 (387.35)	14.876 (377.85)	14.438 (366.73)	–	
20 (508)	17.44 (443.98)	17.0 (431.80)	16.5 (410.10)	16.064 (408.03)	–	
24 (610)	20.938 (531.83)	20.376 (517.55)	19.876 (504.85)	19.314 (490.58)	–	

(1) Measurement is in inches (millimeters).

Materials of Construction

1495 Orifice Plate

304/304L or 316/316L Stainless Steel ASTM A240; DIN 1.4571 (316Ti SST)(1); Alloy C-276 ASTM B575; or Alloy 400 ASTM B127.

(1) May not be available in all world areas.

Orifice Bore Sizes

Standard bore sizes are in 1/8-in. (3.2 mm) increments from ½-in. (12.7 mm) to 4-in. (101.6 mm) and in 1/4-in. (6.3 mm) increments from 4 1/4 to 6-in. (107.95 mm to 152.4 mm).

If required, Emerson Process Management can determine the orifice bore. Basic flow data is required at the time of order, see Calculation Data Sheet.

Bore tolerances are within AGA and ASME specifications. Available options allow the user to have the Rosemount 1495 sized for specific operating conditions. The “1495PC Paddle Type Orifice Plate” on page 172 specifies the physical parameters of the orifice from a detailed sizing calculation.

1496 Flange Unions

Orifice Flanges (ANSI B16.36): Carbon Steel ASTM A105 / A350; Stainless Steel ASTM A182; Alloy C-276 ASTM B564/575; or Alloy 400 ASTM B564/127; DIN 1.4571 (316Ti SST)(1); DIN 1.0460 (carbon steel)(1).

(1) May not be available in all world areas.

Flange Mounting Hardware

- Studs: Carbon Steel ASTM A193 Grade B7M
- Nuts: Carbon Steel ASTM A194 Gr 2H
- Gaskets: Non-asbestos ring type, Durlon® 8500 Green, Klingersil C4400, or equivalent
- Pipe Plugs: Match flange material

Pressure Taps

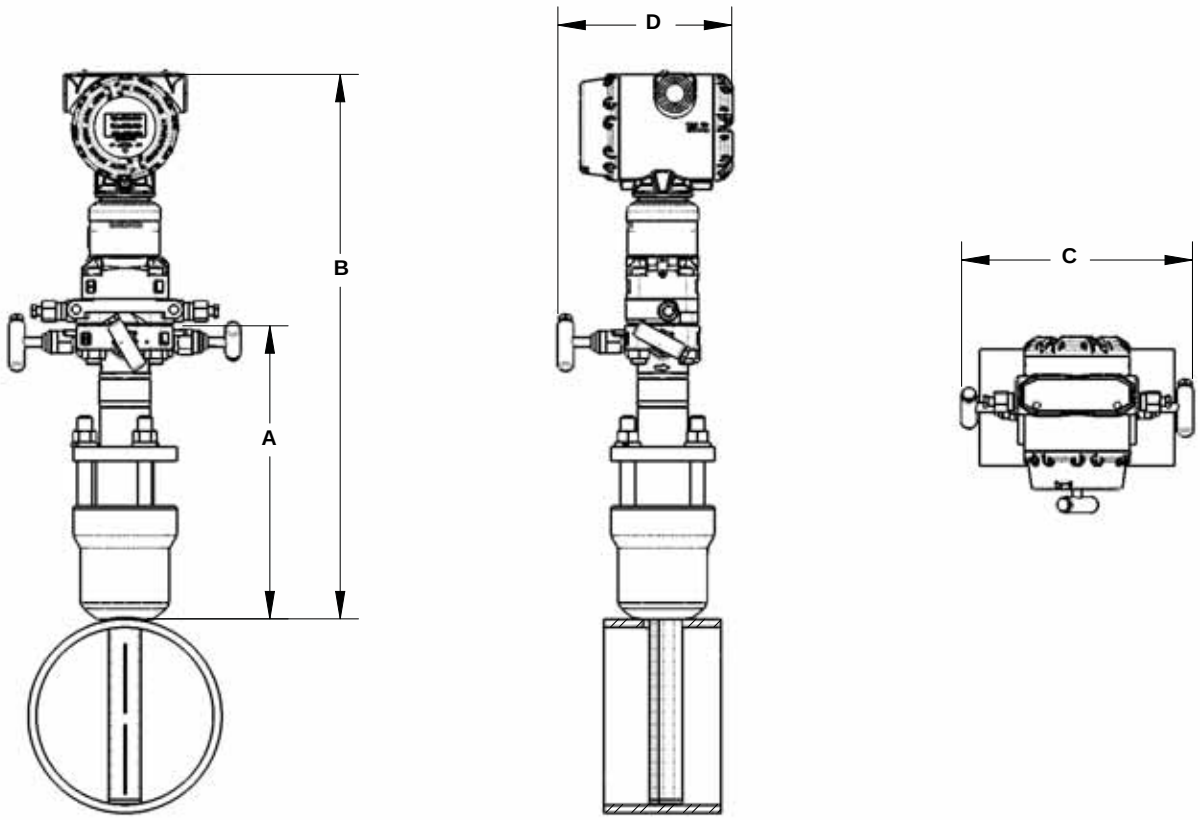
Pressure tap connections are ½ -in. (12.7 mm) NPT and 180° apart as standard. The tap hole diameter is ¼-in. (6.35 mm) for 2-in. (51 mm) and 2 ½ -in. (63.5 mm) size, 3/8-in. (9.6 mm) for 3-in. (76.2 mm) size, and ½-in. (12.7 mm) for 4-in. (101.6 mm) and larger sizes.

Dimensional Drawings

3051SF DIMENSIONAL DRAWINGS

Rosemount 3051SFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



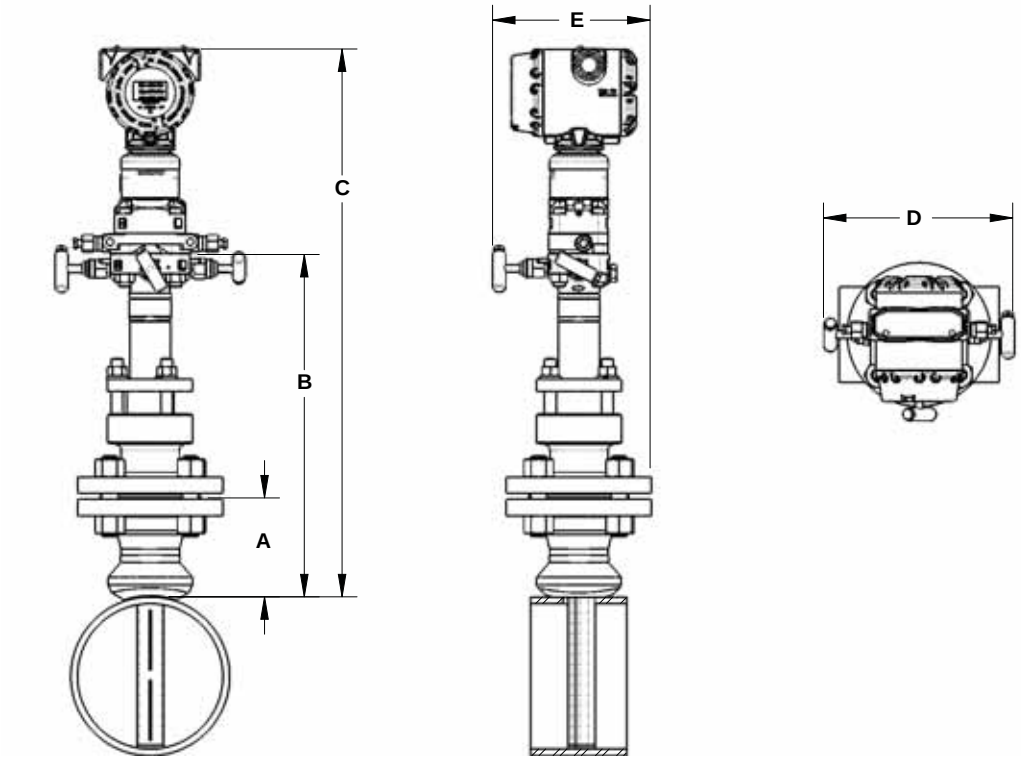
(1) The Pak-Lok Annubar model is rated equivalent to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 70. 3051SFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	16.03 (407.2)	9.00 (228.6)	6.90 (175.3)
2	11.00 (279.4)	17.78 (451.6)	9.00 (228.6)	6.90 (175.3)
3	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	6.90 (175.3)
Dimensions are in inches (millimeters)				

Rosemount 3051SFA Flange-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Flange-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 71. 3051SFA Flange-Lok Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN40	3.52 (89.4)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN16	3.85 (97.8)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
Dimensions are in inches (millimeters)						

Rosemount 3051SFA Flanged with Opposite Side Support Annubar Flowmeter

Front View	Side View	Top View

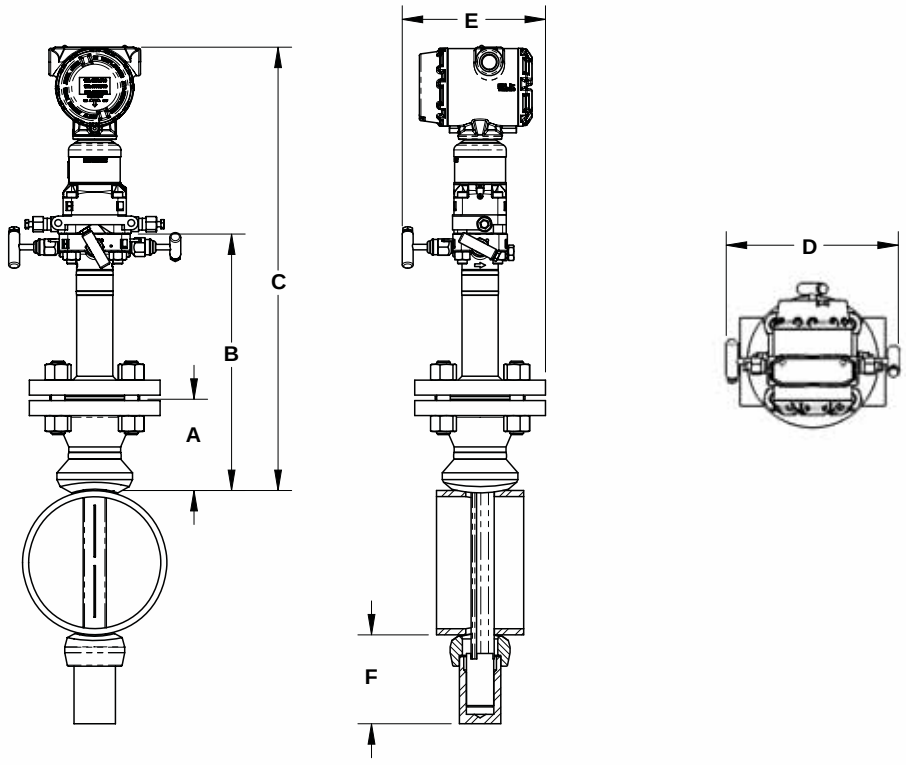


Table 72. 3051SFA Flanged Annubar Flowmeter Dimensional Data

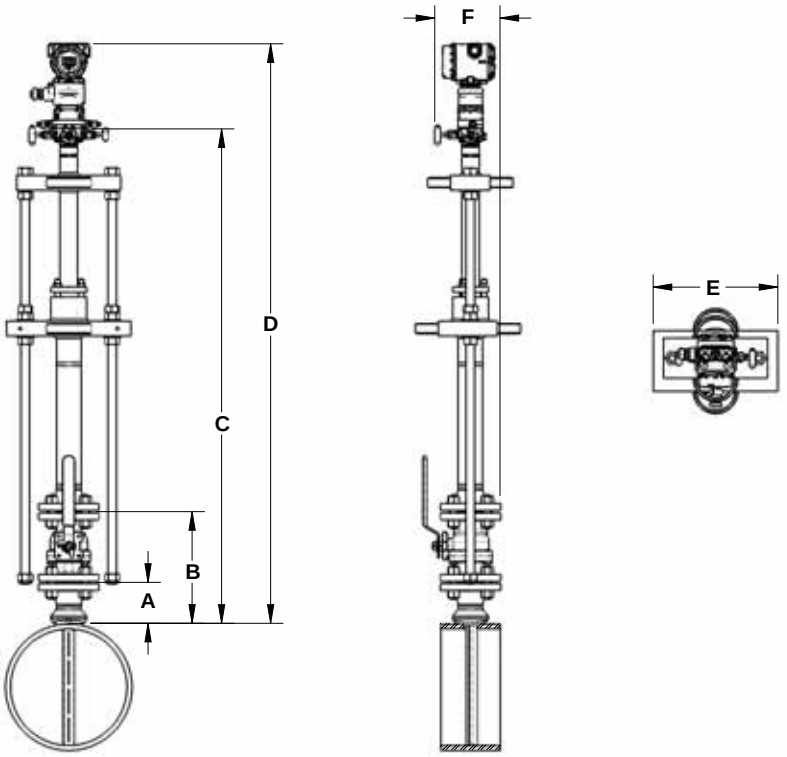
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	19.53 (496.1)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	—	—	—	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	6.80 (172.7)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	—	—	—	4.50 (114.3)

Table 72. 3051SFA Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.55 (191.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.06 (331.7)	—	—	—	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	—	—	—	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	—	—	—	7.00 (177.8)
	Dimensions are in inches (millimeters)						

Rosemount 3051SFA Flanged Flo-Tap Annubar Flowmeter(1)

Front View | **Side View** | **Top View**



(1) The Flanged Flo-Tap Annubar Flowmeter is available with either the manual or gear drive options.

Table 73. 3051SFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data

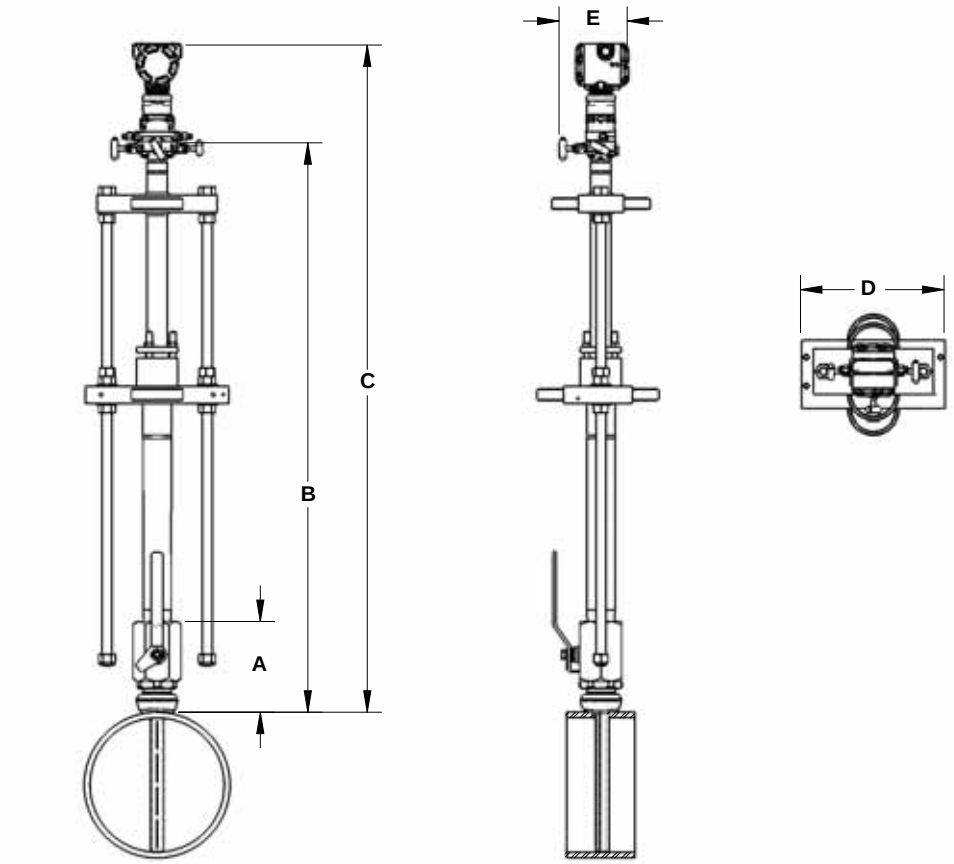
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	10.50 (266.7)	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN16(1)	3.09 (78.5)	See Note 1.	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN40(1)	3.21 (81.5)	See Note 1.	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN100(1)	3.88 (98.6)	See Note 1.	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	16.38 (416.0)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN16(1)	3.40 (86.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN40(1)	3.52 (89.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN100(1)	4.30 (109.2)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	19.50 (495.3)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN16(1)	3.85 (97.8)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN40(1)	4.16 (105.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN100(1)	4.95 (125.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
	Dimensions are in inches (millimeters)							

(1) DIN Valves are not offered

Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I
Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

Rosemount 3051SFA Threaded Flo-Tap Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Threaded Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 74. 3051SFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	C (Max)	D (Max)	E (Max)
1	7.51 (190.9)	—	16.96 (430.8)	B + 8.53 (216.7)	10.50 (266.7)	6.90 (175.3)
2	8.17 (207.5)	23.62 (599.9)	20.39 (517.9)	B + 8.53 (216.7)	12.56 (319.0)	6.90 (175.3)
Sensor Size 3 is not available in a Threaded Flo-Tap.						
Dimensions are in inches (millimeters)						

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

Rosemount 3051SFC Compact Orifice Flowmeter

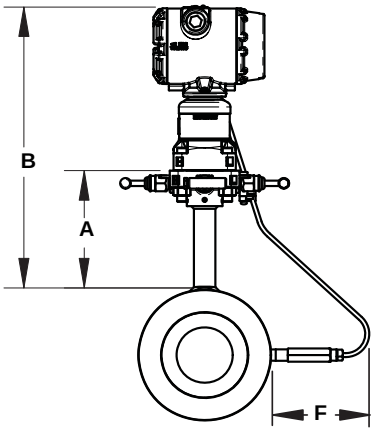
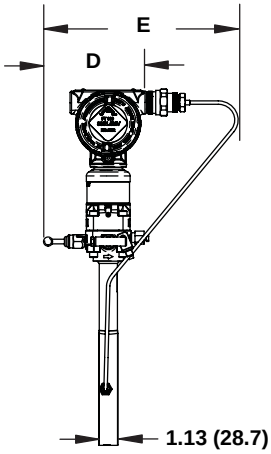
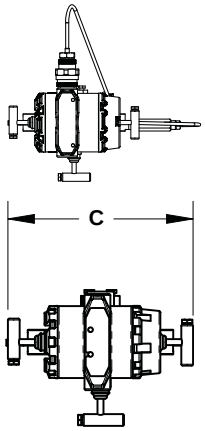
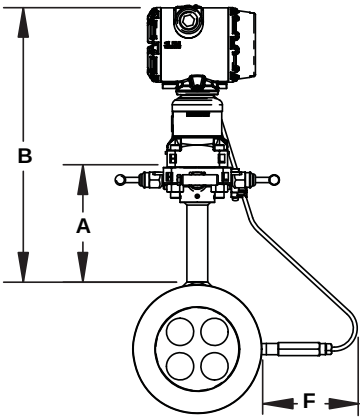
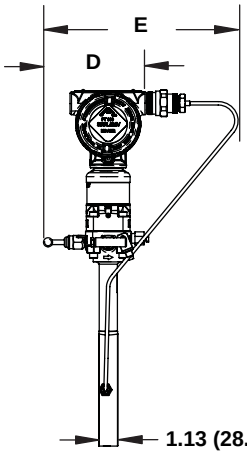
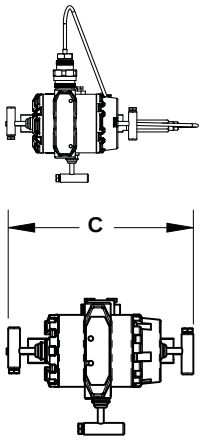
	Orifice Plate Front View	Orifice Plate Side View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)			
Conditioning Orifice Plate (Primary Element Type code C)			

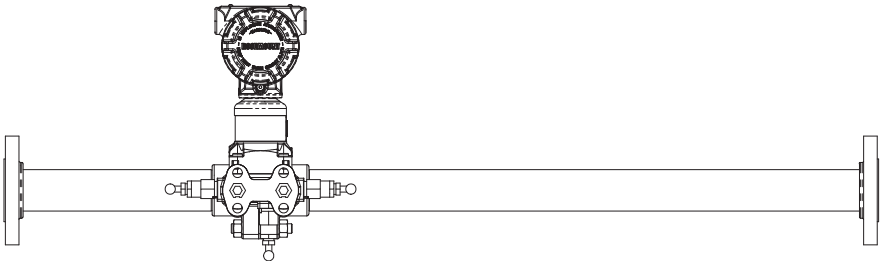
Table 75. 3051SFC Compact Orifice Dimensional Data(1)

Primary Element Type	A	B	Transmitter Height	C	D	E	F
Type P and C	5.62 (143)	Transmitter Height + A	7.70 (196)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open	10.2 (257.8) - closed 10.4 (264.2) - open	Max of 6.7 (71)

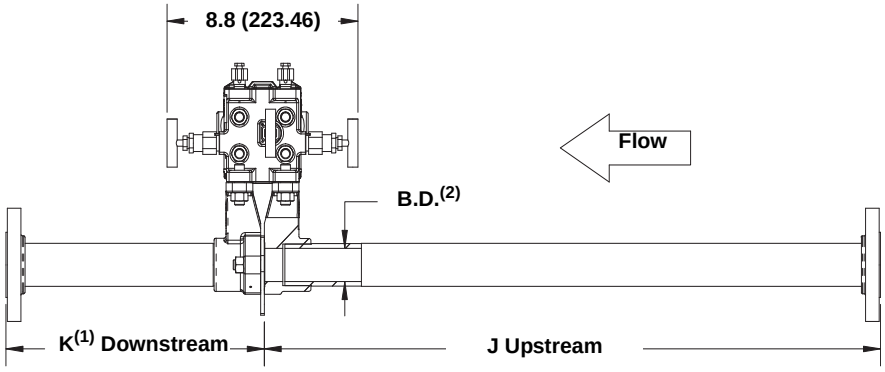
(1) Measurement in inches (millimeters).

Rosemount 3051SFP Integral Orifice Flowmeter

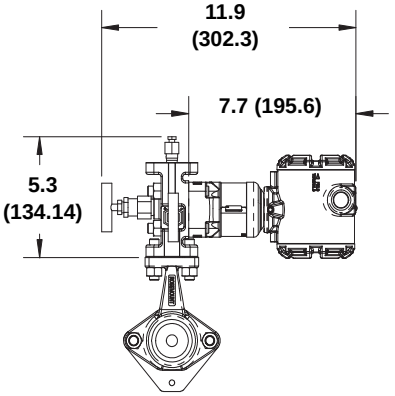
Front View



Bottom View



Side View



Dimensions are in inches (millimeters).

Table 76. 3051SFP Integral Orifice Flowmeter Dimensional Data

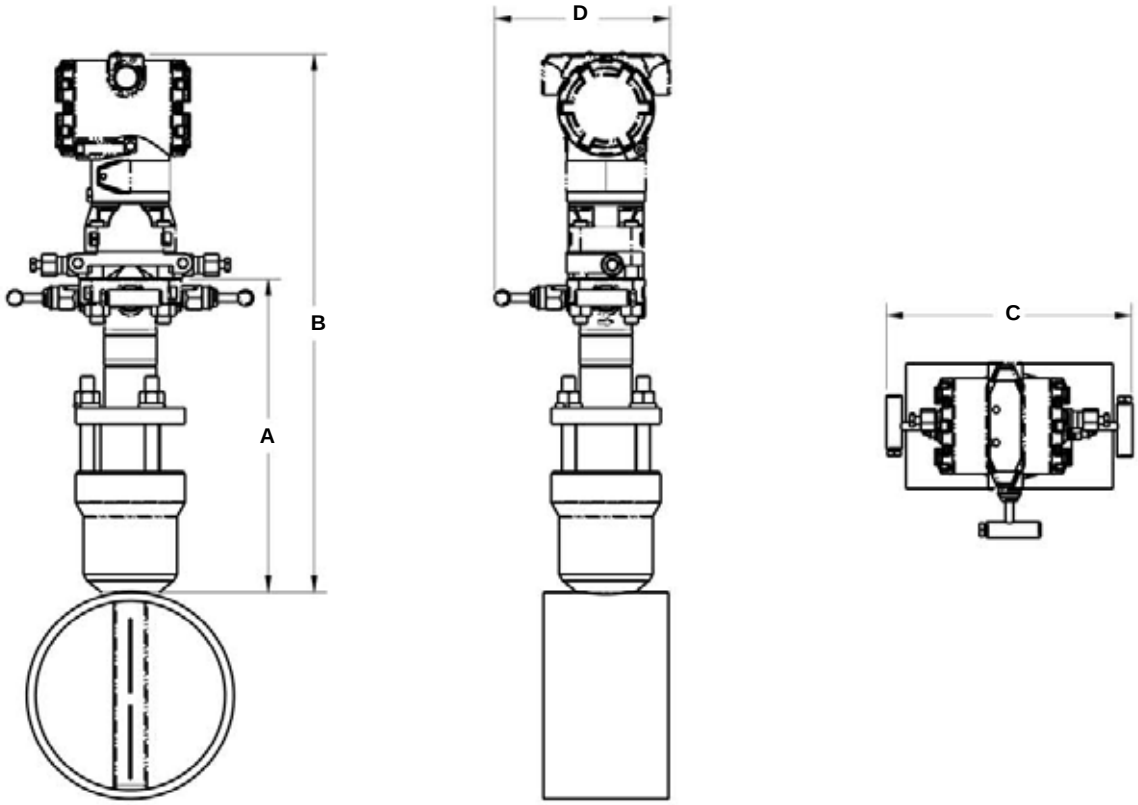
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

3051CF DIMENSIONAL DRAWINGS

Rosemount 3051CFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



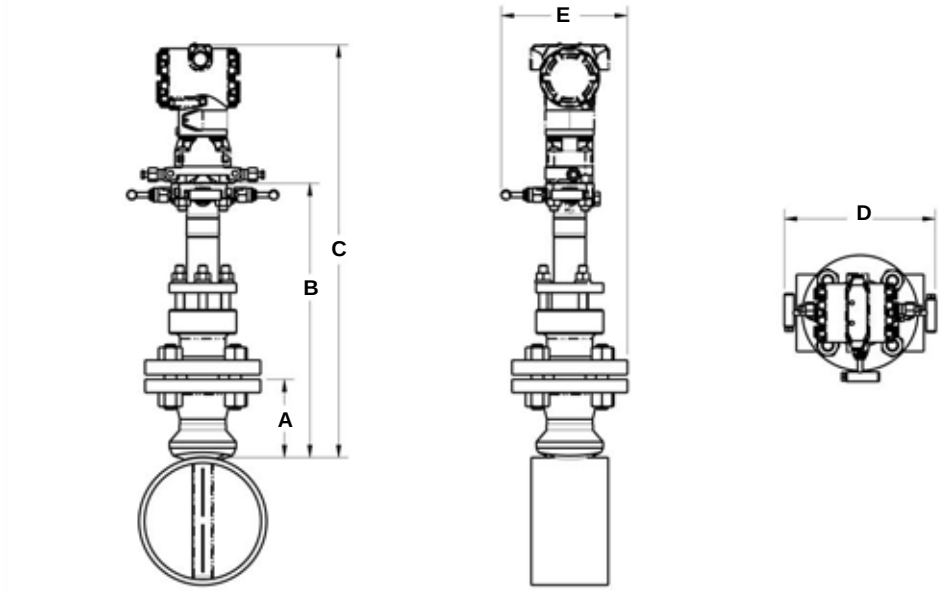
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 77. 3051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.60 (370.8)	9.00 (228.6)	6.00 (152.4)
2	11.0 (279.4)	16.35 (415.3)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount 3051CFA Flange-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Flange-Lok Annubar model can be direct mounted up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 78. 3051CFA Flange-Lok Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN40	3.52 (89.4)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN16	3.85 (97.8)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)

Dimensions are in inches (millimeters)

Rosemount 3051CFA Flanged Annubar Flowmeter

Front View | **Side View** | **Top View**

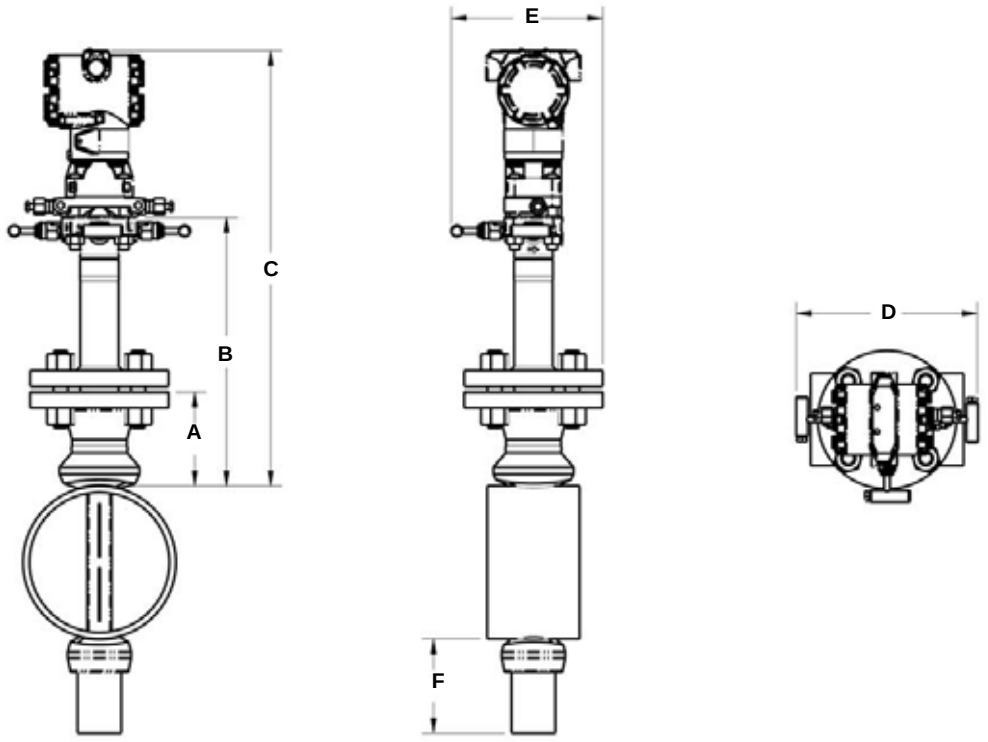


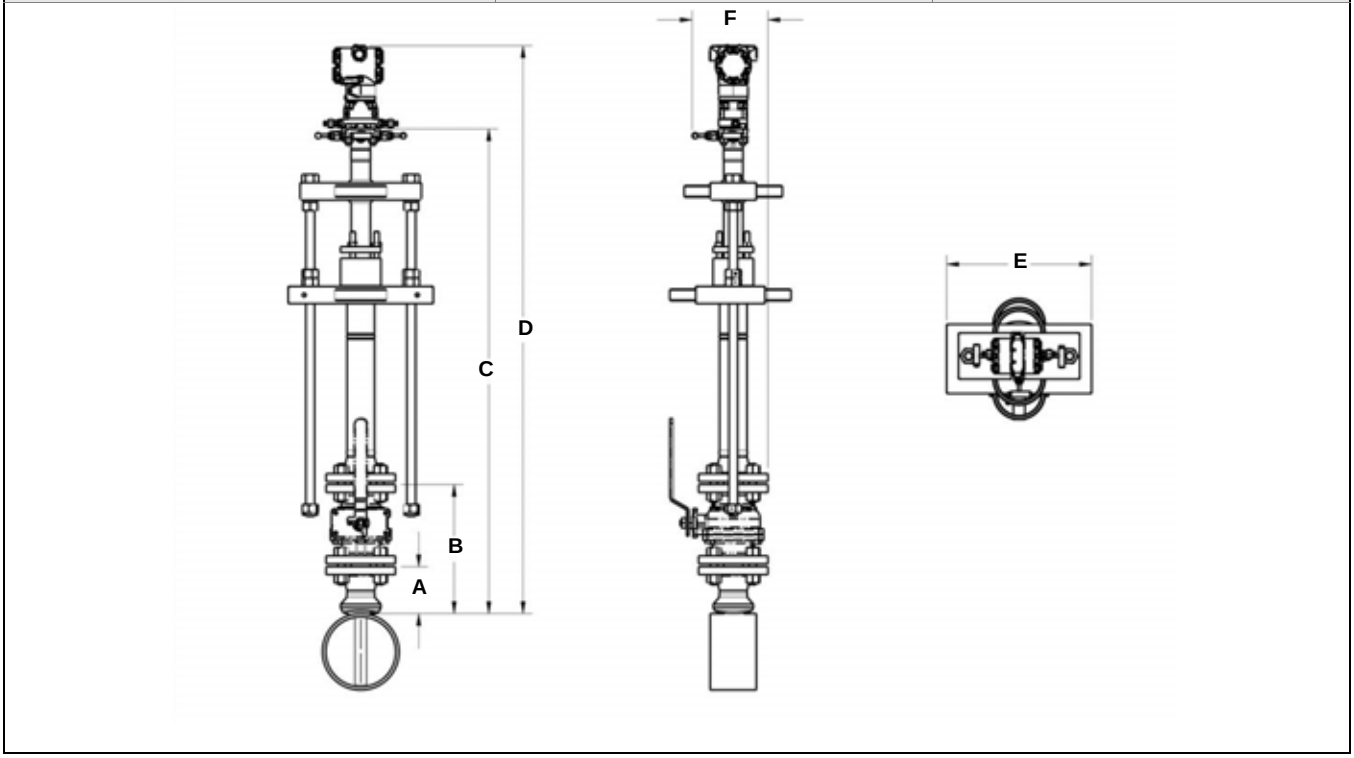
Table 79. 3051CFA Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	18.10 (459.7)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	—	—	—	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	6.80 (172.7)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.3)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	—	—	—	4.50 (114.3)

Table 79. 3051CFA Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.55 (191.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.06 (331.8)	—	—	—	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	—	—	—	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	—	—	—	7.00 (177.8)
Dimensions are in inches (millimeters)							

Rosemount 3051CFA Flanged Flo-Tap Annubar Flowmeter(1)



(1) The Flanged Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 80. 3051CFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	10.50 (266.7)	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN16(1)	3.09 (78.5)	See Note 1.	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	See Note 1.	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN100	3.88 (98.6)	See Note 1.	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	16.38 (416.0)	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN16	3.40 (86.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN40	3.52 (89.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN100	4.30 (109.2)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	19.50 (495.3)	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN16	3.85 (97.8)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN100	4.95 (125.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
	Dimensions are in inches (millimeters)							

(1) DIN Valves are not offered.

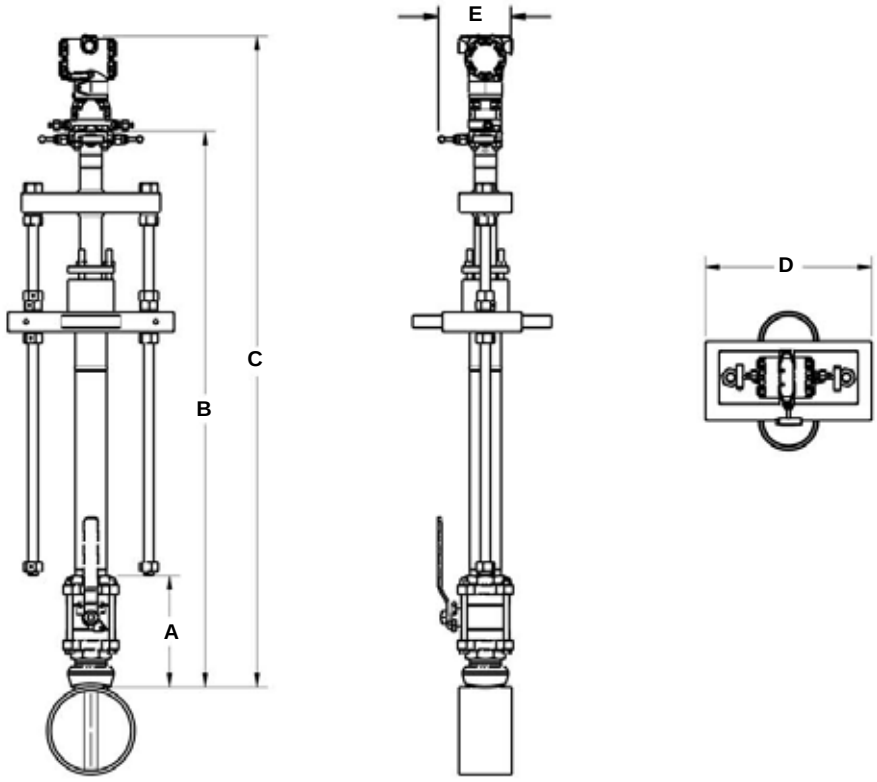
Note: Customer Supplied.

Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I

Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

Rosemount 3051CFA Threaded Flo-Tap Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Threaded Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 81. 3051CFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	C (Max)	D (Max)	E (Max)
1	7.51 (190.9)	—	16.96 (430.8)	B + 7.10 (180.3)	10.50 (266.7)	6.00 (152.4)
2	8.17 (207.5)	23.62 (599.9)	20.39 (517.9)	B + 7.10 (180.3)	12.56 (319.0)	6.00 (152.4)
Sensor Size 3 is not available in a Threaded Flo-Tap.						
Dimensions are in inches (millimeters)						

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

Rosemount 3051CFC Compact Orifice Flowmeter

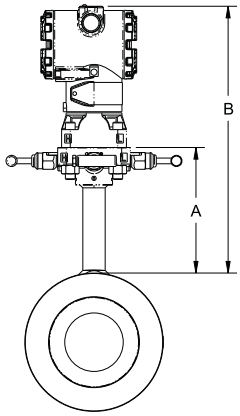
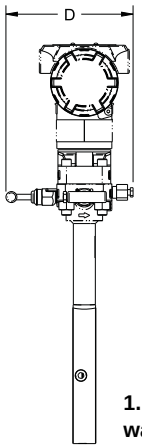
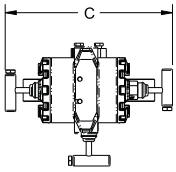
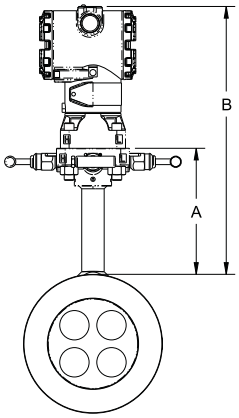
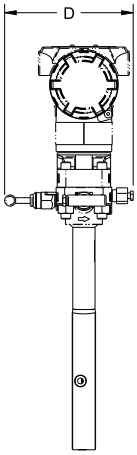
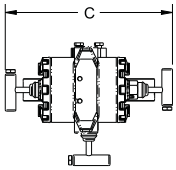
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)		 **1.13-in. (28.7 mm) wafer thickness**	
Conditioning Orifice Plate (Primary Element Type code C)			

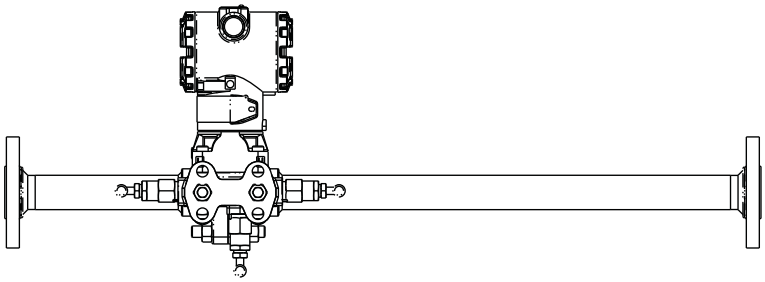
Table 82. 3051CFC Compact Orifice Dimensional Data(1)

Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.27 (159)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

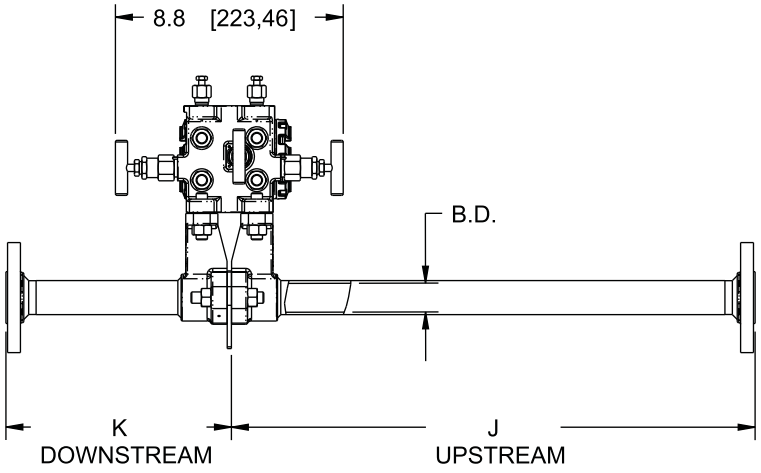
(1) Measurement in inches (millimeters).

Rosemount 3051CFP Integral Orifice Flowmeter

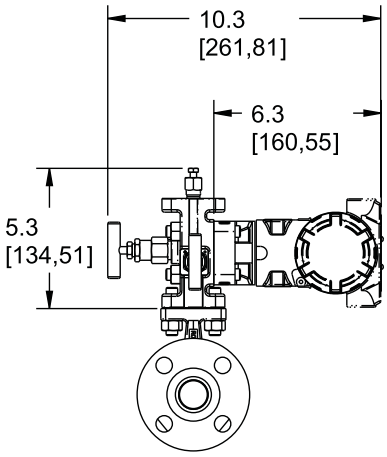
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

Table 83. 3051CFP Integral Orifice Dimensional Data

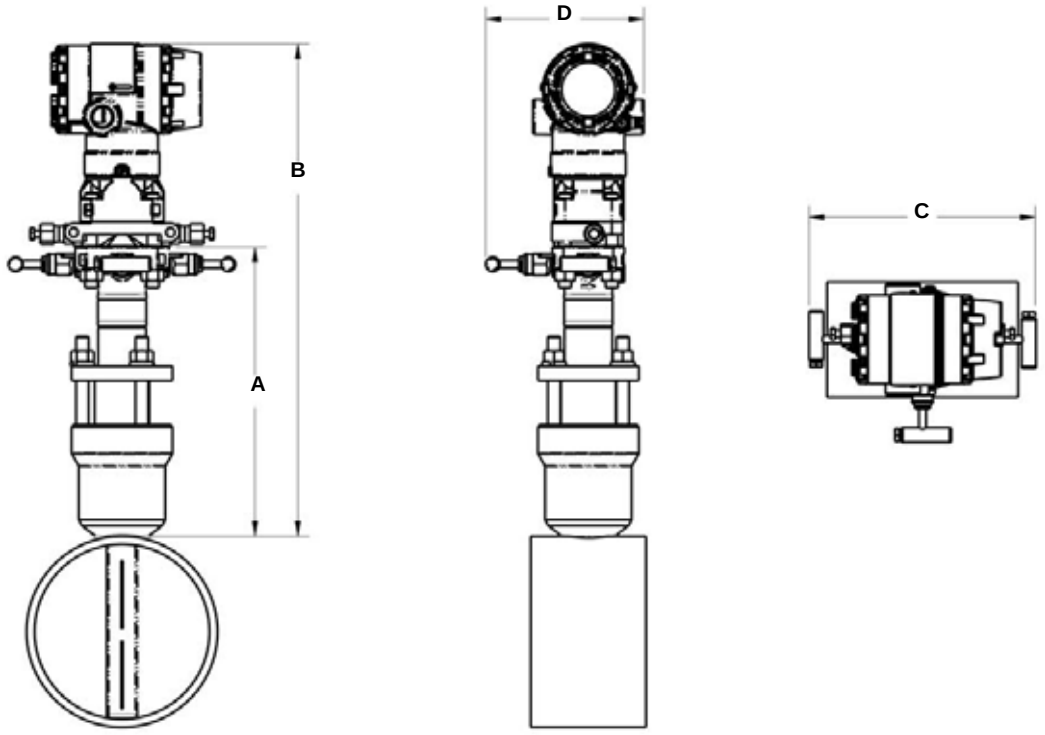
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

2051CF DIMENSIONAL DRAWINGS

Rosemount 2051CFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 84. 2051CFA Pak-Lok Annubar Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.55 (369.6)	9.00 (228.6)	6.00 (152.4)
2	11.00 (279.4)	16.30 (414.0)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.05 (483.9)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount 2051CFA Flanged with Opposite Side Support Annubar Flowmeter

Front View	Side View	Top View

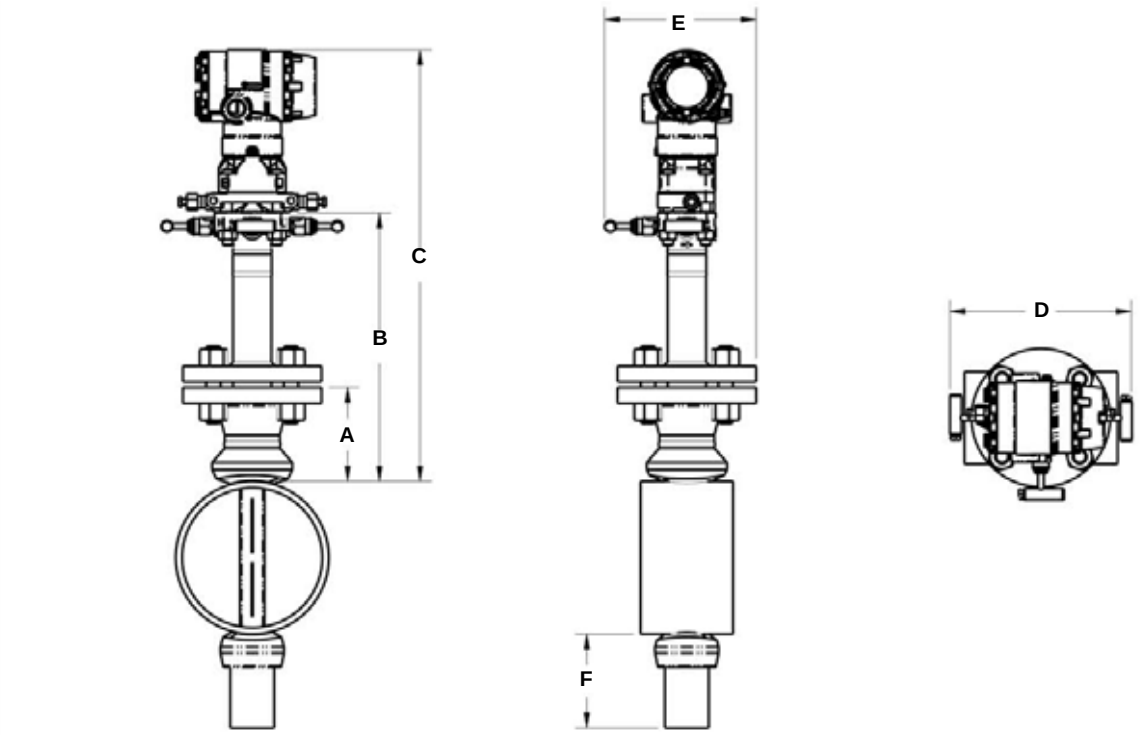


Table 85. 2051CFA Flanged Annubar Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	-	-	-	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	-	-	-	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	-	-	-	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.30 (160.0)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.30 (160.0)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	-	-	-	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	-	-	-	5.00 (127.0)
2	2 – 2500#	9.88 (251.0)	15.63 (397.0)	-	-	-	4.50 (114.3)

Table 85. 2051CFA Flanged Annubar Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.30 (160.0)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.30 (160.0)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)
3	3 – 900#	8.19 (208.0)	13.06 (331.7)	-	-	-	7.00 (177.8)
3	3 – 1500#	8.56 (217.4)	13.81 (350.8)	-	-	-	7.00 (177.8)
3	3 – 2500#	11.19 (284.2)	17.31 (439.7)	-	-	-	7.00 (177.8)

Dimensions are in inches (millimeters)

Rosemount 2051CFC Compact Orifice Flowmeter

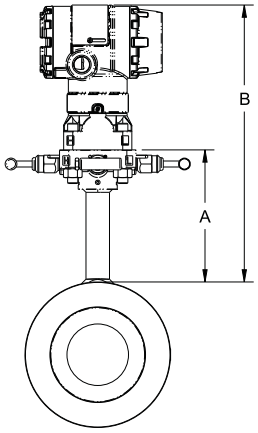
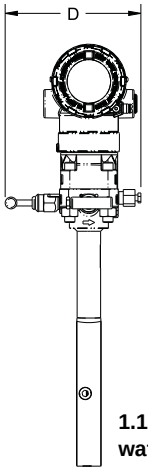
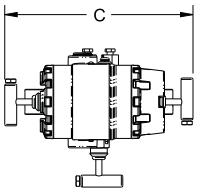
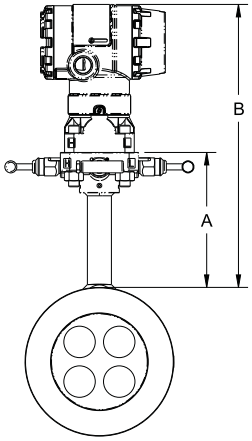
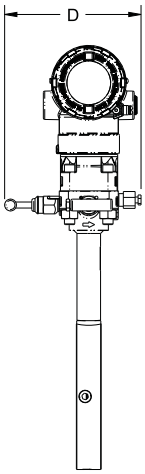
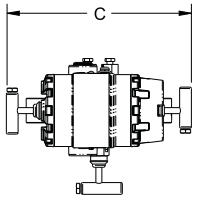
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)		 **1.13-in. (28.7 mm) wafer thickness**	
Conditioning Orifice Plate (Primary Element Type code C)			

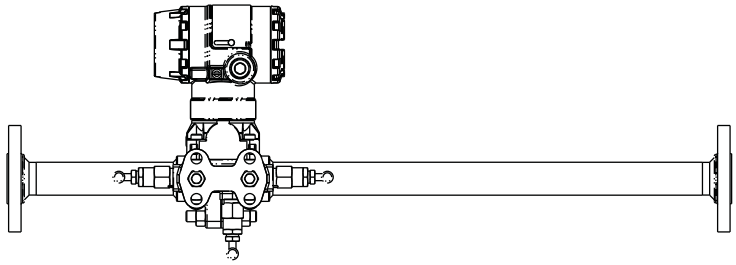
Table 86. 2051CFC Compact Orifice Dimensional Data(1)

Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.2 (157)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

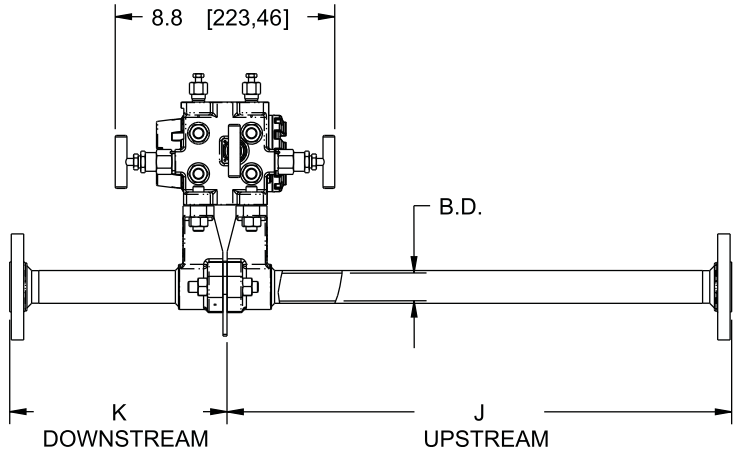
(1) Measurement in inches (millimeters).

Rosemount 2051CFP Integral Orifice Flowmeter

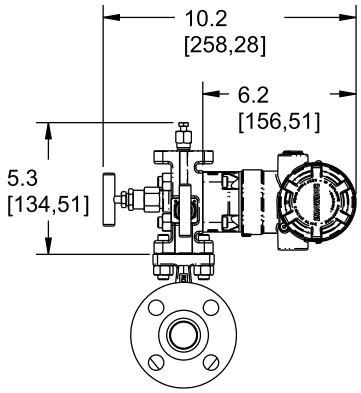
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

Table 87. 2051CFP Integral Orifice Dimensional Data

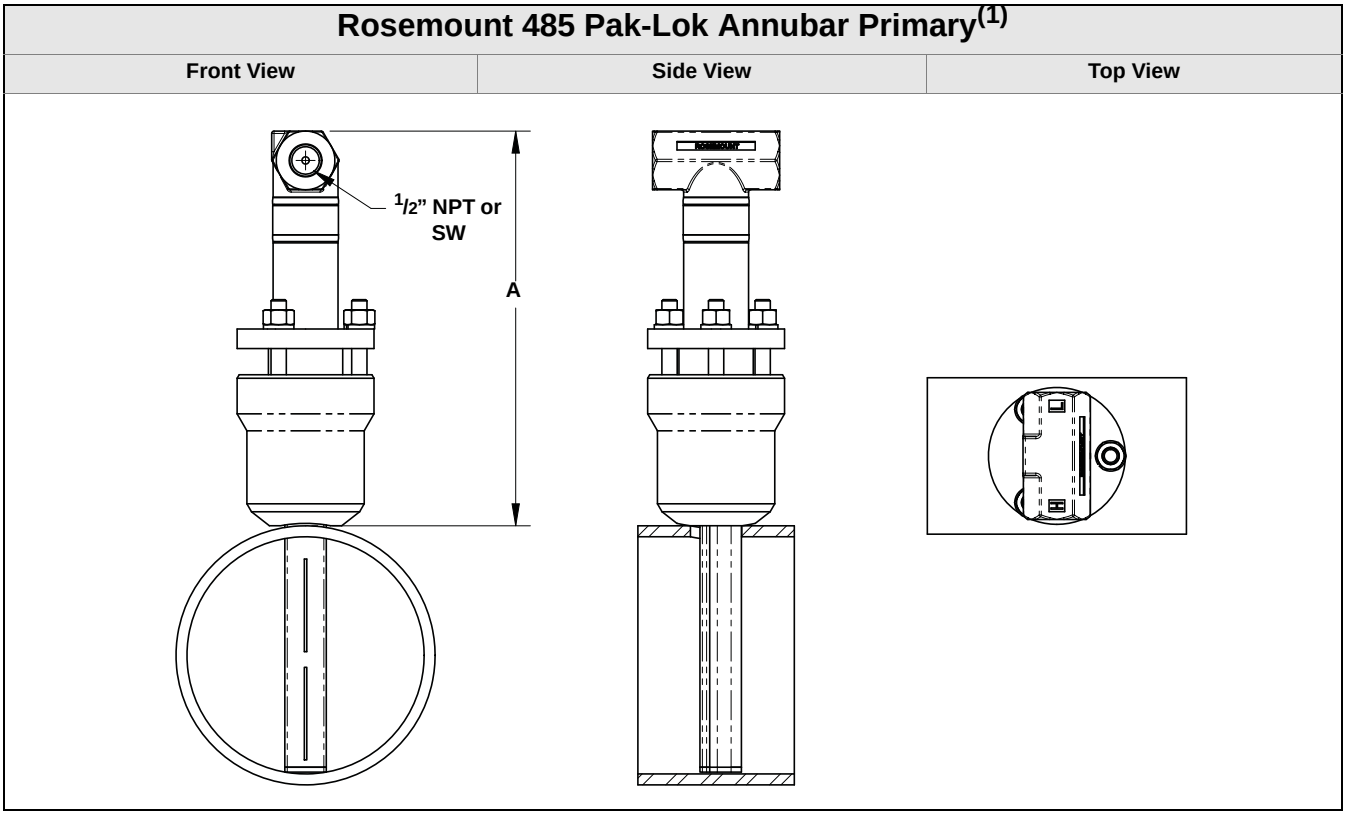
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)

Dimensions are in inches (millimeters).

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

485 DIMENSIONAL DRAWINGS

Rosemount 485 Pak-Lok Annubar Primary(1)



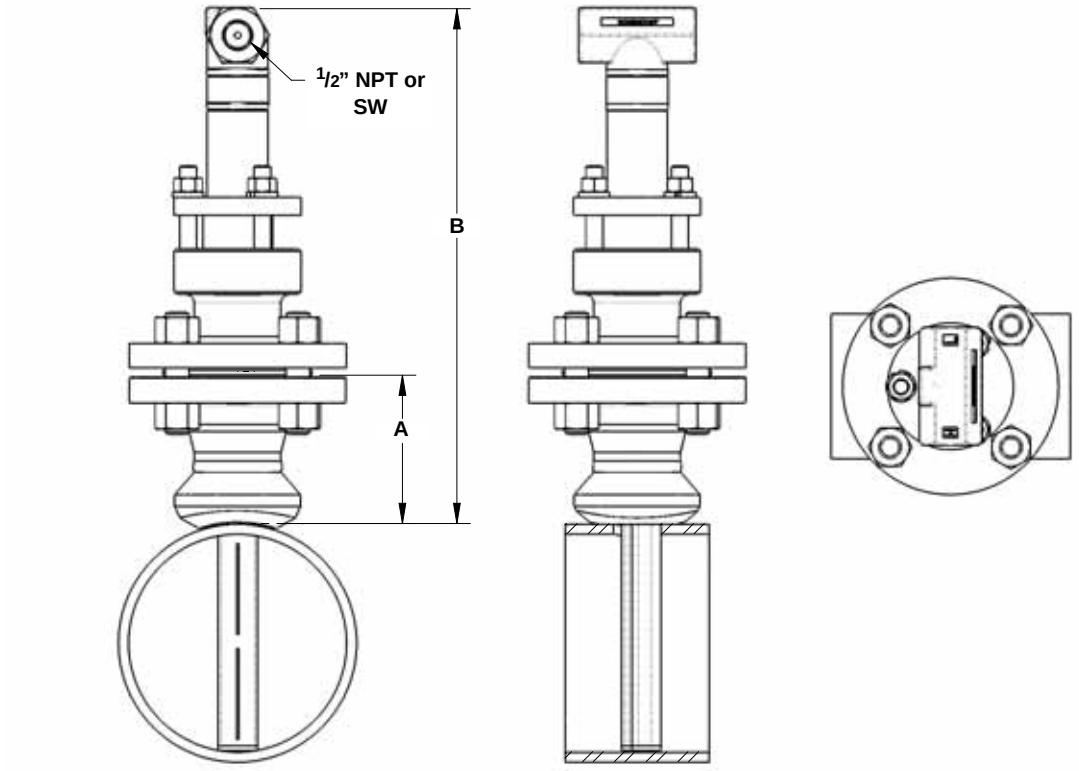
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 88. 485 Pak-Lok Annubar Primary Dimensional Data

Sensor Size	A (Max)
1	8.50 (215.9)
2	11.00 (279.4)
3	12.00 (304.8)
Dimensions are in inches (millimeters)	

Rosemount 485 Flange-Lok Annubar Primary(1)

Front View	Side View	Top View



(1) The Flange-Lok Annubar model can be direct mounted up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 89. 485 Flange-Lok Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)
1	DN40/PN100	3.88 (98.6)	12.25 (311.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)
2	2 – 600#	4.75 (120.7)	14.25 (362.0)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)
2	DN50/PN40	3.52 (89.4)	14.25 (362.0)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)
3	DN80/PN16	3.85 (97.8)	17.50 (444.5)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)
Dimensions are in inches (millimeters)			

Rosemount 485 Flanged Annubar Primary

Front View | Side View | Top View

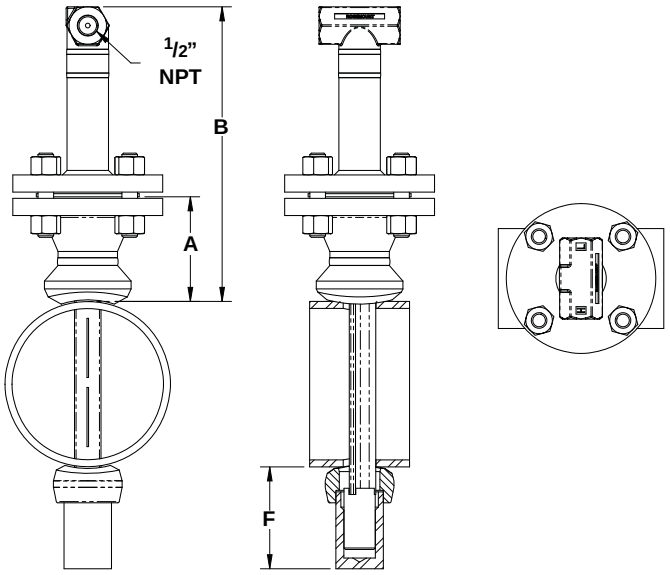


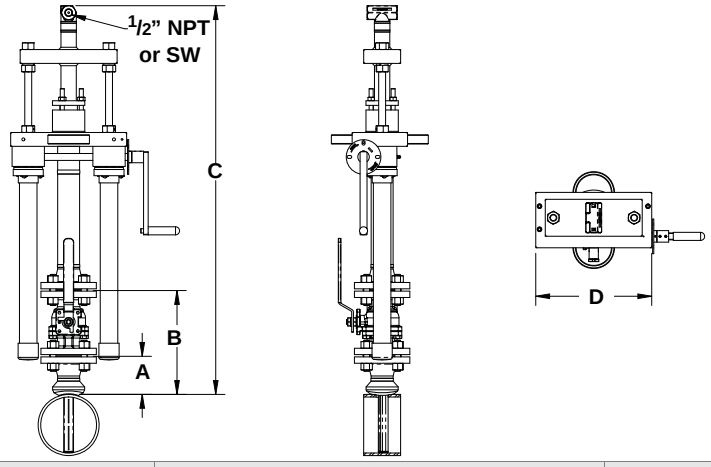
Table 90. 485 Flanged Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.06 (331.7)	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	7.00 (177.8)

Dimensions are in inches (millimeters)

Rosemount 485 Flanged Flo-Tap Annubar Primary

Gear Drive



Manual

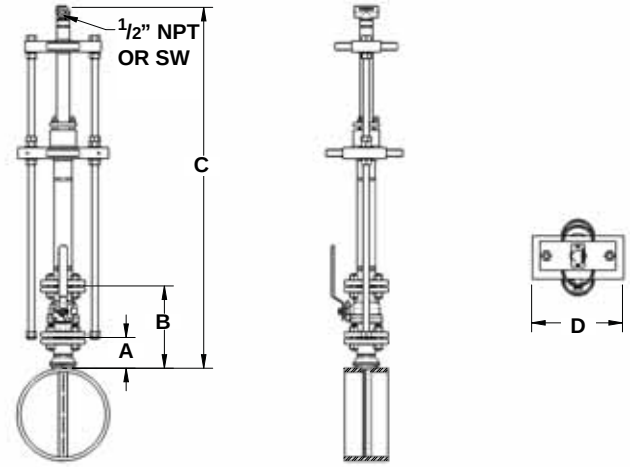


Table 91. 485 Flanged Flo-Tap Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)
1	1 1/2 – 150#	3.88 (98.6)	10.50 (266.7)	—	**17.77 (451.4)**	10.50 (266.7)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	**17.77 (451.4)**	10.50 (266.7)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	**17.77 (451.4)**	10.50 (266.7)
1	DN40/PN16	3.09 (78.5)	See Note (1)	—	**17.77 (451.4)**	10.50 (266.7)
1	DN40/PN40	3.21 (81.5)	See Note (1)	—	**17.77 (451.4)**	10.50 (266.7)
1	DN40/PN100	3.88 (98.6)	See Note (1)	—	**17.77 (451.4)**	10.50 (266.7)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	2 – 600#	4.75 (120.7)	16.38 (416.0)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN16	3.40 (86.4)	See Note (1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN40	3.52 (89.4)	See Note (1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN100	4.30 (109.2)	See Note (1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)

Table 91. 485 Flanged Flo-Tap Annubar Primary Dimensional Data

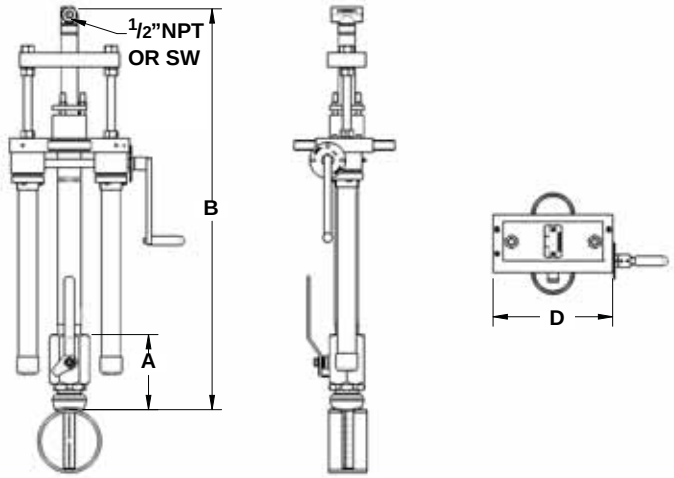
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	3 – 600#	5.38 (136.7)	19.50 (495.4)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN16	3.85 (97.8)	See Note (1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN40	4.16 (105.7)	See Note (1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN100	4.95 (125.7)	See Note (1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
	Use the appropriate formula to determine C value: *Inserted formula:* Pipe I.D. + Wall Thickness + Value B + C^1 (use the Manual Drive or Gear drive values for C^1) *Retracted formula:* [2 x (Pipe I.D. + Wall Thickness + Value B)] + C^1 (use the Manual Drive or Gear drive values for C^1)					
Dimensions are in inches (millimeters)						

(1) DIN Valves are not offered.

Rosemount 485 Threaded Flo-Tap Annubar Primary

Front View	Side View	Top View

Gear Drive



Front View	Side View	Top View

Manual

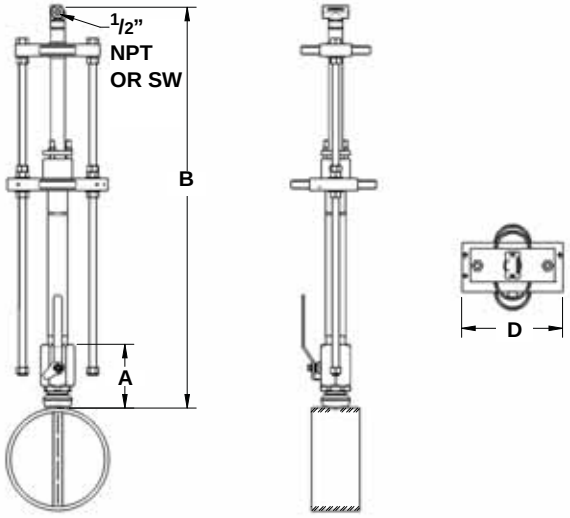


Table 92. 485 Threaded Flo-Tap Annubar Primary Dimensional Data

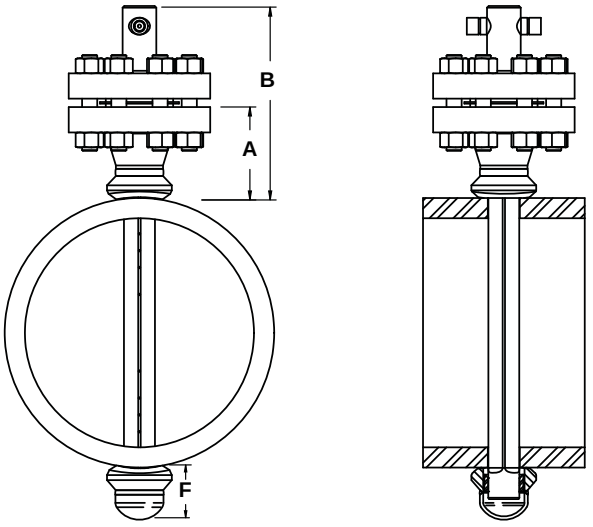
Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	D (Max)
1	7.51 (190.9)	—	16.96 (430.8)	10.50 (266.7)
2	8.17 (207.5)	23.62 (599.9)	20.39 (517.9)	12.56 (319.0)
Sensor Size 3 is not available in a Threaded Flo-Tap.				

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

585 DIMENSIONAL DRAWINGS

Rosemount 585 Flanged w/ Opposite Side Support Annubar Primary

Front View | **Side View**



Note: Dimensions are shown with a remote-mount connection. Using direct-mount will add 0.15-in. for sensor size 11 and 22 or 3.15-in. for sensor size 44 to Dimension B.

Table 93. 585 Flanged w/ Opposite Side Support Annubar Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
11	1 1/2-in.– 150#	3.88 (98.6)	9.70 (246.4)	3.10 (78.7)
11	1 1/2-in. – 300#	4.13 (104.9)	10.07 (255.8)	3.10 (78.7)
11	1 1/2-in. – 600#	4.44 (112.8)	10.70 (271.8)	3.10 (78.7)
11	DIN40/PN16	3.21 (81.5)	9.05 (229.9)	3.10 (78.7)
11	DIN40/PN40	3.21 (81.5)	9.05 (229.9)	3.10 (78.7)
11	DIN40/ PN100	3.88 (98.6)	10.03 (254.8)	3.10 (78.7)
11	1 1/2-in. – 900#	4.94 (125.5)	11.57 (293.9)	3.60 (91.4)
11	1 1/2-in. – 1500#	4.94 (125.5)	11.57 (293.9)	3.60 (91.4)
11	1 1/2-in. – 2500#	6.75 (171.5)	13.88 (352.6)	3.60 (91.4)
22	2-in. – 150#	4.13 (104.9)	10.01 (254.3)	4.50 (114.3)
22	2-in. – 300#	4.38 (111.3)	10.38 (263.7)	4.50 (114.3)
22	2-in. – 600#	4.75 (120.7)	11.13 (282.7)	4.50 (114.3)
22	DIN50/PN16	3.40 (86.4)	9.24 (234.7)	4.50 (114.3)
22	DIN50/PN40	3.52 (89.4)	9.44 (239.8)	4.50 (114.3)
22	DIN50/ PN100	4.30 (109.2)	10.53 (267.5)	4.50 (114.3)
22	2-in. – 900#	5.88 (149.4)	12.76 (324.1)	4.50 (114.3)
22	2-in. – 1500#	5.88 (149.4)	12.76 (324.1)	4.50 (114.3)
22	3-in. – 2500#	9.88 (250.1)	17.88 (454.2)	4.50 (114.3)
44	3-in. – 150#	4.63 (117.6)	10.69 (271.5)	3.90 (99.1)
44	3-in. – 300#	5.00 (127.0)	11.26 (286.6)	3.90 (99.1)
44	3-in. – 600#	5.38 (136.7)	12.00 (304.8)	3.90 (99.1)
44	DIN80/PN16	3.85 (97.8)	9.77 (248.2)	3.90 (99.1)
44	DIN80/PN40	4.16 (105.7)	10.23 (259.8)	3.90 (99.1)
44	DIN80/ PN100	4.95 (125.7)	11.34 (288.8)	3.90 (99.1)
44	4-in. – 900#	8.19 (208.8)	15.32 (389.1)	6.40 (162.6)
44	4-in. – 1500#	8.56 (217.4)	16.07 (408.2)	6.40 (162.6)
44	4-in. – 2500#	11.19 (284.2)	19.57 (497.1)	6.40 (162.6)

Dimensions are in inches (millimeters)

Rosemount 585 Main Steam Annubar w/ Opposite Side Support Annubar Primary

Front View | **Top View**

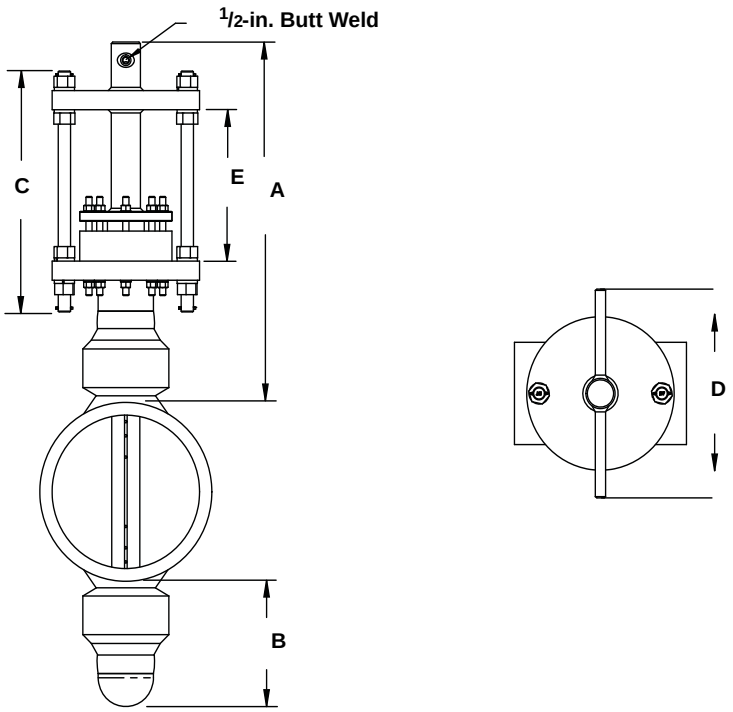


Table 94. 585 Main Steam Annubar w/ Opposite Side Support Annubar Dimensional Data

Sensor Size	A (Max)	B	C	D	E
44	29.67 (753.6)	10.0 (254)	19.0 (483)	16.33 (414.0)	11.0 (279)
Dimensions are in inches (millimeters)					

NOTE
Locking rods are always located 90° from the instrument connections. For horizontal installations, the instrument connections will be parallel to the pipe. For vertical installations, the instrument connections will be perpendicular to the pipe.

Rosemount 585 Flanged Flo-Tap Annubar Primary

Front View | **Top View**

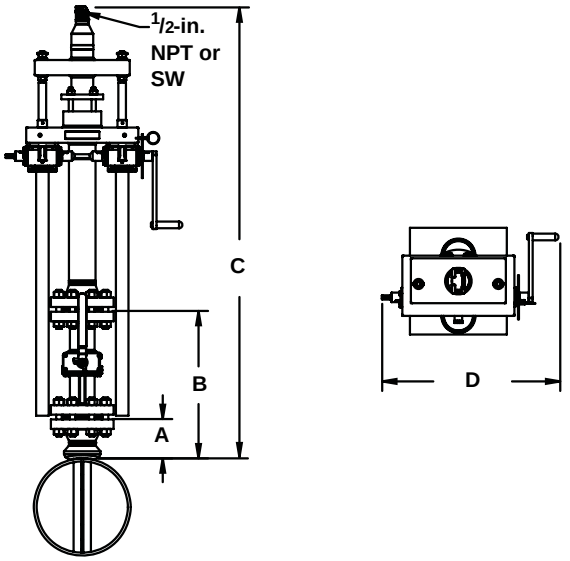
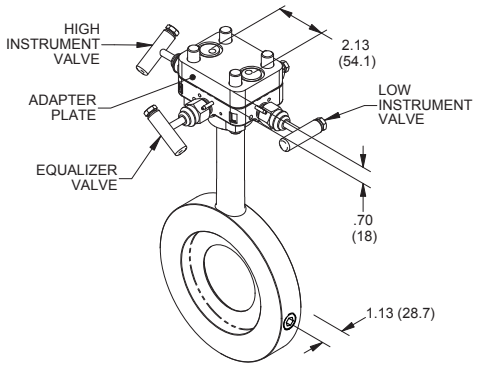
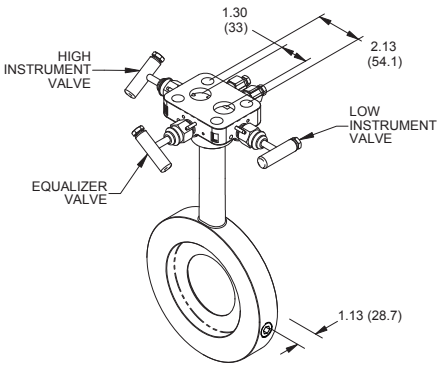
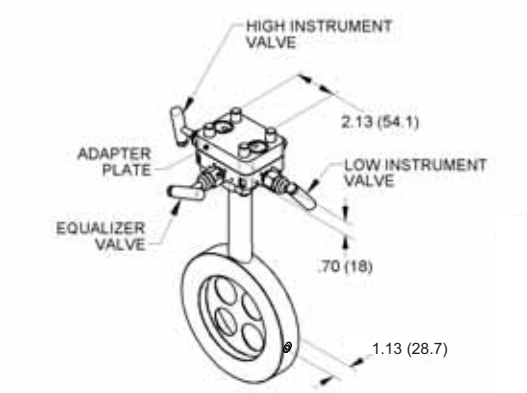
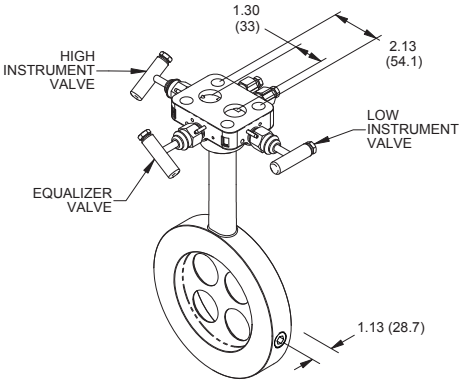


Table 95. 585 Flanged Flo-Tap Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C[1] (Max) (Gear Drive)	D (Max)
44	3 – 150#	4.63 (117,6)	12.75 (323,9)	25.58 (649.7)	23.3 (591,8)
44	3 – 300#	5.00 (127,0)	16.25 (412,8)	25.58 (649.7)	23.3 (591,8)
44	3 – 600#	5.38 (136,7)	19.50 (495,4)	25.58 (649.7)	23.3 (591,8)
	Use the appropriate formula to determine C value: *Inserted formula:* Pipe I.D. + Wall Thickness + Value B + C[1] (use the Gear drive values for C[1]) *Retracted formula:* [2 x (Pipe I.D. + Wall Thickness + Value B)] + C[1] (use the Gear drive values for C[1])				
Dimensions are in inches (millimeters)					

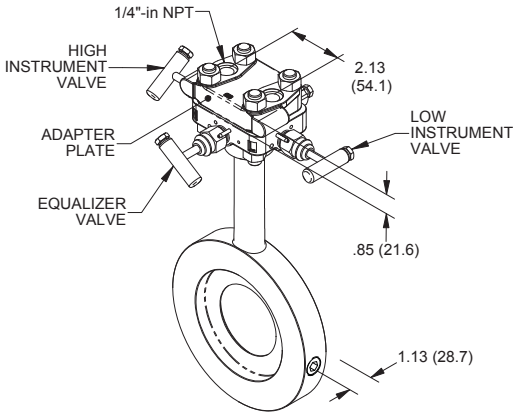
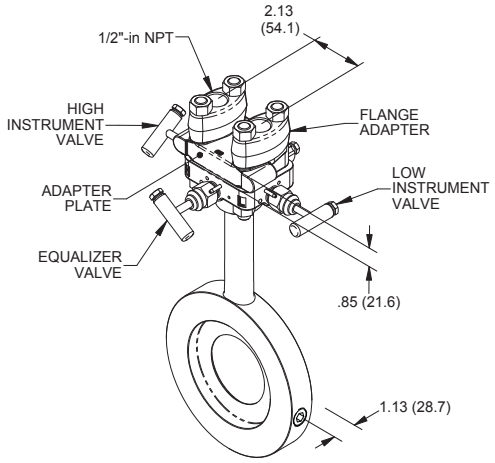
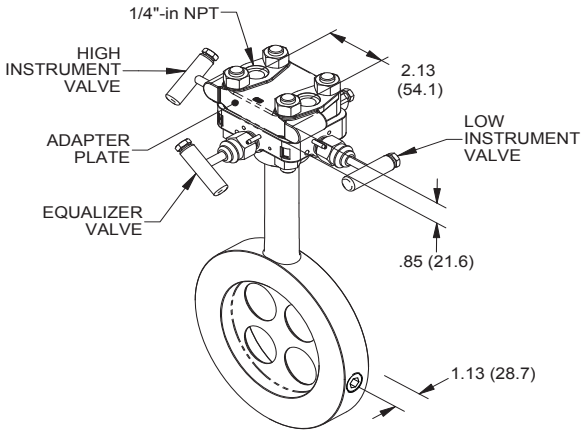
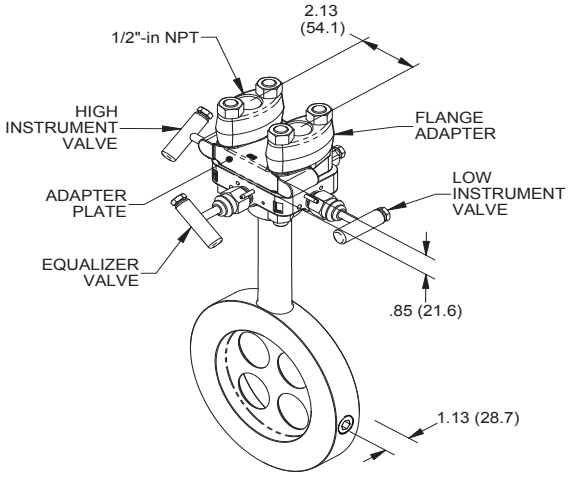
405 DIMENSIONAL DRAWINGS

Rosemount 405 Compact Orifice Plate (Direct Mount)

	Front View (transmitter connection A3)	Front View (transmitter connection D3)
Compact Orifice Plate (Primary Element Type code P)		
Conditioning Orifice Plate (Primary Element Type code C)		

NOTE
Transmitter connection code A3 is to be used with a traditional style transmitter. This is a stainless steel adapter plate for allowing the direct mount of traditional style transmitters.

Rosemount 405 Compact Orifice Plate (Remote Mount Transmitter)

	Adapter Plate (R3)	Flange Adapter (R3 with option E)
Compact Orifice Plate (Primary Element Type code P)		
Conditioning Orifice Plate (Primary Element Type code C)		

1595 DIMENSIONAL DRAWINGS

Rosemount 1595 Conditioning Orifice Plate

(ANSI Flange, Paddle, Square edged)

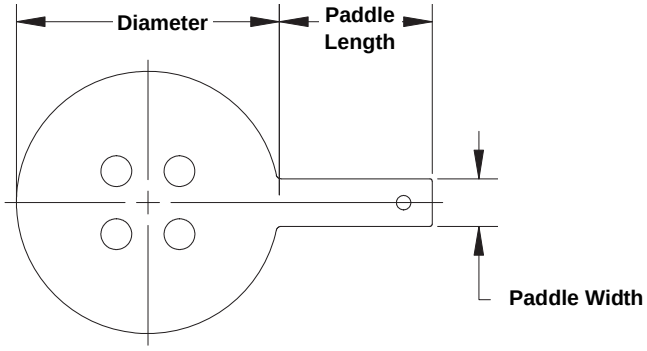


Table 96. Paddle Type Orifice Plate Dimensions in inches (millimeters)

Line Size	150#	Diameter for Paddle Type 300#	600#	900#	1500#	2500#	Paddle Length	Paddle Width
2 -in. (50 mm)	4.125 (104.78)	4.375. (111.13)	4.375 (111.13)	5.625 (142.875)	5.625 (142.875)	5.750 (146.050)	4.0 (101.6)	1.0 (25.4)
3-in. (76 mm)	5.375 (136.53)	5.875 (149.23)	5.875 (149.23)	6.625 (168.275)	6.875 (174.625)	7.750 (196.85)	4.0 (101.6)	1.0 (25.4)
4-in. (100 mm)	6.875 (174.63)	7.125 (180.98)	7.625 (193.68)	8.125 (206.35)	8.250 (209.550)	9.250 (234.95)	4.0 (101.6)	1.0 (25.4)
6-in. (150 mm)	8.750 (222.25)	9.875 (250.83)	10.500 (266.7)	11.375 (288.925)	11.125 (282.575)	12.500 (317.50)	4.0 (101.6)	1.0 (25.4)
8-in. (200 mm)	11.000 (279.4)	12.125 (307.98)	12.625 (320.675)	14.125 (358.775)	13.875 (352.425)	15.250 (387.350)	6.0 (152.4)	1.5 (38.1)
10-in. (250 mm)	13.375 (339.73)	14.250 (361.95)	15.750 (400.05)	17.125 (434.975)	17.125 (434.975)	18.750 (476.25)	6.0 (152.4)	1.5 (38.1)
12-in. (300 mm)	16.125 (409.58)	16.625 (422.26)	18.000 (457.2)	19.625 (498.475)	20.500 (520.7)	21.625 (549.275)	6.0 (152.4)	1.5 (38.1)
14-in. (350 mm)	17.750 (450.85)	19.125 (485.78)	19.375 (492.125)				6.0 (152.4)	1.5 (38.1)
16-in (400 mm)	20.250 (514.35)	21.250 (539.75)	22.250 (565.15)				6.0 (152.4)	1.5 (38.1)
18-in. (450 mm)	21.500 (546.1)	23.375 (593.725)	24.000 (609.6)				6.0 (152.4)	1.5 (38.1)
20-in. (500 mm)	23.750 (603.25)	25.625 (650.875)	26.750 (679.45)				6.0 (152.4)	1.5 (38.1)
24-in. (600 mm)	28.125 (714.375)	30.375 (771.525)	31.000 (787.4)				6.0 (152.4)	1.5 (38.1)

NOTE: Consult factory for availability of line sizes and flange ratings not shown in the above table.

1595U Orifice Universal Type
(Universal, Square edged)

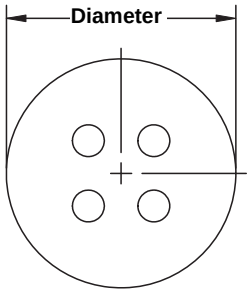


Table 97. A.P.I Ring No.'s and Rating

Line Size	Diameter for Universal Type	A.P.I Ring No.	Rating (lbs.)
2-in. (50 mm)	2.437-in. (61.8998 mm)	R-23	300-600
		R-24	900-1500
		R-26	2500
3-in. (76 mm)	3.437-in. (87.2998 mm)	R-31	300-600 & 900
		R-32	2500
		R-35	1500
4-in. (100 mm)	4.406-in. (111.912 mm)	R-37	300-600 & 900
		R-38	2500
		R-39	1500
6-in. (150 mm)	6.437-in. (163.5 mm)	R-45	300-600 & 900
		R-46	1500
		R-47	2500
8-in. (200 mm)	8.437-in. (214.3 mm)	R-49	300-600 & 900
		R-50	1500
		R-51	2500
10-in. (250 mm)	10.687-in. (271.45 mm)	R-53	300-600 & 900
		R-54	1500
		R-55	2500
12-in. (300 mm)	12.593-in. (319.862 mm)	R-57	300-600 & 900
		R-58	1500
		R-59	2500

NOTE
Refer to Table 96 for line size and pressure rating availability.

Rosemount 1595 Conditioning Orifice Plate
(DIN Flange, Paddle, Square edged)

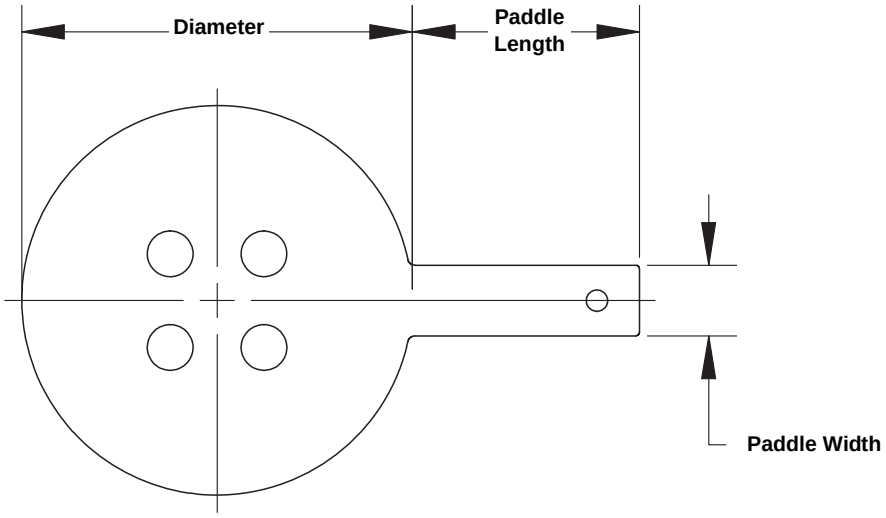


Table 98. 1595 Conditioning Orifice Plate Dimensions in millimeters (inches)

	Diameter (max) – by flange rating							
Line Size	**PN 10**	**PN 16**	**PN 25**	**PN 40**	**PN 63/64**	**PN 100**	**Paddle Length**	**Paddle Width**
DN 50 (2-in.)	107 (4.21)	107 (4.21)	107 (4.21)	107 (4.21)	113 (4.45)	119 (4.69)	101.6 (4.0)	25.4 (1.0)
DN 80 (3-in.)	142 (5.60)	142 (5.60)	142 (5.60)	142 (5.60)	148 (5.82)	154 (6.06)	101.6 (4.0)	25.4 (1.0)
DN 100 (4-in.)	162 (6.38)	162 (6.38)	168 (6.61)	168 (6.61)	174 (6.85)	180 (7.09)	101.6 (4.0)	25.4 (1.0)
DN 150 (6-in.)	218 (8.58)	218 (8.58)	224 (8.82)	224 (8.82)	247 (9.72)	257 (10.12)	101.6 (4.0)	25.4 (1.0)
DN 200 (8-in.)	273 (10.74)	273 (10.74)	284 (11.18)	290 (11.42)	309 (12.17)	324 (12.76)	152.4 (6.0)	38.1 (1.5)
DN 250 (10-in.)	328 (12.91)	329 (12.95)	340 (13.39)	352 (13.86)	364 (14.33)	391 (15.39)	152.4 (6.0)	38.1 (1.5)
DN 300 (12-in.)	378 (14.88)	384 (15.12)	400 (15.75)	417 (16.42)	424 (16.69)	458 (18.03)	152.4 (6.0)	38.1 (1.5)

NOTE: Consult factory for availability of line sizes and flange ratings not shown in the above table.

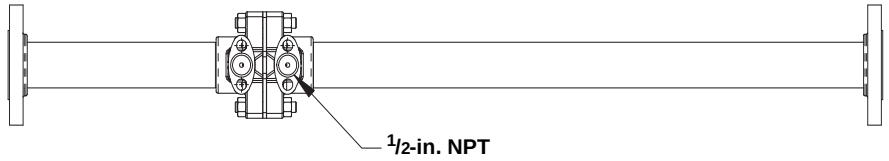
Table 99. Conditioning Orifice Plate Available Beta Ratio (β)
The table below shows the available Beta Ratio (β) for line size vs. pipe schedule

Line Size	Pipe Schedule	Beta (β) Available	Line Size	Pipe Schedule	Beta (β) Available
2	≤ 80	0.20, 0.40, 0.60	14	≤ 80	0.20, 0.40, 0.65
2	160	0.20	14	100	0.20, 0.40
3	≤ 80	0.20, 0.40, 0.65	14	120	0.20, 0.40
3	160	0.20, 0.40	14	140	0.20, 0.40
3	XXS	0.20	14	160	0.20, 0.40
4	≤ 80	0.20, 0.40, 0.65	14	XXS	0.20, 0.40
4	120	0.20, 0.40	16	≤ 80	0.20, 0.40, 0.65
4	160	0.20, 0.40	16	100	0.20, 0.40
4	XXS	0.20	16	120	0.20, 0.40
6	≤ 80	0.20, 0.40, 0.65	16	140	0.20, 0.40
6	120	0.20, 0.40	16	160	0.20, 0.40
6	160	0.20, 0.40	16	XXS	0.20, 0.40
6	XXS	0.20	18	≤ 80	0.20, 0.40, 0.65
8	≤ 80	0.20, 0.40, 0.65	18	100	0.20, 0.40, 0.65
8	100	0.20, 0.40, 0.65	18	120	0.20, 0.40
8	120	0.20, 0.40	18	140	0.20, 0.40
8	140	0.20, 0.40	18	160	0.20, 0.40
8	160	0.20, 0.40	18	XXS	0.20, 0.40
8	XXS	0.20, 0.40	20	≤ 80	0.20, 0.40, 0.65
10	≤ 80	0.20, 0.40, 0.65	20	100	0.20, 0.40, 0.65
10	100	0.20, 0.40, 0.65	20	120	0.20, 0.40
10	120	0.20, 0.40	20	140	0.20, 0.40
10	140	0.20, 0.40	20	160	0.20, 0.40
10	160	0.20, 0.40	20	XXS	0.20, 0.40
10	XXS	0.20, 0.40	24	≤ 80	0.20, 0.40, 0.65
12	≤ 80	0.20, 0.40, 0.65	24	100	0.20, 0.40
12	100	0.20, 0.40	24	120	0.20, 0.40
12	120	0.20, 0.40	24	140	0.20, 0.40
12	140	0.20, 0.40	24	160	0.20, 0.40
12	160	0.20, 0.40	24	XXS	0.20, 0.40
12	XXS	0.20, 0.40			

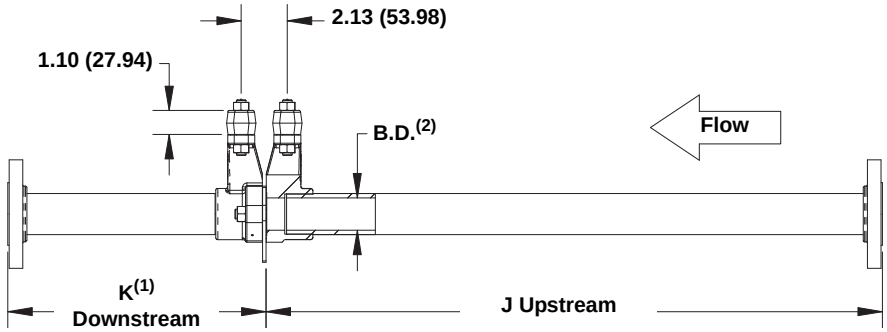
1195 DIMENSIONAL DRAWINGS

Rosemount 1195 Integral Orifice Plate

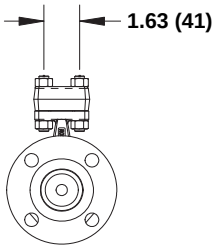
Top View



Bottom View



End View



Dimensions are in inches (millimeters).

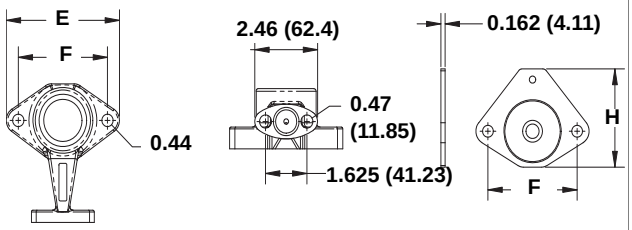
Table 100. 1195 Integral Orifice Plate Dimensional Data

	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip-on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld-neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld-neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld-neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K ((RF slip-on, RTJ slip-on, RF-DIN slip-on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld-neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld-neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld-neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D.(Bore Diameter)(2)	0.664 (16.86)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

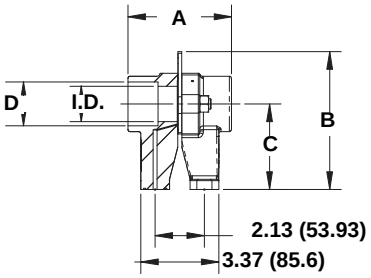
(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

(2) B.D is diameter of the precision bored portion of the upstream and downstream piping.

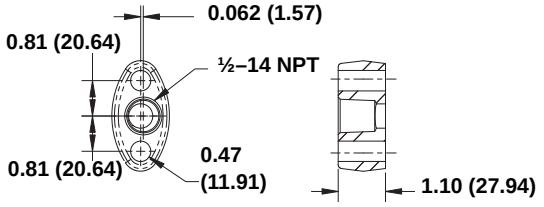
Orifice Plate



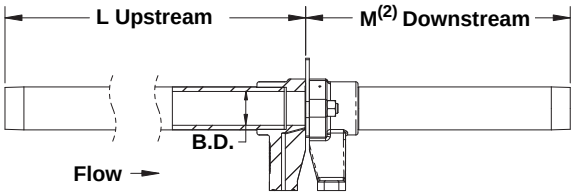
Socket-Weld or Threaded Body



Remote Adapter



NPT / Beveled Piping (Prepared for welding)



Temperature Sensor

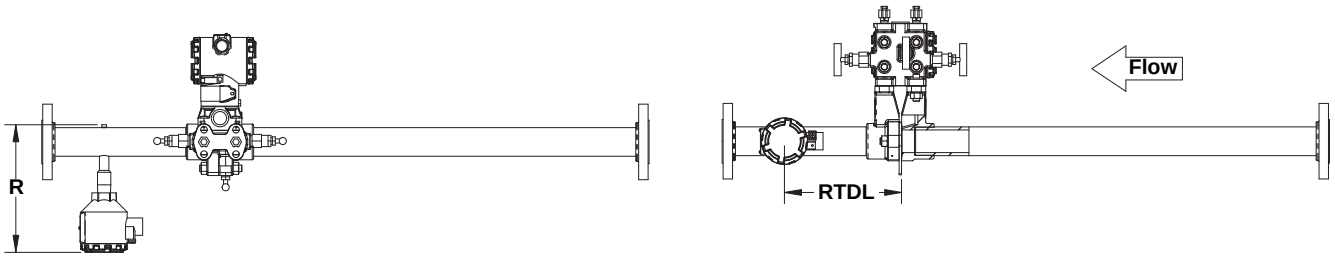


Table 101. 1195 Integral Orifice Dimensional Data

	Line Size					
Dimension	**1/2-in. (12.7 mm)**		**1-in. (25.4 mm)**		**1 1/2-in. (38.1 mm)**	
A	3.4-in.	86 mm	3.8-in.	97 mm	4.5-in.	114 mm
B	4.7-in.	119.4 mm	5.2-in.	132 mm	5.9-in.	149.9 mm
C	3.0-in.	76 mm	3.3-in.	84 mm	3.7-in.	94 mm
D(1)	0.805-in.	20.45 mm	1.280-in.	32.51 mm	1.865-in.	47.37 mm
E	3.6-in.	91 mm	3.9-in.	99 mm	4.4-in.	112 mm
F	2.6-in.	66 mm	3.0-in.	76 mm	3.5-in.	89 mm
H	2.5-in.	64 mm	3.0-in.	76 mm	3.5-in.	89 mm
L	12.54-in.	318.4 mm	20.24-in.	514 mm	28.44-in.	722.4 mm
M	5.74-in.	145.7 mm	8.75-in.	222.2mm	11.91-in.	302.6 mm
R	7.4-in.	187.96 mm	7.8-in.	198.12 mm	8.4-in.	213.36 mm
RTDL	3.11-in.	78.9 mm	5.25-in.	133.4 mm	7.50-in.	190.5 mm
B.D. (Bore Diameter)(2)	0.664-in.	16.87 mm	1.097-in.	27.86 mm	1.567-in.	39.80 mm
I.D. (Inside Diameter)	0.622-in.	15.80 mm	1.049-in.	26.64 mm	1.500-in.	38.10 mm

(1) To improve pipe perpendicularity for gasket sealing, socket diameter "D" is smaller than standard pipe O.D. Pipe O.D. must be machined smaller than socket diameter "D" to ensure proper fit.

(2) B.D is diameter of the precision bored portion of the upstream and downstream piping.

Pipe I.D. Range Code

For pipes with an Inner Diameter (I.D.) Range / Pipe Wall Thickness not found in this table or with a line size greater than 12-in. (300 mm), choose option code Z and specify the exact pipe dimensions (I.D. and Pipe Wall Thickness) on the Configuration Data Sheet (See document 00806-0100-4010). The Emerson process Management sizing program will determine this code, based on the application piping.

	Line Size				Pipe Wall Thickness		I.D.
	Nominal	Max. O.D.	Option Code	Inner Diameter (I.D.) Range	ANSI Pipes	Non-ANSI Pipes	Range Code
	2-in. (50 mm)	2.625-in. (66.68 mm)	020	1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
	2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025	2.207 to 2.322-in. (56.06 to 58.98 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.448-in. (2.1 to 11.4 mm)	B
				2.323 to 2.469-in. (59.00 to 62.71 mm)		0.083 to 0.417-in. (2.1 to 10.6 mm)	C
				2.470 to 2.598-in. (62.74 to 65.99 mm)		0.083 to 0.435-in. (2.1 to 11.0 mm)	D
				2.599 to 2.647-in. (66.01 to 67.23 mm)		0.083 to 0.515-in. (2.1 to 13.1 mm)	E
	3-in. (80 mm)	3.75-in. (95.25 mm)	030	2.648 to 2.751-in. (67.26 to 69.88 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.460-in. (2.1 to 11.7 mm)	A
				2.752 to 2.899-in. (69.90 to 73.63 mm)		0.083 to 0.416-in. (2.1 to 10.6 mm)	B
				2.900 to 3.068-in. (73.66 to 77.93 mm)		0.083 to 0.395-in. (2.1 to 10.0 mm)	C
				3.069 to 3.228-in. (77.95 to 81.99 mm)		0.083 to 0.404-in (2.1 to 10.3 mm)	D
	3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035	3.229 to 3.333-in. (82.02 to 84.66 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.496-in. (3.0 to 12.6 mm)	B
				3.334 to 3.548-in. (84.68 to 90.12 mm)		0.120 to 0.386-in. (3.0 to 9.8 mm)	C
				3.549 to 3.734-in. (90.14 to 94.84 mm)		0.120 to 0.415-in. (3.0 to 10.5 mm)	D
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	B
				3.826 to 4.026-in. (97.18 to 102.26 mm)		0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.027 to 4.237-in. (102.29 to 107.62 mm)		0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.238 to 4.437-in. (107.65 to 112.70 mm)		0.120 to 0.401-in. (3.0 to 10.2 mm)	E
	5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.438 to 4.571-in. (112.73 to 116.10 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	A
				4.572 to 4.812-in. (116.13 to 122.22 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				4.813 to 5.047-in. (122.25 to 128.19 mm)		0.134 to 0.380-in. (3.4 to 9.7 mm)	C
				5.048 to 5.249-in. (128.22 to 133.32 mm)		0.134 to 0.413-in. (3.4 to 10.5 mm)	D
Sensor Size 1	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 138.99 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.3919-in. (3.4 to 9.9 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 0.327-in. (3.4 to 8.3 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 0.31-in. (3.4 to 7.9 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 0.297-in. (3.4 to 7.5 mm)	D
Sensor Size 2	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 139.99 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 1.067-in. (3.4 to 27.1 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 1.05-in. (3.4 to 26.7 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 1.037-in. (3.4 to 26.3 mm)	D
Sensor Size 1	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.216-in. (3.4 to 5.5 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.246-in. (3.4 to 6.2 mm)	D
Sensor Size 2	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.114-in. (3.4 to 28.3 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.956-in. (3.4 to 24.3 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.986-in. (3.4 to 25.0 mm)	D
Sensor Size 1	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
Sensor Size 2	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 1.052-in. (6.4 to 26.7 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
	10-in. (250 mm)	11.75-in. (298.45 mm)	100	8.767 to 9.172-in. (222.68 to 232.97 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.065-in. (6.4 to 27.1 mm)	A
				9.173 to 9.561-in. (232.99 to 242.85 mm)		0.250 to 1.082-in. (6.4 to 27.5 mm)	B
				9.562 to 10.020-in. (242.87 to 254.51 mm)		0.250 to 1.012-in. (6.4 to 25.7 mm)	C
				10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.945-in. (6.4 to 24.0 mm)	D
				10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 1.018-in. (6.4 to 25.9 mm)	E
	12-in. (300 mm)	13.0375-in. (331.15 mm)	120	11.000 to 11.373-in. (279.40 to 288.87 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.097-in. (6.4 to 27.9 mm)	B
				11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 0.906-in. (6.4 to 23.0 mm)	C
				11.939 to 12.250-in. (303.25 to 311.15 mm)		0.250 to 1.159-in. (6.4 to 29.4 mm)	D

Installation and Flowmeter Orientation

Annubar Installation Considerations

Table 102. Annubar Straight Run Requirements(1)

Upstream (inlet) side	Annubar Products			
	3051SFA, 3051CFA, 2051CFA, 485, 585(2)			
	Without Straightening Vanes(3)		With Straightening Vanes(4)	
	In Plane	Out Plane	From Disturbance	From Straightening Vane
Reducer	12	12	8	4
Expander	18	18	8	4
Single Elbow (90°) or tee	8	10	8	4
Two Elbows in plane	11	16	8	4
Two Elbow out of plane	23	28	8	4
Butterfly Valve (75-100% open)	30	30	8	4
Ball / Gate Valve full open	8	10	8	4
Downstream (outlet) side	4	4	4	4

(1) Consult an Emerson Process Management representative if a disturbance is not listed or if multiple disturbances are present.

(2) Consult the factory for instructions regarding use in square or rectangular ducts.

(3) In Plane means the Annubar is in the same plane as the elbow. Out of Plane means the bar is perpendicular to the plane of the upstream elbow. Refer to Figure 1 on page 163.

(4) Use straightening vane to reduce the required straight run length.

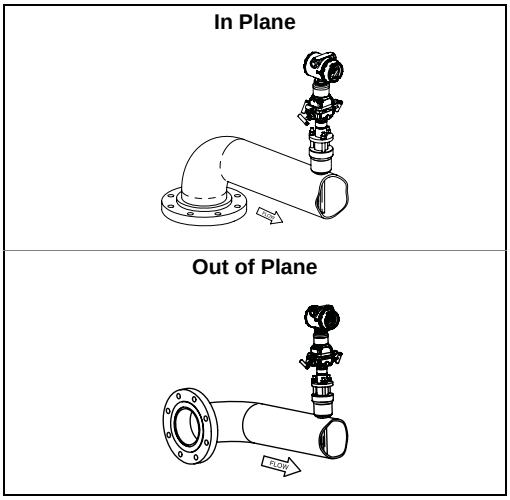
Table 103. 3051SFA, 3051CFA, 2051CFA, 485 Drill Hole Size According to Sensor Size

Sensor Size	Diameter
1	3/4-in. (19 mm)
2	1 5/16-in. (34 mm)
3	2 1/2-in. (64 mm)

Table 104. 585 Drill Hole Size According to Sensor Size

Sensor Size	Hole Diameter	
11	7/8-in. (23 mm)	+ 1/32-in (0,80 mm)
		– 0.00
22	1 5/16-in. (34 mm)	+ 1/16-in. (1,59 mm)
		– 0.00
44	2 1/2-in. (64 mm)	+ 1/16-in. (1,59 mm)
		– 0.00

Figure 1. Annubar In plane and Out of plane



Orifice Plate Installation Considerations

Table 105. Conditioning Orifice Plate and Compact Orifice Plate Straight Run Requirements[1]

Upstream (inlet) side	Conditioning Orifice Plate Products: 3051SFC_C, 3051CFCDC, 2051CFCDC, 1595, 405C[2]		Compact Orifice Plate Products: 3051SFC_P, 3051CFCDP, 2051CFCDP, 405P[3][4]	
	0.4 Beta	0.65 Beta	0.4 Beta	0.65 Beta
Reducer	2	2	5	12
Expander	6	8	12	28
Single Elbow (90°) or tee	2	2	16	44
Two Elbows in plane	2	2	10	44
Two Elbow out of plane	2	2	50	60
Butterfly Valve (75-100% open)	2	5	16[5]	44[5]
Ball / Gate Valve full open	2	2	12	18
Downstream (outlet) side	2	2	6	7

(1) Consult an Emerson Process Management representative if a disturbance is not listed or if multiple disturbances are present.

(2) For any Beta greater than 0.40, use beta 0.65 recommended lengths. For any Beta ratio less than or equal to 0.40, use beta 0.4 recommended lengths.

(3) Recommended lengths represented in pipe diameters per ISO 5167.

(4) Refer to ISO 5167 for recommended lengths when using flow straighteners.

(5) Recommended lengths not per ISO 5167. Butterfly valves are not listed in the ISO specification.

Table 106. Integral Orifice Plate Straight Run Requirements[1][2][3]

Upstream (inlet) side	3051SFP, 3051CFP, 2051CFP, 1195					
	<0.20 Beta	0.40 Beta	0.50 Beta	0.60 Beta	0.70 Beta	0.75 Beta
Reducer	20	20	20	20	23	25
Expander	22	22	23	25	28	30
Single Elbow (90°) or tee	24	25	25	27	32	35
Two Elbows in plane	25	27	28	31	35	38
Two Elbows out of plane	30	31	33	37	42	45
Butterfly Valve fully open	22	22	23	25	28	30
Gate Valve fully open	22	22	23	25	28	30
Downstream (outlet) side	10	10	10	10	10	10

(1) Recommended lengths are guidelines based on ASME MFC-14M.

(2) All straight lengths are expressed as multiples of the pipe inside diameter D and shall be measured from the upstream face of the orifice plate to the disturbance.

(3) Interpolation of intermediate beta values can be used.

Orifice Plate Pipe Orientation

Pipe orientation for both 3051SFC, 3051CFC,2051CFC, 405C, 405P, 3051SFP, 3051CFP, 2051CFP AND 1195.

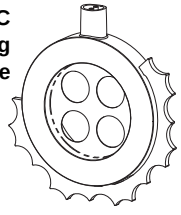
Orientation/ Flow Direction	Process[1]		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	D/R	R
Vertical Down	D/R	NR	NR

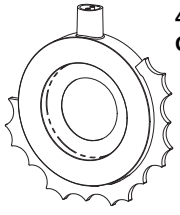
(1) D = Direct mount acceptable (recommended)
R = Remote mount acceptable
NR = Not recommended

Compact Flowmeter Pipe Centering

Improper centering of any orifice type device can cause an error of up to ±5% in small line sizes. A centering mechanism (centering ring) independent of flange rating comes standard with the 405 Compact Flowmeter Series.

405C Conditioning Orifice





405P Compact Orifice

1595 Pressure Tap Orientation

Orient the 1595 Conditioning Orifice Plate so that the pressure taps are centered between any 2 (of 4) orifice bore holes. In addition, the pressure taps should be located at 90° to the plane of the last upstream elbow under these conditions:

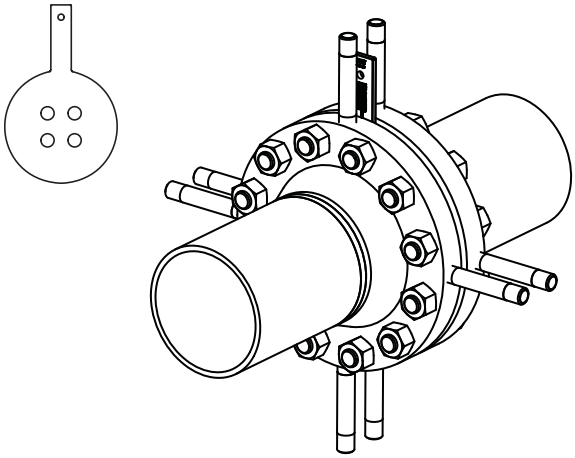
- with less than 6 upstream pipe diameters
- with a .65 Beta

Pressure Tap Locations

At Least Six Upstream Pipe Diameters

If the installation location has at least six upstream pipe diameters, the pressure taps can be located between any two of the four holes of the 1595 Orifice Plate. See Figure 2.

Figure 2. 1595 Pressure Tap Locations



Within Six Diameters Of An Elbow

If the installation location has less than six upstream pipe diameters, the pressure taps can be located between any two of the four holes of the 1595 Orifice Plate. In addition, the pressure taps must be located 90° from the plane of the elbow. See Figure 3 and Figure 4.

Figure 3. 1595 Pressure Tap Locations

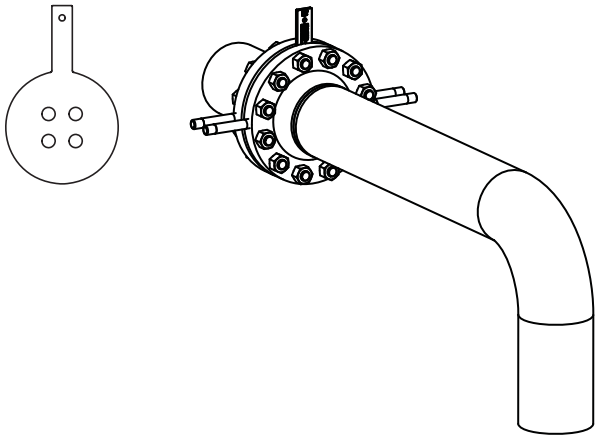
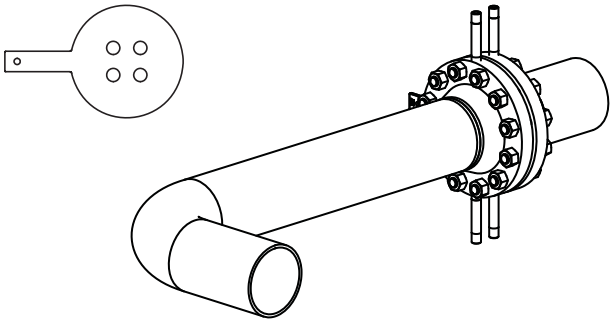


Figure 4. 1595 Pressure Tap Locations

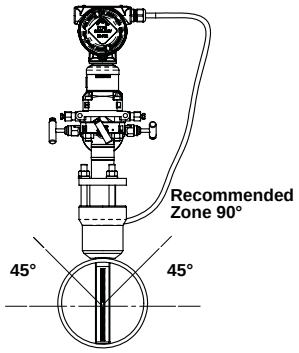


Annubar Flowmeter Orientation

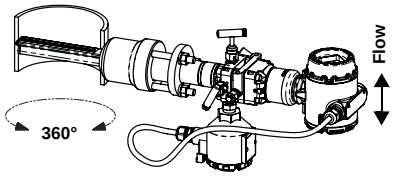
For 3051SFA, 3051CFA, 2051CFA, 485, 585

Annubar Direct Mount Flowmeter Orientation (Recommended)(1)

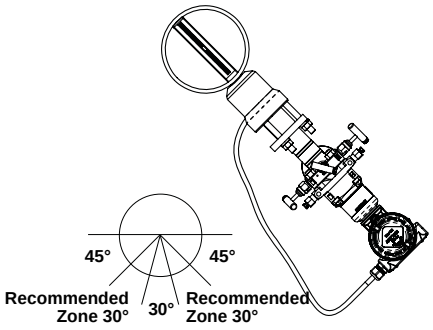
Gas (Horizontal)



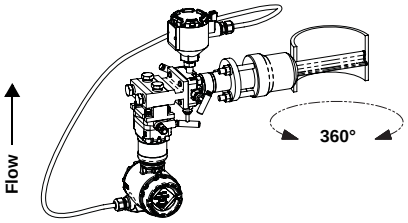
Gas (Vertical)



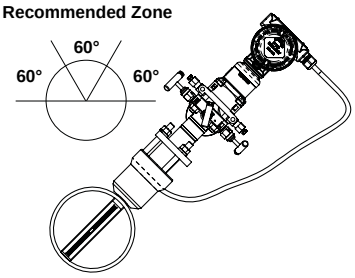
Liquid and Steam (Horizontal)



Steam (Vertical)



Top Mounting for Steam (Horizontal)(2)



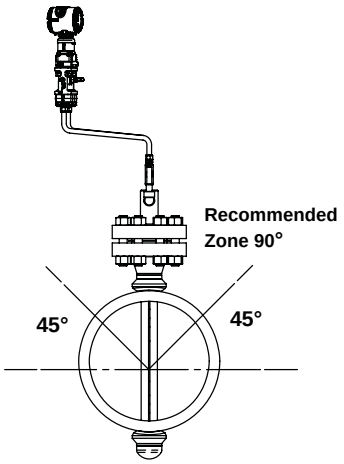
Note: If steam quality is not 100%, mount the Annubar 15° from the vertical position.

(1) The flowmeter orientation recommendations may vary for the Manual and Gear-Drive Flo-Tap Annubar Types.

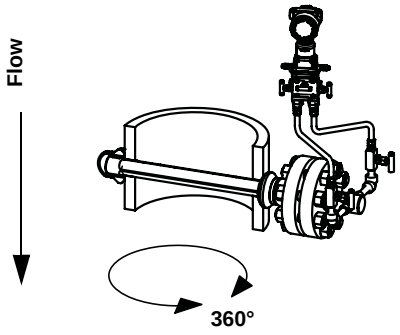
(2) Note: This mounting orientation is not recommended for the 585 Annubar Type L (Main Stream Line). For 585 Main Steam Line, use Liquid and Steam (Horizontal) orientation for mounting recommendations.

Annubar Remount Mount Flowmeter Orientation (Recommended)(1)

Gas (Horizontal)

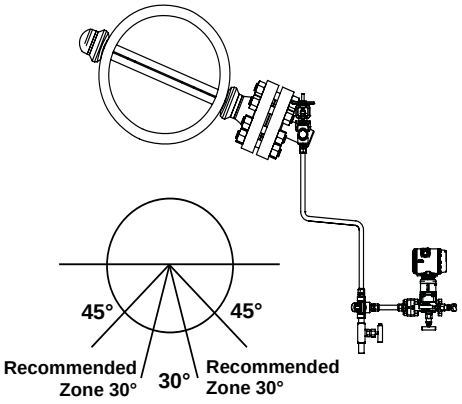


Gas (Vertical)

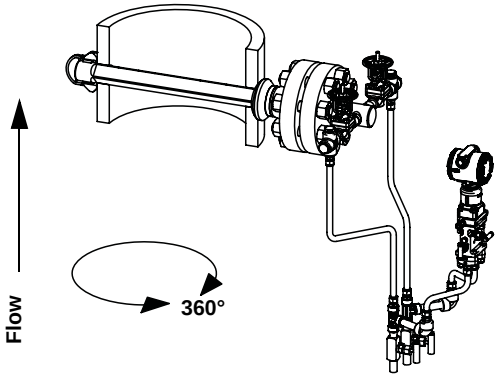


Note: Can also be mounted for Gas Vertical up applications.

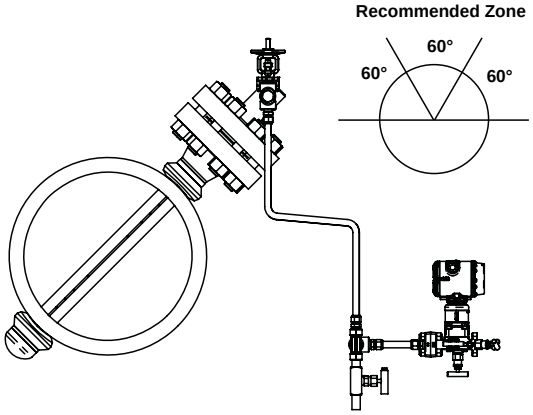
Liquid and Steam (Horizontal)



Steam (Vertical)



Top Mounting for Steam (Horizontal)



Note: This mounting orientation is not recommended for the Annubar Type L (Main Steam Line). For 585 Main Steam Line, use Liquid and Steam (Horizontal) orientation for mounting recommendations.

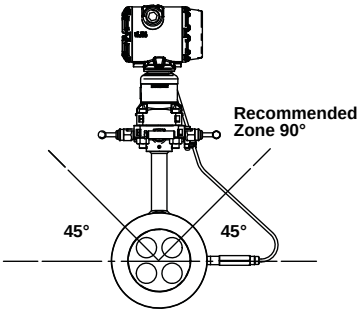
(1) The flowmeter orientation recommendations may vary for the Gear-Drive Flo-Tap Annubar Type.

405 Flowmeter Orientation

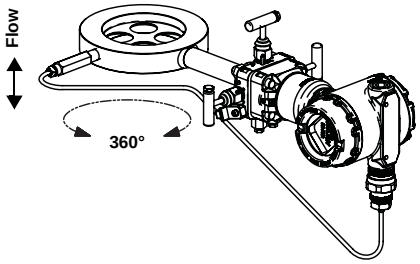
For 3051SFC, 3051CFC, 2051CFC, 405C, 405P

405 Direct Mount Flowmeter Orientation (Recommended)

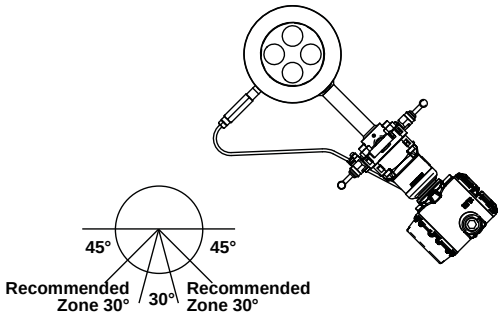
Gas (Horizontal)



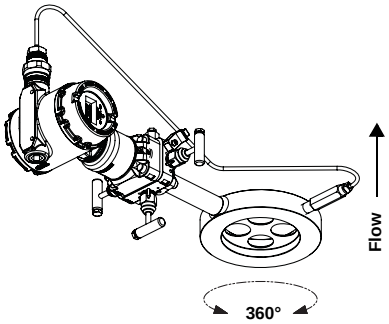
Gas (Vertical)



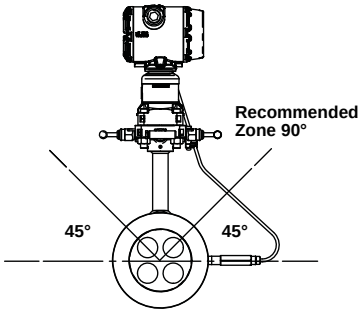
Liquid and Steam (Horizontal)



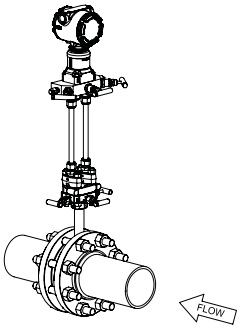
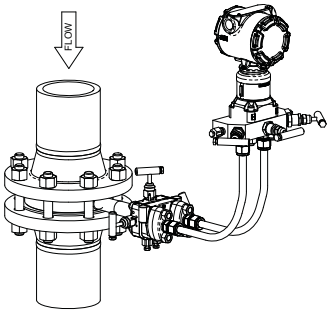
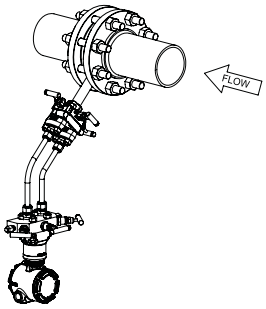
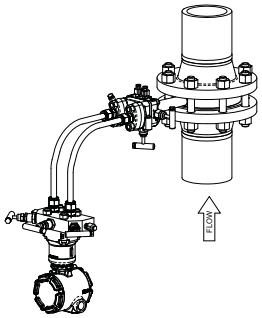
Steam (Vertical)



Top Mounting for Steam (Horizontal)



405 Remote Mount Flowmeter Orientation (Recommended)

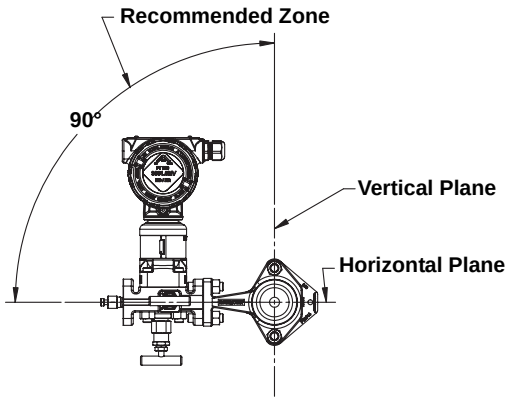
Gas (Horizontal)	Gas (Vertical)
	
Liquid and Steam (Horizontal)	**Liquid and Steam (Vertical)**
	

1195 Integral Orifice Flowmeter Orientation

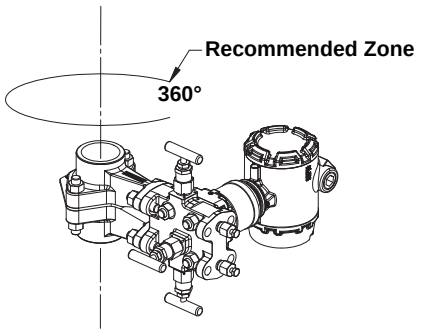
For 3051SFP, 3051CFP, 2051CFP, 1195

1195 Flowmeter Orientation with Traditional Style Manifold (Recommended)

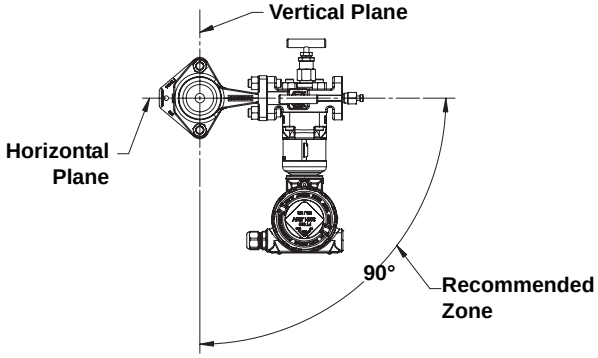
Gas (Horizontal)



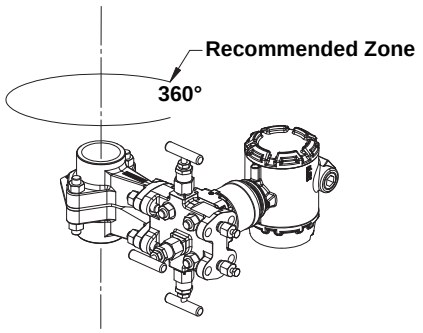
Gas (Vertical)



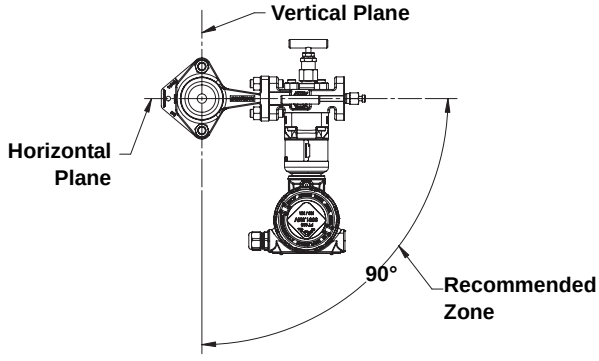
Liquid (Horizontal)



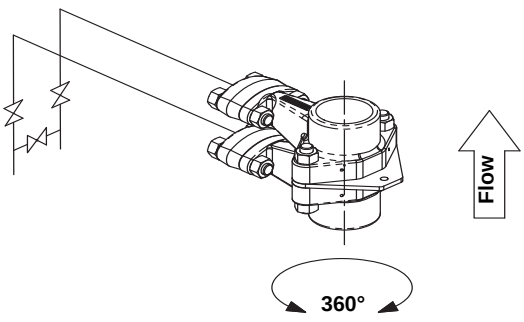
Liquid (Vertical)



Steam (Horizontal)

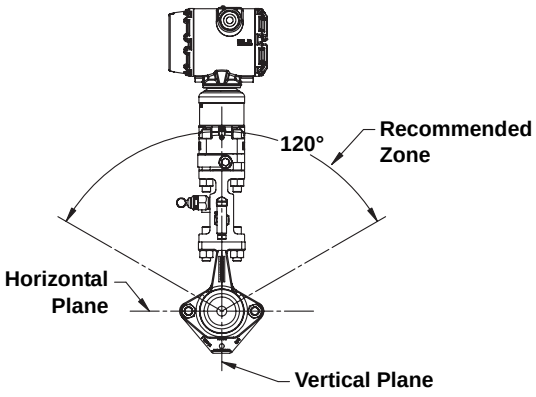


Steam (Vertical)

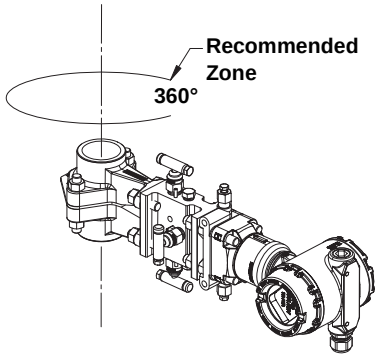


1195 Flowmeter Orientation with H-Pattern Manifold (Recommended)

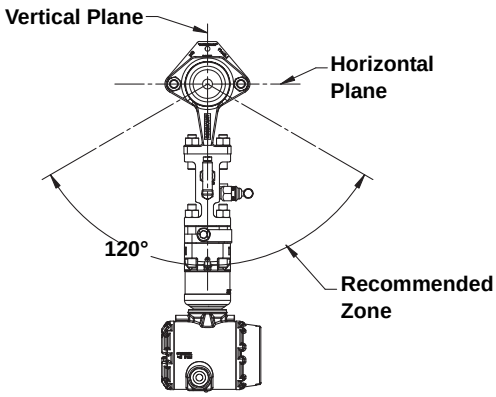
Gas (Horizontal)



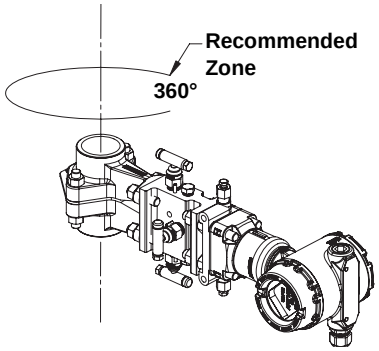
Gas (Vertical)



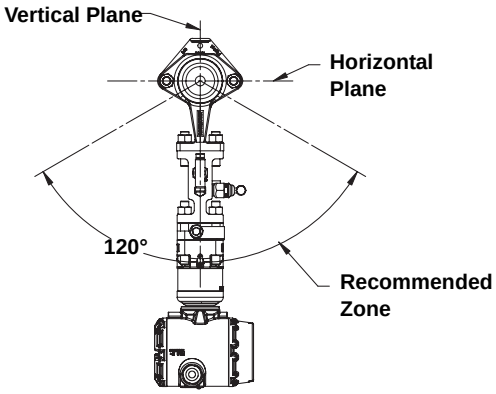
Liquid (Horizontal)



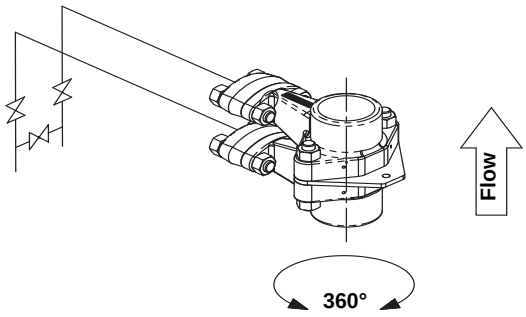
Liquid (Vertical)



Steam (Horizontal)



Steam (Vertical)



1495 DIMENSIONAL DRAWINGS

1495PC Paddle Type Orifice Plate
(DIN, Paddle, Square edged, Concentric)

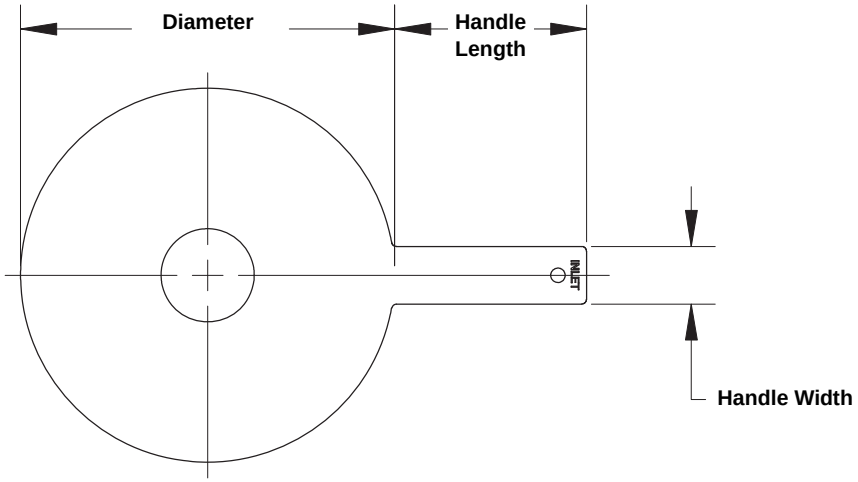
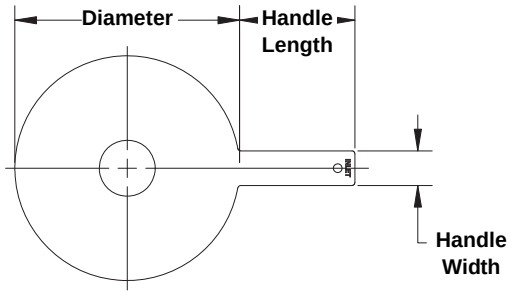


Table 107. 1495 Orifice Plate Dimensions[1]

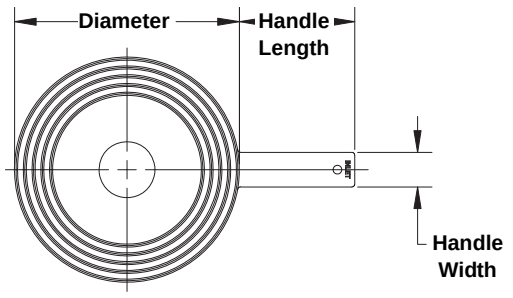
DN	Diameter (max) – by flange rating						Handle Width	Handle Length
	PN 10	PN 16	PN 25	PN 40	PN 63/64	PN 100		
DN 50	4.21 (107)	4.21 (107)	4.21 (107)	4.21 (107)	4.45 (113)	4.69 (119)	1.5 (40)	6.3 (160)
DN 65	5 (127)	5 (127)	5 (127)	5 (127)	5.43 (138)	5.67 (144)	1.5 (40)	6.3 (160)
DN 80	5.6 (142)	5.6 (142)	5.6 (142)	5.6 (142)	5.82 (148)	6.06 (154)	1.5 (40)	6.3 (160)
DN 100	6.38 (162)	6.38 (162)	6.61 (168)	6.61 (168)	6.85 (174)	7.09 (180)	1.5 (40)	6.3 (160)
DN 125	7.56 (192)	7.56 (192)	7.64 (194)	7.63 (194)	8.27 (210)	8.54 (217)	1.5 (40)	6.3 (160)
DN 150	8.58 (218)	8.58 (218)	8.82 (224)	8.82 (224)	9.72 (247)	10.12 (257)	1.5 (40)	6.3 (160)
DN 200	10.74 (273)	10.74 (273)	11.18 (284)	11.42 (290)	12.17 (309)	12.76 (324)	1.5 (40)	6.3 (160)
DN 250	12.91 (328)	12.95 (329)	13.39 (340)	13.86 (352)	14.33 (364)	15.39 (391)	1.5 (40)	6.3 (160)
DN 300	14.88 (378)	15.11 (384)	15.75 (400)	16.42 (417)	16.69 (424)	18.03 (458)	1.5 (40)	6.3 (160)
DN 350	17.24 (438)	17.48 (444)	17.99 (457)	18.66 (474)	19.13 (486)	20.16 (512)	1.5 (40)	6.3 (160)
DN 400	19.25 (489)	19.49 (495)	20.24 (514)	21.49 (546)	21.38 (543)	22.52 (572)	1.5 (40)	6.3 (160)
DN 450	21.22 (539)	21.85 (555)	22.24 (565)	22.48 (571)	Not Applicable	Not Applicable	1.5 (40)	6.3 (160)
DN 500	23.39 (594)	24.29 (617)	24.57 (624)	24.72 (628)	25.87 (657)	27.72 (704)	1.5 (40)	8.0 (200)
DN 600	27.36 (695)	28.9 (734)	28.78 (731)	29.41 (747)	30.08 (764)	32.01(813)	1.5 (40)	8.0 (200)

(1) Measurement is in inches (millimeters)

1495PC Orifice Paddle Type
(Paddle, Square edged, Concentric)



1495PG Orifice Paddle Type
(Paddle, Square edged, Concentric, Spiral finish)

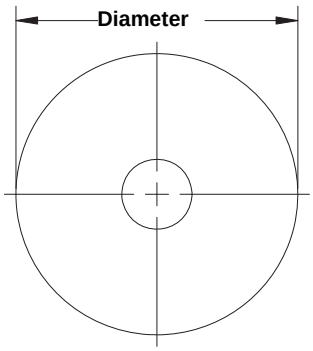


Line Size	Diameter for Paddle Type (1)						Handle Length	Handle Width
	150#	300#	600#	900#	1500#	2500#		
2-in.	4.125 (104.78)	4.375 (111.13)	4.375 (111.13)	5.625 (142.875)	5.625 (142.875)	5.750 (146.05)	4.0 (101.6)	1.00 (25.4)
2 1/2-in.	4.875 (123.82)	5.125 (130.18)	5.125 (130.18)	6.500 (165.1)	6.500 (165.1)	6.625 (168.275)	4.0 (101.6)	1.00 (25.4)
3-in.	5.375 (136.53)	5.875 (149.23)	5.875 (149.23)	6.625 (168.275)	6.875 (174.625)	7.750 (196.85)	4.0 (101.6)	1.00 (25.4)
4-in.	6.875 (174.63)	7.125 (180.98)	7.625 (193.675)	8.125 (206.375)	8.250 (209.55)	9.250 (234.95)	4.0 (101.6)	1.00 (25.4)
6-in.	8.750 (222.25)	9.875 (250.83)	10.500 (266.7)	11.375 (288.925)	11.125 (282.575)	12.500 (317.5)	4.0 (101.6)	1.00 (25.4)
8-in.	11.000 (279.4)	12.125 (307.98)	12.625 (320.675)	14.125 (358.775)	13.875 (352.425)	15.250 (387.35)	6.0 (127)	1.5 (38.1)
10-in.	13.375 (339.73)	14.250 (361.95)	15.750 (400.05)	17.125 (434.975)	17.125 (434.975)	18.750 (476.25)	6.0 (152.4)	1.5 (38.1)
12-in.	16.125 (409.58)	16.625 (422.26)	18.000 (457.2)	19.625 (498.475)	20.500 (520.7)	21.625 (549.275)	6.0 (152.4)	1.5 (38.1)
14-in.	17.750 (450.85)	19.125 (485.78)	19.375 (339.725)	20.500 (520.7)	22.750 (577.85)	—	6.0 (152.4)	1.5 (38.1)
16-in.	20.250 (514.35)	21.250 (539.75)	22.250 (565.15)	22.625 (574.675)	25.250 (641.35)	—	6.0 (152.4)	1.5 (38.1)
18-in.	21.500 (546.1)	23.375 (593.725)	24.000 (609.6)	25.000 (635.00)	27.625 (701.675)	—	6.0 (152.4)	1.5 (38.1)
20-in.	23.750 (603.25)	25.625 (650.875)	26.750 (679.45)	27.375 (695.325)	29.625 (752.475)	—	6.0 (152.4)	1.5 (38.1)
24-in.	28.125 (714.375)	30.375 (771.525)	31.000 (787.4)	32.875 (835.025)	35.500 (901.7)	—	6.0 (152.4)	1.5 (38.1)

(1) Measurement is in inches (millimeters)

1495UC Orifice Universal Type

(Universal, Square edged, Concentric

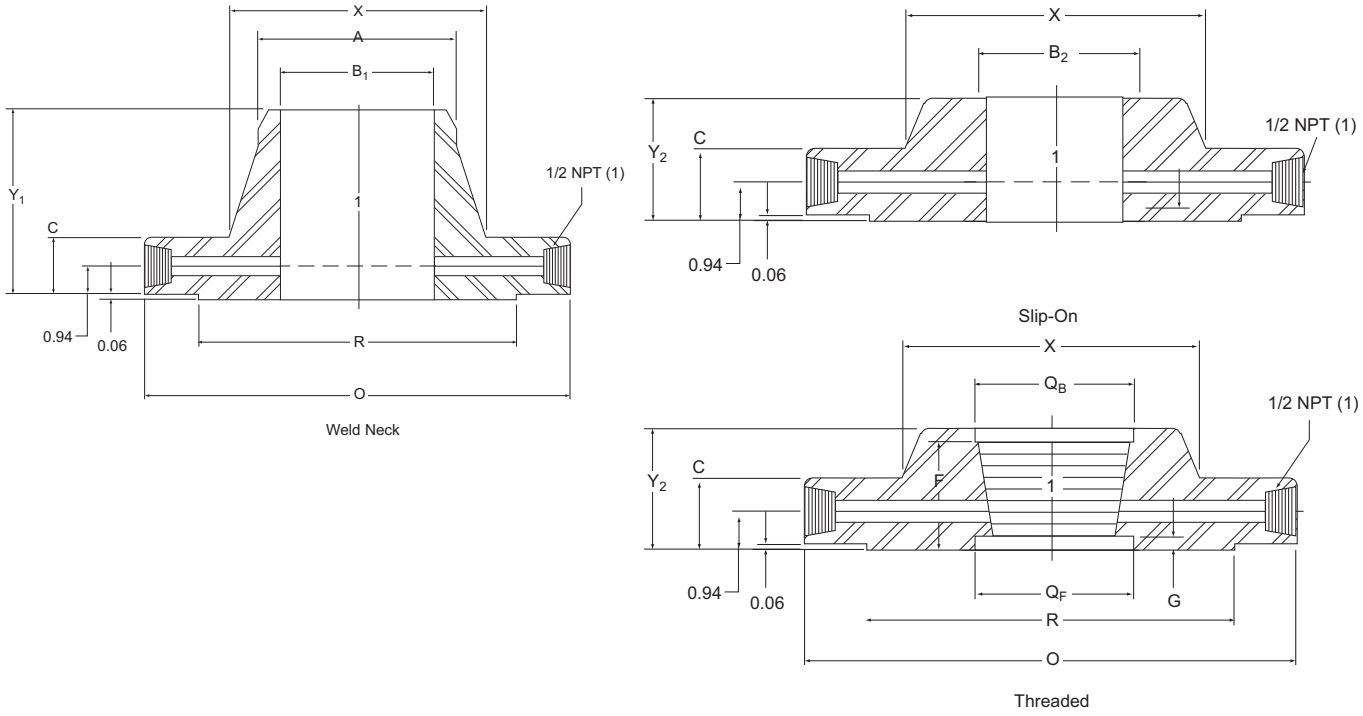


Line Size	Diameter for Universal Type(1)
2-in.	2.437 (61.8998)
2 1/2-in.	2.812 (71.4248)
3-in.	3.437 (87.2998)
4-in.	4.406 (111.912)
6-in.	6.437 (163.5)
8-in.	8.437 (214.3)
10-in.	10.687 (271.45)
12-in.	12.593 (319.862)
14-in.	14.000 (355.6)
16-in.	16.000 (406.4)
18-in.	18.000 (457.2)
20-in.	20.000 (508)
24-in.	24.000 (609.6)

(1) Measurement is in inches (millimeters)

1496 DIMENSIONAL DRAWINGS

Figure 5. Class 300



ASME B16.36-1996

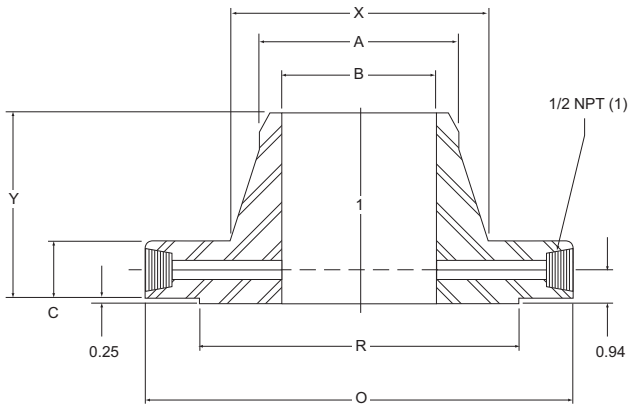
Table 108. Class 300 Orifice Flanges, Welding Neck, Slip-On, and Threaded(1)(2)

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub		Diameter of Hub X	Hub Diameter Beginning of Chamfer (W.N.) A	Diameter of Counter-bore		Counter-bore Depth (From Face)		Bore	
				Slip-On and Threaded Y_2	Weld Neck Y_1			Back Q_B	Face Q_F	F	G	Slip-On B_2	Weld Neck B_1
1	2.00	4.88	1.50	1.88	3.25	2.12	1.32	1.41	1.30	1.44	0.75	1.36	See Note (5)
$1\frac{1}{2}$	2.88	6.12	1.50	1.88	3.38	2.75	1.90	1.99	1.89	1.47	0.72	1.95	
2	3.62	6.50	1.50	1.94	3.38	3.31	2.38	2.50	2.36	1.50	0.69	2.44	
$2\frac{1}{2}$	4.12	7.50	1.50	2.00	3.50	3.94	2.88	3.00	2.84	1.75	0.56	2.94	
3	5.00	8.25	1.50	2.06	3.50	4.62	3.50	3.63	3.46	1.81	0.56	3.57	
4	6.19	10.00	1.50	2.12	3.62	5.75	4.50	4.63	4.45	1.88	0.56	4.57	
6	8.50	12.50	1.50	2.12	3.94	8.12	6.63	6.75	6.57	1.88	0.31	6.72	
8	10.62	15.00	1.62	2.44	4.38	10.25	8.63	8.75	8.55	2.19	0.44	8.72	
10	12.75	17.50	1.88	2.62	4.62	1262	10.75	See Note (6).				10.88	
12	15.00	20.50	2.00	2.88	5.12	14.75	12.75					12.88	
14	16.25	23.00	2.12	3.00	5.62	16.75	14.00					14.14	
16	18.50	25.50	2.25	3.25	5.75	19.00	16.00					16.16	
18	21.00	28.00	2.38	3.50	6.25	21.00	18.00					18.18	
20	23.00	30.50	2.50	3.75	6.38	23.12	20.00					20.20	
24	27.25	36.00	2.75	4.19	6.62	27.62	24.00					24.25	

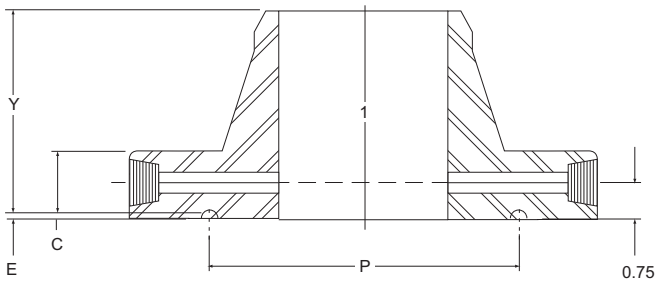
Nominal Pipe Size (1)(2)	Diameter of Pressure Connection TT	Drilling Template				Bolt Length (3)(4)	
		Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Machine Bolts	Stud Bolts
1	1/4	3.50	4	0.69	5/8	4.50	5.00
1 1/2	1/4	4.50	4	0.81	3/4	4.75	5.25
2	1/4	5.00	8	0.69	5/8	4.50	5.00
2 1/2	1/4	5.88	8	0.81	3/4	4.75	5.25
3	3/8	6.62	8	0.81	3/4	4.75	5.25
4	1/2	7.88	8	0.81	3/4	4.75	5.25
6	1/2	10.62	12	0.88	3/4	4.75	5.25
8	1/2	13.00	12	1.00	7/8	5.00	5.75
10	1/2	15.25	16	1.12	1	5.75	6.50
12	1/2	17.75	16	1.25	1 1/8	6.25	7.00
14	1/2	20.25	20	1.25	1 1/8	6.50	7.25
16	1/2	22.50	20	1.38	1 1/4	7.00	7.75
18	1/2	24.75	24	1.38	1 1/4	7.25	8.00
20	1/2	27.00	24	1.38	1 1/4	7.50	8.50
24	1/2	32.00	24	1.62	1 1/2	8.25	9.50

(1) Weld neck flanges NPS 3 and smaller are identical to Class 600 flanges and may be so marked.
(2) All other dimensions are in accordance with ASME B16.5.
(3) Bolt lengths include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24.
(4) In conformance with ASME B16.5, stud bolt lengths do not include point heights.
(5) Threaded flanges are furnished in NPS 1-8 only.
(6) Bore diameter of weld neck flanges is to be specified by the purchaser.

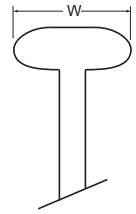
Figure 6. Class 600



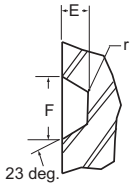
Raised Face



Ring Type Joint



Special One or Two Piece Ring and Orifice Plate Assembly



Groove Detail

Table 109. Class 600 Orifice Flanges, Welding Neck[1][2]

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Height of Raised Face H	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
						Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	2.00	4.88	1.44	3.19	0.06	R16	2.000	0.250	0.344	0.03	1.00	2.12	1.32
1 1/2	2.88	6.12	1.44	3.32	0.06	R20	2.688	0.250	0.344	0.03	1.00	2.75	1.90
2	3.62	6.50	1.44	3.32	0.06	R23	3.250	0.312	0.469	0.03	1.06	3.31	2.38
2 1/2	4.12	7.50	1.44	3.44	0.06	R26	4.000	0.312	0.469	0.03	1.06	3.94	2.88
3	5.00	8.25	1.44	3.44	0.06	R31	4.875	0.312	0.469	0.03	1.06	4.62	3.50
4	6.19	10.75	1.50	4.00	0.25	R37	5.875	0.312	0.469	0.03	1.06	6.00	4.50
6	8.50	14.00	1.88	4.62	0.25	R45	8.312	0.312	0.469	0.03	1.06	8.75	6.63
8	10.62	16.50	2.19	5.25	0.25	R49	10.625	0.312	0.469	0.03	1.06	10.75	8.63
10	12.75	20.00	2.50	6.00	0.25	R53	12.750	0.312	0.469	0.03	1.06	13.50	10.75
12	15.00	22.00	2.62	6.12	0.25	R57	15.000	0.312	0.469	0.03	1.06	15.75	12.75
14	16.25	23.75	2.75	6.50	0.25	R61	16.500	0.312	0.469	0.03	1.06	17.00	14.00
16	18.50	27.00	3.00	7.00	0.25	R65	18.500	0.312	0.469	0.03	1.19	19.50	16.00
18	21.00	29.25	3.25	7.25	0.25	R69	21.000	0.312	0.469	0.03	1.19	21.50	18.00
20	23.00	32.00	3.50	7.50	0.25	R73	23.000	0.375	0.531	0.06	1.25	24.00	20.00
24	27.25	37.00	4.00	8.00	0.25	R77	27.250	0.438	0.656	0.06	1.44	28.25	24.00

(1)(2) Nominal Pipe Size	Bore B	Diameter of Pressure Conn-ection TT	Drilling Template				Diameter of Bolts	Length of Stud Bolts[3][4]	
			Bolt Circle	Number of Holes	Diameter of Holes			Raised Face	Ring Joint
					Raised Face	Ring Joint			
1	See Note (4).	1/4	3.50	4	0.69	0.75	5/8	5.00	5.50
1 1/2		1/4	4.50	4	0.81	0.88	3/4	5.25	5.50
2		1/4	5.00	8	0.69	0.75	5/8	5.00	5.50
2 1/2		1/4	5.88	8	0.81	0.88	3/4	5.25	5.75
3		3/8	6.62	8	0.81	0.88	3/4	5.25	5.75
4		1/2	8.50	8	1.00	1.00	7/8	6.00	6.50
6		1/2	11.50	12	1.12	1.12	1	7.00	7.50
8		1/2	13.75	12	1.25	1.25	1 1/8	7.75	8.25
10		1/2	17.00	16	1.38	1.38	1 1/4	8.75	9.25
12		1/2	19.25	20	1.38	1.38	1 1/4	9.00	9.50
14		1/2	20.75	20	1.50	1.50	1 3/8	9.50	10.00
16		1/2	23.75	20	1.62	1.62	1 1/2	10.25	10.75
18		1/2	25.75	20	1.75	1.75	1 5/8	11.00	11.50
20		1/2	28.50	24	1.75	1.75	1 5/8	11.75	12.50
24		1/2	33.00	24	2.00	2.00	1 7/8	13.25	13.75

(1) Weld neck flanges NPS 3 and smaller are identical to Class 300 flanges except for bolting and may be used for such service.
(2) All other dimensions are in accordance with ASME B16.5.
(3) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 1-10, 0.75 in. for NPS 12-18, and 0.88 in. for NPS 20.
(4) In conformance with ASME B16.5, stud bolt lengths do not include point heights.

Figure 7. Class 900

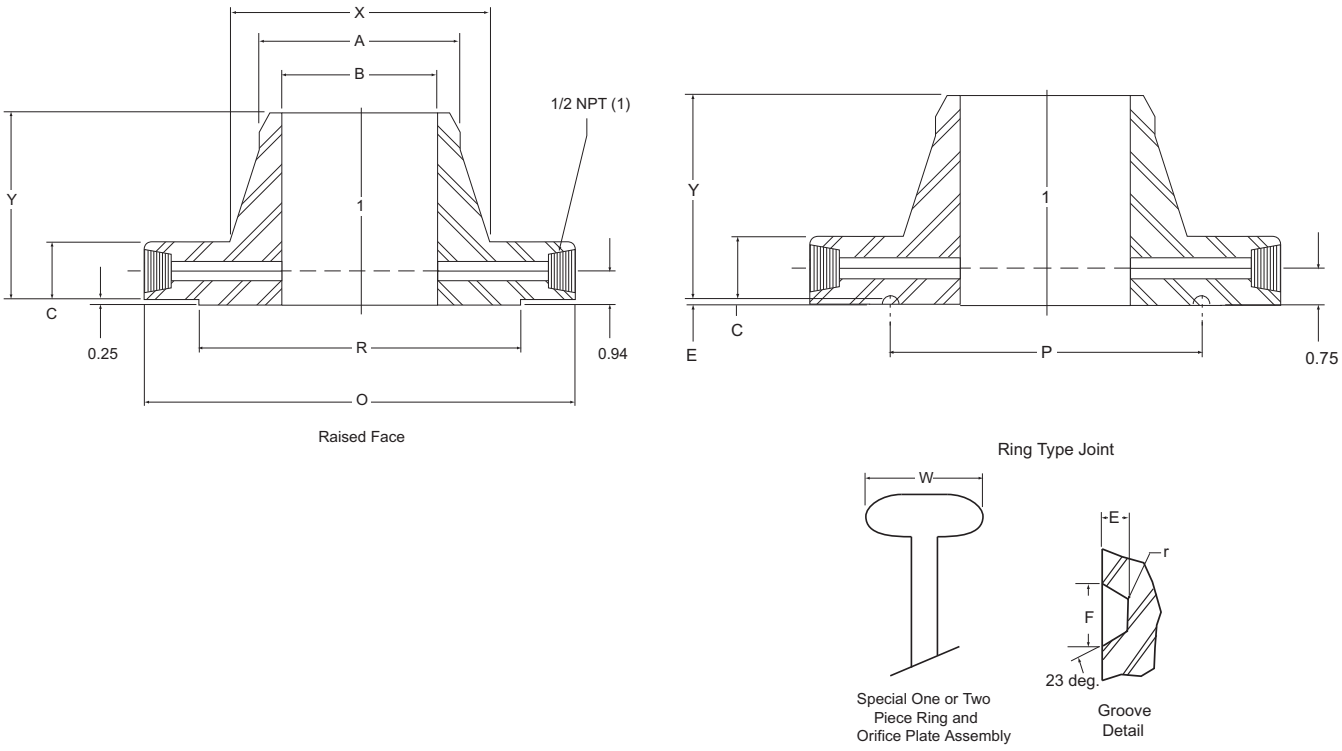


Table 110. Class 900 Orifice Flanges, Welding Neck(1)

Nominal Pipe Size	Out-side Diameter of Raised Face R	Out-side Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
					Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	For Nominal Pipe Size (NPS) 2 1/2 and smaller, use Class 1500.											
1 1/2												
2												
2 1/2												
3	5.00	9.50	1.50	4.00	R31	4.875	0.312	0.469	0.03	1.06	5.00	3.50
4	6.19	11.50	1.75	4.50	R37	5.875	0.312	0.469	0.03	1.06	6.25	4.50
6	8.50	15.00	2.19	5.50	R45	8.312	0.312	0.469	0.03	1.06	9.25	6.63
8	10.62	18.50	2.50	6.38	R49	10.625	0.312	0.469	0.03	1.06	11.75	8.63
10	12.75	21.50	2.75	7.25	R53	12.750	0.312	0.469	0.03	1.06	14.50	10.75
12	15.00	24.00	3.12	7.88	R57	15.000	0.312	0.469	0.03	1.06	16.50	12.75
14	16.25	25.25	3.38	8.38	R62	16.500	0.438	0.656	0.06	1.31	17.75	14.00
16	18.50	27.75	3.50	8.50	R66	18.500	0.438	0.656	0.06	1.44	20.00	16.00
18	21.00	31.00	4.00	9.00	R70	21.000	0.500	0.781	0.06	1.56	22.25	18.00
20	23.00	33.75	4.25	9.75	R74	23.000	0.500	0.781	0.06	1.56	24.50	20.00
24	27.25	41.00	5.50	11.50	R78	27.250	0.625	1.062	0.09	1.88	29.50	24.00

(1) Nominal Pipe Size	Bore B	Diameter of Pressure Connection TT	Drilling Template				Length of Stud Bolts(2)(3)	
			Diameter of Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Raised Face	Ring Joint
1	For Nominal Pipe Size (NPS) 2 1/2 and smaller, use Class 1500.							
1 1/2								
2								
2 1/2								
3	See Note (4).	3/8	7.50	8	7.50	7/8	6.00	6.50
4		1/2	9.25	8	9.25	1 1/8	7.00	7.50
6		1/2	12.50	12	12.50	1 1/8	7.75	8.25
8		1/2	15.50	12	15.50	1 3/8	9.00	9.50
10		1/2	18.50	16	18.50	1 3/8	9.50	10.00
12		1/2	21.00	20	21.00	1 3/8	10.25	10.75
14		1/2	22.00	20	22.00	1 1/2	11.00	11.50
16		1/2	24.25	20	24.25	1 5/8	11.50	12.00
18		1/2	27.00	20	27.00	1 7/8	13.00	13.75
20		1/2	29.50	20	29.50	2	14.00	14.75
24		1/2	35.50	20	35.50	2 1/2	17.50	18.50

(1) All other dimensions are in accordance with ASME B16.5.
(2) In conformance with ASME B16.5, stud bolt lengths do not include point heights.
(3) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 3-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 3-10 and 0.75 in. for NPS 12.
(4) Bore is to be specified by the purchaser.

Figure 8. Class 1500

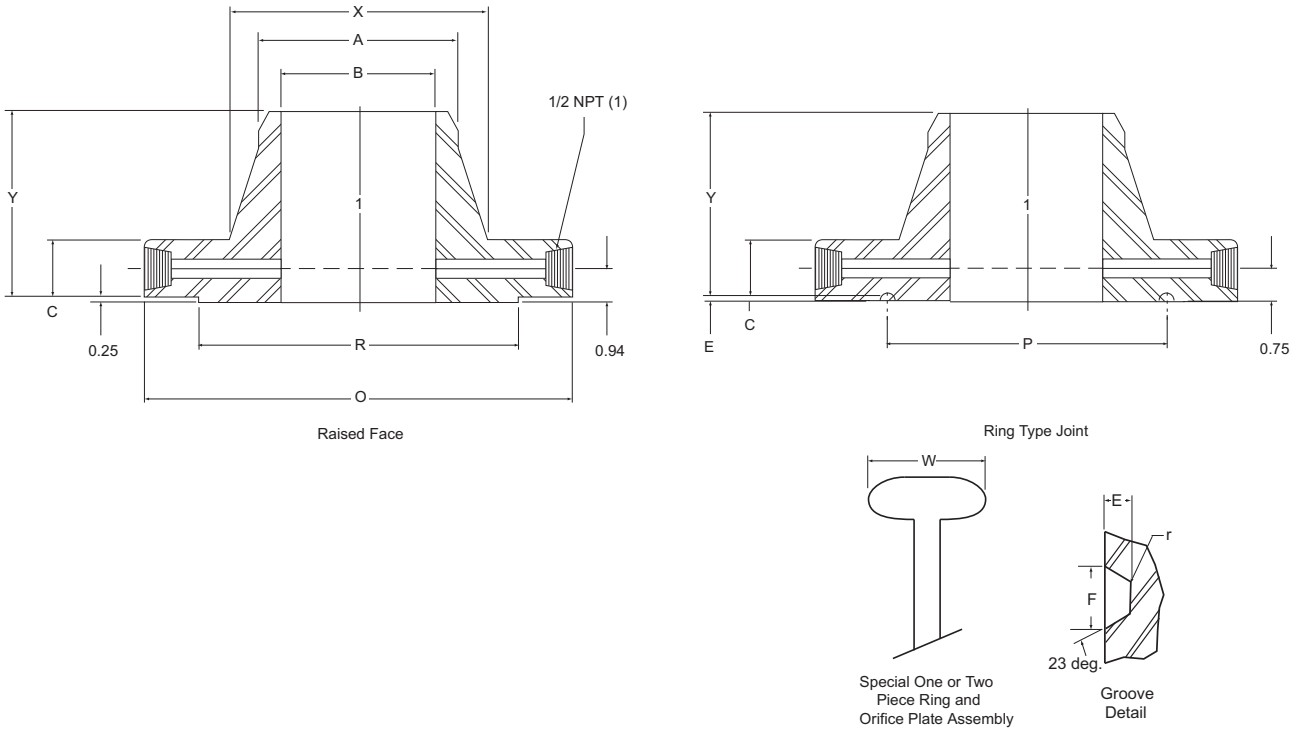


Table 111. Class 1500 Orifice Flanges, Welding Neck[1]

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
					Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	2.00	5.88	1.50	3.25	R16	2.000	0.250	0.344	0.03	1.00	2.06	1.32
1 1/2	2.88	7.00	1.50	3.50	R20	2.688	0.250	0.344	0.03	1.00	2.75	1.90
2	3.62	8.50	1.50	4.00	R24	3.750	0.312	0.469	0.03	1.06	4.12	2.38
2 1/2	4.12	9.62	1.62	4.12	R27	4.250	0.312	0.469	0.03	1.06	4.88	2.88
3	5.00	10.50	1.88	4.62	R35	5.375	0.312	0.469	0.03	1.06	5.25	3.50
4	6.19	12.25	2.12	4.88	R39	6.375	0.312	0.469	0.03	1.06	6.38	4.50
6	8.50	15.50	3.25	6.75	R46	8.312	0.375	0.531	0.06	1.12	9.00	6.63
8	10.62	19.00	3.62	8.38	R50	10.625	0.438	0.656	0.06	1.31	11.50	8.63
10	12.75	23.00	4.25	10.00	R54	12.750	0.438	0.656	0.06	1.31	14.50	10.75
12	15.00	26.50	4.88	11.12	R58	15.000	0.562	0.806	0.06	1.56	17.75	12.75
14	16.25	29.50	5.25	11.75	R63	16.500	0.625	1.062	0.09	1.75	19.50	14.00
16	18.50	32.50	5.75	12.25	R67	18.500	0.688	1.188	0.09	2.00	21.75	16.00
18	21.00	36.00	6.38	12.88	R71	21.000	0.688	1.188	0.09	2.00	23.50	18.00
20	23.00	38.75	7.00	14.00	R75	23.000	0.688	1.312	0.09	2.12	25.25	20.00
24	27.25	46.00	8.00	16.00	R79	27.250	0.812	1.438	0.09	2.31	30.00	24.00

(1) Nominal Pipe Size	Bore B	Diameter of Pressure Connection TT	Drilling Template				Length of Stud Bolts[2][3]	
			Diameter of Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Raised Face	Ring Joint
1	See Note [4].	1/4	4.00	4	1.00	7/8	6.00	6.25
1 1/2		1/4	4.88	4	1.12	1	6.25	6.50
2		1/4	6.50	8	1.00	7/8	6.00	6.50
2 1/2		1/4	7.50	8	1.12	1	6.50	7.00
3		3/8	8.00	8	1.25	1 1/8	7.25	7.25
4		1/2	9.50	8	1.38	1 1/4	8.00	8.50
6		1/2	12.50	12	1.50	1 3/8	10.50	11.00
8		1/2	15.50	12	1.75	1 5/8	11.75	12.25
10		1/2	19.00	12	2.00	1 7/8	13.50	14.00
12		1/2	22.50	16	2.12	2	15.00	15.75
14		1/2	25.00	16	2.38	2 1/4	16.25	17.52
16		1/2	27.75	16	2.62	2 1/2	17.75	19.00
18		1/2	30.50	16	2.88	2 3/4	19.75	21.00
20		1/2	32.75	16	3.12	3	21.50	22.50
24		1/2	39.00	16	3.62	3 1/2	24.50	26.00

(1) All other dimensions are in accordance with ASME B16.5.
(2) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 1-10, 0.75 in. for NPS 12-18, and 0.88 in. for NPS 20.
(3) In conformance with ASME B16.5, stud bolt lengths do not include point heights.

(4) Bore is to be specified by the purchaser.

Figure 9. Class 2500

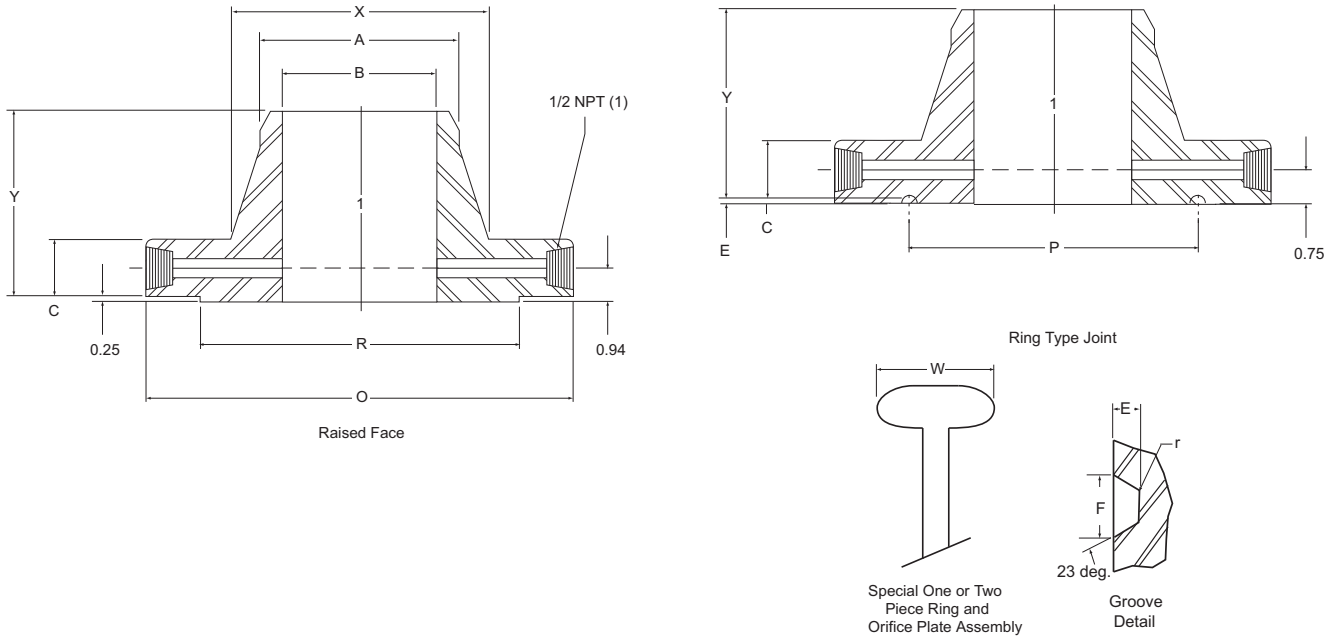


Table 112. Class 2500 Orifice Flanges, Welding Neck[(1)]

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
					Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	2.00	6.25	1.50	3.62	R18	2.375	0.250	0.344	0.03	1.00	2.25	1.32
1.5	2.88	8.00	1.75	4.38	R23	3.250	0.312	0.469	0.03	1.06	3.12	1.90
2	3.62	9.25	2.00	5.00	R26	4.000	0.312	0.469	0.03	1.06	3.75	2.38
2.5	4.12	10.50	2.25	5.62	R28	4.375	0.375	0.531	0.06	1.19	4.50	2.88
3	5.00	12.00	2.62	6.62	R32	5.000	0.375	0.531	0.06	1.19	5.25	3.50
4	6.19	14.00	3.00	7350	R38	6.188	0.438	0.656	0.06	1.31	6.50	4.50
6	8.50	19.00	4.25	10.75	R47	9.000	0.500	0.781	0.06	1.31	6.50	4.50
8	10.62	21.75	5.00	12.50	R51	11.000	0.562	0.906	0.06	1.56	12.00	8.63
10	12.75	26.50	6.50	16.50	R55	13.500	0.688	1.188	0.09	1.88	14.75	10.75
12	15.00	30.00	7.25	18.25	R60	16.000	0.688	1.312	0.09	2.00	17.38	12.75

(1) Nominal Pipe Size	Bore B	Diameter of Pressure Conn-ection TT	Drilling Template				Length of Stud Bolts(2)(3)	
			Diameter of Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Raised Face	Ring Joint
1	See Note(4)	1/4	4.25	4	1.00	7/8	6.00	6.25
1.5		1/4	5.75	4	1.25	1 1/8	7.00	7.50
2		1/4	6.75	8	1.12	1	7.25	7.75
2.5		1/4	7.75	8	1.25	1 1/8	8.00	8.50
3		3/8	9.00	8	1.38	1 1/4	9.00	9.50
4		1/2	10.75	8	1.62	1 1/2	10.25	10.75
6		1/2	14.50	8	2.12	2	13.75	14.50
8		1/2	17.25	12	2.12	2	15.25	16.00
10		1/2	21.25	12	2.62	2 1/2	19.25	20.25
12		1/2	24.38	12	2.88	2 3/4	21.25	22.50

(1) All other dimensions are in accordance with ASME B16.5.
(2) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 1-10, 0.75 in. for NPS 12-18, and 0.88 in. for NPS 20.
(3) In conformance with ASME B16.5, stud bolt lengths do not include point heights.

(4) Bore is to be specified by the purchaser.

Rosemount DP Flow

Product Data Sheet
00813-0100-4485, Rev CA
January 2011

Emerson Process Management
Rosemount Measurement
8200 Market Boulevard
Chanhassen MN 55317 USA
Tel (USA) 1 800 999 9307
Tel (International) +1 952 906 8888
Fax +1 952 949 7001

Emerson Process Management
Blegistrasse 23
P.O. Box 1046
CH 6341 Baar
Switzerland
Tel +41 (0) 41 768 6111
Fax +41 (0) 41 768 6300

Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone
Dubai UAE
Tel +971 4 811 8100
Fax +971 4 886 5465

Emerson Process Management Asia Pacific Pte Ltd
1 Pandan Crescent
Singapore 128461
Tel +65 6777 8211
Fax +65 6777 0947
Service Support Hotline : +65 6770 8711
Email : Enquiries@AP.EmersonProcess.com

00813-0100-4485 Rev CA, 1/11
A.P.O. - ELMOS v.o.s., Pražská 90, 509 01 Nová Paka, Tel.: +420 493 504 261, Fax: +420 493 504 257, E-mail: apo@apoelmos.cz, Internet: www.apoelmos.cz