Product Data Sheet
March 2015
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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 most flow disturbances with Conditioning Orifice Plate Technology
- Improve accuracy and repeatability in small line sizes with Integral Orifice Plate Technology

ROSEMOUNT

EMERSON.
Process Management

Contents

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
- Multi-variable 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
- 15-year stability, 15-year warranty
- SIL3 Capable: IEC 61508 certified by an accredited 3rd party agency for use in safety instrumented systems up to SIL 3 (minimum requirement of single use [1oo1] for SIL 2 and redundant use [1oo2] for SIL 3)

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®, *Wireless*HART®, FOUNDATION™ fieldbus, and PROFIBUS® Protocols
- 10-year stability
- SIL3 Capable: IEC 61508 certified by an accredited 3rd party agency for use in safety instrumented systems up to SIL 3 (minimum requirement of single use [1oo1] for SIL 2 and redundant use [1oo2] for SIL 3)

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, *Wireless*HART, and FOUNDATION fieldbus Protocols
- 3-year stability

Rosemount Annubar Primary Element Technology

- Energy savings gained through minimal permanent pressure loss
- Innovative T-shape design providing accuracies up to ±0.75% of flow rate (485 Annubar Primary Element)
- 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 (585 Annubar Primary Element)
- 405A Compact Annubar primary element easily installs like an orifice plate
- Integral thermowell allows temperature measurement without additional pipe penetrations for 485 and 405A models.

Rosemount Conditioning Orifice Plate Technology

- Reduce straight pipe requirements to two diameters upstream and downstream from most flow disturbances
- Discharge coefficient uncertainty as low as ±0.5%
- Integral thermowell allows temperature measurement without an additional pipe penetration with the compact design
- 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 allows temperature measurement without an additional pipe penetration

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 1-4)
- 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 34
Dimensional Drawings: page 197

Rosemount 3051SFA Annubar® Flowmeter ordering information

- 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.

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 43 for more information on Material Selection.

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				
1	Fully Compensated Mass & Energy Flow Calculations – Differential & Static Pressures w/ Temperature	—	•	★
2	Compensated Flow Calculations – Differential & Static Pressures	—	•	★
3	Compensated Flow Calculations – Differential Pressure & Temperature	—	•	★
4	Compensated Flow Calculations – Differential Pressure	—	•	★
D	Differential Pressure	•	—	★
5	Process Variables Only (No Flow Calculations) – Differential & Static Pressures w/ Temperature	—	•	
6	Process Variables Only (No Flow Calculations) – Differential & Static Pressures	—	•	
7	Process Variables Only (No Flow Calculations) – Differential Pressure & Temperature	—	•	

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Fluid type		**D**	**1-7**	
L	Liquid	•	•	★
G	Gas	•	•	★
S	Steam	•	•	★
Line size				
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)	•	•	★
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				
C	Range C from the Pipe I.D. table	•	•	★
D	Range D from the Pipe I.D. table	•	•	★
A	Range A from the Pipe I.D. table	•	•	
B	Range B from the Pipe I.D. table	•	•	

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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		**D**	**1-7**	
C	Carbon steel (A105)	•	•	★
S	316 Stainless Steel	•	•	★
0[(1)]	No Mounting (customer supplied)	•	•	★
G	Chrome-Moly Grade F-11	•	•	
N	Chrome-Moly Grade F-22	•	•	
J	Chrome-Moly Grade F-91	•	•	
Piping orientation				
H	Horizontal Piping	•	•	★
D	Vertical Piping with Downwards Flow	•	•	★
U	Vertical Piping with Upwards Flow	•	•	★
Annubar type				
P	Pak-Lok	•	•	★
F	Flanged with opposite side support	•	•	★
L	Flange-Lok	•	•	
G	Gear-Drive Flo-Tap	•	•	
M	Manual Flo-Tap	•	•	
Sensor material				
S	316 Stainless Steel	•	•	★
H	Alloy C-276	•	•	
Sensor size				
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				
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	•	•	★
A9[(2)]	900# RF ANSI	•	•	

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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				**D**	**1-7**	
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					
	Packing gland material	Rod material	Packing material			
J[3]	Stainless Steel Packing Gland/Cage Nipple	Carbon Steel	PTFE	•	•	
K[3]	Stainless Steel Packing Gland/Cage Nipple	Stainless Steel	PTFE	•	•	
L[3]	Stainless Steel Packing Gland/Cage Nipple	Carbon Steel	Graphite	•	•	
N[3]	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						
0[1]	Not Applicable or Customer Supplied			•	•	★
1	Gate Valve, Carbon Steel			•	•	
2	Gate Valve, Stainless Steel			•	•	
5	Ball Valve, Carbon Steel			•	•	
6	Ball Valve, Stainless Steel			•	•	
Temperature measurement						
T[4]	Integral RTD – not available with Flanged model greater than class 600#			•	•	★
0[5]	No Temperature Sensor			•	•	★
R[4]	Remote Thermowell and RTD			•	•	

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Transmitter connection platform				**D**	**1-7**	
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)			•	•	★
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						
1	0 to 25 in H_2O (0 to 62,16 mbar)			•	•	★
2	0 to 250 in H_2O (0 to 621,60 mbar)			•	•	★
3	0 to 1000 in H_2O (0 to 2,48 bar)			•	•	★
Static pressure range						
A[(6)]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55,15 bar)			–	•	★
E[(7)]	Absolute 0 to 3626 psia (0 to 250,00 bar)			–	•	★
J	Gage -14.2 to 800 psig (-0.98 to 55,15 bar)			–	•	★
K[(7)]	Gage -14.2 to 3626 psig (-0.98 to 250,00 bar)			–	•	★
Transmitter output						
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus protocol (requires PlantWeb® housing)			•	–	★
X[(8)(9)]	Wireless (requires wireless options and Wireless PlantWeb housing)			•	•	★
Transmitter housing style		**Material**	**Conduit entry size**			
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	•	–	★

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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)	N/A	N/A	•	–	★
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	•	–	
Performance class[12]				**D**	**1-7**	
3051S MultiVariable™ SuperModule™, Measurement Types 1, 2, 5, and 6						
3[13]	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability, 15-year limited 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, 15-year stability, 15-year limited warranty			•	•	★
2	Classic: up to 1.4% flow rate accuracy, 8:1 flow turndown, 15-year stability			•	•	★
3[13]	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 15-year stability, 15-year limited warranty			•	•	★

Wireless options[9] (requires option code X and wireless PlantWeb housing)

Update rate, operating frequency and protocol	**D**	**1-7**	
WA	User Configurable Update Rate	•	–	★
Operating frequency and protocol			
3	2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	•	–	★
Omni-directional wireless antenna			
WK	External Antenna	•	–	★
WM	Extended Range, External Antenna	•	–	★
WN	High-Gain, Remote Antenna	•	–	
SmartPower™ Adapter			
1[14]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	–	★

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Other options (include with selected model number)

Extended product warranty		D	1-7	
WR3	3-year limited warranty	•	•	★
WR5	5-year limited warranty	•	•	★
Pressure testing				
P1[15]	Hydrostatic Testing with Certificate	•	•	
PX[15]	Extended Hydrostatic Testing	•	•	
Special cleaning				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 level D (section 11.4)	•	•	
Material testing				
V1	Dye Penetrant Exam	•	•	
Material examination				
V2	Radiographic Examination	•	•	
Flow calibration				
W1	Flow Calibration (Average K)	•	•	
WZ	Special Calibration	•	•	
Special inspection				
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Surface finish				
RL	Surface finish for Low Pipe Reynolds Number in Gas & Steam	•	•	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	•	•	★
Material traceability certification				
Q8[16]	Material Traceability Certificate per EN 10204:2004 3.1	•	•	★
Code conformance				
J2[17]	ANSI / ASME B31.1	•	•	
J3[17]	ANSI / ASME B31.3	•	•	
Material conformance				
J5[18]	NACE MR-0175/ISO 15156	•	•	
Country certification				
J6	European Pressure Directive (PED)	•	•	★
J1	Canadian Registration	•	•	

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Installed in flanged pipe spool section		**D**	**1-7**	
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				
G2	Needle Valves, Stainless Steel	•	•	★
G6	OS&Y Gate Valve, Stainless Steel	•	•	★
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				
Y1	Mounting Hardware Shipped Separately	•	•	★
Special dimensions				
VM	Variable Mounting	•	•	
VT	Variable Tip	•	•	
VS	Variable length Spool Section	•	•	
Transmitter calibration certification				
Q4	Calibration Certificate for Transmitter	•	•	★
QP	Calibration Certificate & Tamper Evident Seal	•	•	★
Quality certification for safety				
QS[(21)(28)]	Prior-use Certificate of FMEDA data	•	—	★
QT[(20)(21)(28)]	Safety certified to IEC 61508 with certificate of FMEDA data	•	—	★
Product certifications				
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; Nonincendive	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★

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E6[19]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[19]	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	•	•	★
EM	Technical Regulations Customs Union (EAC) Flameproof	•	•	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	•	•	★
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[19]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard approvals		**D**	**1-7**	
SBS	American Bureau of Shipping	•	•	★
SBV	Bureau Veritas (BV) Type Approval	•	•	★
SDN	Det Norske Veritas (DNV) Type Approval	•	•	★
SLL	Lloyds Register (LR) Type Approval	•	•	★
Sensor fill fluid and O-ring options				
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-Filled (PTFE) O-ring	•	•	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	•	•	★
Digital display[20]				
M5	PlantWeb LCD display (requires PlantWeb housing)	•	•	★
M7[21][22][23]	Remote mount LCD display and interface, PlantWeb housing, no cable; SST bracket	•	–	★
M8[21][22]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable; SST bracket	•	–	★
M9[21][22]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable; SST bracket	•	–	★
Transient protection				
T1[24]	Transient terminal block	•	•	★
Manifold for remote mount option				
F2	3-Valve Manifold, Stainless Steel	•	•	★
F6	5-Valve Manifold, Stainless Steel	•	•	★

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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**	
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	–	★
PlantWeb diagnostic functionality				
D01	FOUNDATION fieldbus Diagnostics Suite	•	–	★
DA2(25)	Advanced HART Diagnostic Suite	•	–	★
PlantWeb enhanced measurement functionality				
H01(26)	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	–	★
Cold temperature				
BRR(27)	-60 °F (-51 °C) Cold Temperature Start-up	–	•	★
Alarm limit(21)(28)				
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				
D1(21)(28)(29)	Hardware Adjustments (zero, span, alarm, security)	•	–	★
D4(30)	External Ground Screw Assembly	•	•	★
DA(21)(28)(29)	Hardware Adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	–	★
Conduit plug				
DO	316 SST Conduit Plug	•	•	★
Conduit electrical connector				
GE(31)	M12, 4-pin, Male Connector (eurofast®)	•	•	★
GM(31)	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) The cage nipple is constructed of 304SST.

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

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

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

(7) For Measurement Type codes 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).

(8) Only intrinsically safe approval codes apply.

(9) Only available with Measurement Types D and 6.

(10) Only available with output code X.

(11) Only available with output code A.

(12) For detailed specifications see "Specifications" on page 35.

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

(14) Long-life Power Module must be shipped separately, order Power Module 701PBKKF.

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

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

(17) Not available with Transmitter Connection Platform 6.

(18) 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.

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

(20) Not available with housing code 7J.

(21) Not available with output code X. Only available with Measurement Type D.

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

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

(24) 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.

(25) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X. Only available with Measurement Type D.

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

(27) -58 °F (50 °C) for Measurement Type 1-7.

(28) Not available with output code F.

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

(30) This assembly is included with options E1, N1, K1, ND, E4, E7, N7, K7, E2, E3, KA, KC, KD, IA, IE, N3, T1, EM, and KM.

(31) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe; Nonincendive (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009.

Rosemount 3051SFC Compact Orifice Flowmeter ordering information

- Compact conditioning flowmeters reduce straight piping requirements to 2D upstream and 2D downstream from most flow disturbances.
- Simple installation of compact flowmeters between any existing raised-face flanges

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 43 for more information on Material Selection.

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	•	•	
Measurement type				
1	Fully Compensated Mass & Energy Flow Calculations – Differential & Static Pressures w/ Temperature	—	•	★
2	Compensated Flow Calculations – Differential & Static Pressures	—	•	★
3	Compensated Flow Calculations – Differential Pressure & Temperature	—	•	★
4	Compensated Flow Calculations – Differential Pressure	—	•	★
D	Differential Pressure	•	—	★
5	Process Variables Only (No Flow Calculations) – Differential & Static Pressures w/ Temperature	—	•	
6	Process Variables Only (No Flow Calculations) – Differential & Static Pressures	—	•	
7	Process Variables Only (No Flow Calculations) – Differential Pressure & Temperature	—	•	
Primary element technology				
A	Annubar Averaging Pitot Tube	•	•	★
C	Conditioning Orifice Plate	•	•	★
P	Orifice Plate	•	•	★
Material type				
S	316 SST	•	•	★
Line size				
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)	•	•	★

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.

080	8-in. (200 mm)			•	•	★
100[(2)(3)]	10-in. (250 mm)			•	•	★
120[(2)(3)]	12-in. (300 mm)			•	•	★
Primary element type				**D**	**1-7**	
N000	Annubar Sensor Size 1			•	•	★
N040	0.40 Beta Ratio (β)			•	•	★
N050	0.50 Beta Ratio (β)			•	•	★
N065[(4)]	0.65 Beta Ratio (β)			•	•	★
Temperature measurement						
T[(6)]	Integral RTD			—	•	★
0[(5)]	No Temperature Sensor			•	•	★
R[(6)]	Remote Thermowell and RTD			•	•	
Transmitter connection platform						
3	Direct-mount			•	•	★
7	Remote-mount, NPT Connections			•	•	★
Differential pressure range						
1	0 to 25 inH_2O (0 to 62,16 mbar)			•	•	★
2	0 to 250 inH_2O (0 to 621,60 mbar)			•	•	★
3	0 to 1000 inH_2O (0 to 2,48 bar)			•	•	★
Static pressure range						
A[(7)]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55,15 bar)			—	•	★
E[(8)]	Absolute 0 to 3626 psia (0 to 250,00 bar)			—	•	★
J	Gage -14.2 to 800 psig (-0,98 to 55,15 bar)			—	•	★
K[(8)]	Gage -14.2 to 3626 psig (-0,98 to 250,00 bar)			—	•	★
Transmitter output						
A	4–20 mA with digital signal based on HART protocol			•	•	★
F[(9)]	FOUNDATION fieldbus protocol			•	—	★
X[(10)(11)]	Wireless			•	•	★
Transmitter housing style		**Material**	**Conduit entry size**			
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	•	•	★

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.

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	•	–	★
Transmitter housing style		**Material**	**Conduit entry size**	**D**	**1-7**	
2M	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT	•	–	★
5A[12]	Wireless PlantWeb housing	Aluminum	1/2-14 NPT	•	•	★
5J[12]	Wireless PlantWeb housing	SST	1/2-14 NPT	•	•	★
7J[10][13]	Quick Connect (A size Mini, 4-pin male termination)			•	–	★
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	•	–	
Performance class[14]						
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6				•	•	
3[15]	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 10-yr stability, 15-yr limited 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, 15-yr stability, 15-yr limited warranty			•	•	★
2	Classic: 1.40% flow rate accuracy, 8:1 flow turndown, 15-yr stability			•	•	★
3[15]	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 15-yr stability, 15-yr limited warranty			•	•	★

Wireless options[11] (requires option code X and wireless PlantWeb housing)

Update rate, operating frequency, and protocol		**D**	**1-7**	
WA	User Configurable Update Rate	•	–	★
Operating frequency and protocol				
3	2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	•	–	★
Omni-directional wireless antenna				
WK	External Antenna	•	–	★
WM	Extended Range, External Antenna	•	–	★

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.

WN	High-Gain, Remote Antenna	•	–	
SmartPower		**D**	**1-7**	
1[16]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	–	★

Other options (include with selected model number)

Extended product warranty		**D**	**1-7**	
WR3	3-year limited warranty	•	•	★
WR5	5-year limited warranty	•	•	★
Installation accessories				
A	ANSI Alignment Ring (150#) (only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
Installation accessories				
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)	•	•	★
B	JIS Alignment Ring (10K)	•	•	
R	JIS Alignment Ring (20K)	•	•	
S	JIS Alignment Ring (40K)	•	•	
Remote adapters				
E	Flange adapters 316 SST ($^1/_2$-in. NPT)	•	•	★
High temperature applications				
T	Graphite Valve Packing (Tmax = 850 °F)	•	•	
Flow calibration				
WC[17]	Flow Calibration, 3 Pt, Conditioning Option C (all pipe schedules)	•	•	
WD[18][19]	Flow Calibration, 10 Pt, Conditioning Option C (all schedules), Annubar Option A (Schedule 40)	•	•	
Pressure testing				
P1	Hydrostatic Testing with Certificate	•	•	
Special cleaning				
P2[20]	Cleaning for Special Processes	•	•	
PA	Cleaning per ASTM G93 Level D (section 11.4)	•	•	

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 inspection		**D**	**1-7**	
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Transmitter calibration certification				
Q4	Calibration Data Certificate for Transmitter	•	•	★
QP	Calibration Certificate and Tamper Evident Seal	•	•	★
Quality certification for safety				
QS[(21)(22)]	Prior-use certificate of FMEDA data	•	–	★
QT[(21)(22)(25)]	Safety Certified to IEC 61508 with certificate of FMEDA data	•	–	★
Material traceability certifications				
Q8	Material Traceability Certification per EN 10204:2004 3.1	•	•	★
Code conformance				
J2	ANSI/ASME B31.1	•	•	
J3	ANSI/ASME B31.3	•	•	
J4	ANSI/ASME B31.8	•	•	
Material conformance				
J5[(23)]	NACE MR-0175/ISO 15156	•	•	
Country certification				
J1	Canadian Registration	•	•	
Product certifications				
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; Nonincendive	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[(24)]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[(24)]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★

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.
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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	•	•	★
EM	Technical Regulations Customs Union (EAC) Flameproof	•	•	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	•	•	★
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety	•	•	★
KA[(24)]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[(24)]	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[(24)]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, E6, E1, I5, I6, and I1)	•	•	★
Shipboard approvals		**D**	**1-7**	
SBS	American Bureau of Shipping	•	•	★
SBV	Bureau Veritas (BV) Type Approval	•	•	★
SDN	Det Norske Veritas (DNV) Type Approval	•	•	★
SLL	Lloyds Register (LR) Type Approval	•	•	★
Sensor fill fluid and O-ring options				
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital display[(25)]				
M5	PlantWeb LCD display	•	•	★
M7[(22)(26)(27)]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	–	★
M8[(22)(26)]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15m) cable, SST bracket	•	–	★
M9[(22)(26)]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31m) cable, SST bracket	•	–	★
Transient protection				
T1[(28)]	Transient terminal block	•	•	★
Manifold for remote mount option				
F2	3-Valve Manifold, SST	•	•	★
F6	5-Valve Manifold, SST	•	•	★

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.

PlantWeb control functionality		**D**	**1-7**	
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	–	★
PlantWeb diagnostic functionality				
D01	FOUNDATION fieldbus Diagnostics Suite	•	–	★
DA2(29)	Advanced HART Diagnostic Suite	•	–	★
PlantWeb enhanced measurement functionality				
H01(30)	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	–	★
Cold temperature				
BRR(31)	-60 °F (-51 °C) Cold Temperature Start-up	•	•	★
Alarm limit(21)(22)				
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				
D1(21)(22)(32)	Hardware adjustments (zero, span, alarm, security).	•	–	★
D4(33)	External ground screw assembly	•	•	★
DA(21)(22)(32)	Hardware adjustments (zero, span, alarm, security) and external ground screw assembly	•	–	★
Conduit plug				
DO	316 SST Conduit Plug	•	•	★
Conduit electrical connector				
ZE(34)	M12, 4-pin, Male Connector (eurofast)	•	•	★
ZM(34)	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) Available with primary element technology P only.

(2) For the 10-in. (250 mm) and 12-in. (300 mm) line sizes, the alignment ring must be ordered (Installation Accessories).

(3) 10-in. (250 mm) and 12-in. (300 mm) line sizes not available with Primary Element Technology code A.

(4) For 2-in. (50 mm) line size the beta ratio is 0.6 for Primary Element Technology code C.

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

(6) Only available with Measurement Type codes 1, 3, 5, 7.

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

(8) For Measurement Type codes 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).

(9) Requires PlantWeb housing.

(10) Only intrinsically safe approval codes apply.

(11) Only available with Measurement Types D and 6.

(12) Only available with output code X.

(13) Available with output code A only.

(14) For detailed specifications see "Specifications" on page 35.

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

(16) Long-life Power Module must be shipped separately, order Power Module 701PBKKF.

(17) Available with Primary Element Technology code C only.

(18) Available with Primary Element Technology codes C or A only.

(19) For Annubar Option A, consult factory for pipe schedules other than Sch. 40.

(20) Available with primary element technology C or P only.

(21) Not available with Output Protocol code F.

(22) Not available with output code X. Only available with Measurement Type D.

(23) 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.

(24) Not available with M20 or G½ conduit entry size.

(25) Not available with housing code 7J.

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

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

(28) 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.

(29) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X. Only available with Measurement Type D.

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

(31) -58°F (50°C) for Measurement Type 1-7.

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

(33) This assembly is included with options EP, KP, E1, N1, K1, ND, E4, E7, K7, E3, KA, KC, KD, IA, T1, EM, and KM.

(34) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe; Nonincendive (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009.

Rosemount 3051SFP Integral Orifice Flowmeter ordering information

- 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

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment.
See page 43 for more information on Material Selection.

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				
1	Fully Compensated Mass & Energy Flow Calculations – Differential & Static Pressures w/ Temperature	—	•	★
2	Compensated Flow Calculations – Differential & Static Pressures	—	•	★
3	Compensated Flow Calculations – Differential Pressure & Temperature	—	•	★
4	Compensated Flow Calculations – Differential Pressure	—	•	★
D	Differential Pressure	•	—	★
5	Process Variables Only (No Flow Calculations) – Differential & Static Pressures w/ Temperature	—	•	
6	Process Variables Only (No Flow Calculations) – Differential & Static Pressures	—	•	
7	Process Variables Only (No Flow Calculations) – Differential Pressure & Temperature	—	•	
Body material				
S	316 SST	•	•	★
Line size				
005	1/2-in. (15 mm)	•	•	★
010	1-in. (25 mm)	•	•	★
015	1 1/2-in. (40 mm)	•	•	★
Process connection				
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, 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	•	•	★

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.

W3	Pipe Ends: Flanged, ANSI Class 300, weld-neck	•	•	★
W6	Pipe Ends: Flanged, ANSI Class 600, weld-neck	•	•	★
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	•	•	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	•	•	
Process connection		**D**	**1-7**	
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				
S	316 SST	•	•	★
H	Alloy C-276	•	•	
M	Alloy 400	•	•	
Bore size option				
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	•	•	★
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	•	•	

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 connection platform				**D**	**1-7**	
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			•	•	★
D4	Direct-mount, 3-valve Manifold, Alloy C-276			•	•	
D6	Direct-mount, 5-valve Manifold, Alloy C-276			•	•	
R4	Remote-mount, 3-valve Manifold, Alloy C-276			•	•	
R6	Remote-mount, 5-valve Manifold, Alloy C-276			•	•	
Differential pressure range						
1	0 to 25 inH_2O (0 to 62,16 mbar)			•	•	★
2	0 to 250 inH_2O (0 to 621,60 mbar)			•	•	★
3	0 to 1000 inH_2O (0 to 2,48 bar)			•	•	★
Static pressure range						
A[2]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55,15 bar)			–	•	★
E[3]	Absolute 0 to 3626 psia (0 to 250,00 bar)			–	•	★
J	Gage -14.2 to 800 psig (-0,98 to 55,15 bar)			–	•	★
K[3]	Gage -14.2 to 3626 psig (-0,98 to 250,00 bar)			–	•	★
Transmitter output						
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus (requires PlantWeb housing)			•	–	★
X[4][5]	Wireless (requires wireless options and wireless PlantWeb housing)			•	•	★
Transmitter housing style		**Material**	**Conduit entry size**			
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	•	–	★

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.

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[6]	Wireless PlantWeb housing	Aluminum	1/2–14 NPT	•	•	★
5J[6]	Wireless PlantWeb housing	SST	1/2–14 NPT	•	•	★
7J[4][7]	Quick Connect (A size Mini, 4-pin male termination)			•	–	★
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	•	–	
Performance class[8]				**D**	**1-7**	
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3[9]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, 15-year limited warranty			•	•	★
Performance class [8]						
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, 15-year stability, 15-year limited warranty			•	•	★
2	Classic: 1.50% flow rate accuracy, 8:1 flow turndown, 15-year stability			•	•	★
3[9]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 15-year stability, 15-year limited warranty			•	•	★

Wireless options[5] (requires option code X and wireless PlantWeb housing)

Update rate, operating frequency and protocol	**D**	**1-7**	
WA	User Configurable Update Rate	•	•	★
Operating frequency and protocol			
3	2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	•	•	★
Omni-directional wireless antenna			
WK	External Antenna	•	•	★
WM	Extended Range, External Antenna	•	•	★
WN	High-Gain, Remote Antenna	•	•	
SmartPower			
1[10]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	•	★

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.

Other options (include with selected model number)

Extended product warranty		**D**	**1-7**	
WR3	3-year limited warranty	•	•	★
WR5	5-year limited warranty	•	•	★
Transmitter/body bolt material				
G[11]	High temperature Option (850 °F (454 °C))	•	•	
Temperature sensor				
T[12]	Thermowell and RTD	•	•	★
Optional connection				
G1	DIN 19213 Transmitter Connection	•	•	★
Pressure testing				
P1[13]	Hydrostatic Testing with Certificate	•	•	
Special cleaning				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	•	•	
Material testing				
V1	Dye Penetrant Exam	•	•	
Material examination				
V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)	•	•	
Flow calibration				
WD[14]	Discharge Coefficient Verification	•	•	
WZ[14]	Special Calibration	•	•	
Special inspection				
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Material traceability certification				
Q8	Material certification per EN 10204:2004 3.1	•	•	★
Code conformance				
J2[15]	ANSI/ASME B31.1	•	•	
J3[15]	ANSI/ASME B31.3	•	•	
J4[15]	ANSI/ASME B31.8	•	•	
Materials conformance				
J5[16]	NACE MR-0175/ISO 15156	•	•	

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.

Country certification		**D**	**1-7**	
J6	European Pressure Directive (PED)	•	•	★
J1	Canadian Registration	•	•	
Transmitter calibration certification				
Q4	Calibration Data Certificate for Transmitter	•	•	★
Quality certification for safety				
QS[17][18]	Prior-use Certificate of FMEDA data	•	–	★
QT[17][18][20]	Safety-certified to IEC 61508 with Certificate of FMEDA data	•	–	★
Product certifications				
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; Nonincendive	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[19]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
Product certifications				
K6[19]	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	•	•	★
EM	Technical Regulations Customs Union (EAC) Flameproof	•	•	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	•	•	★
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety	•	•	★
KA[19]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★

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.

KB[19]	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[19]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard approvals		**D**	**1-7**	
SBS	American Bureau of Shipping	•	•	★
SBV	Bureau Veritas (BV) Type Approval	•	•	★
SDN	Det Norske Veritas (DNV) Type Approval	•	•	★
SLL	Lloyds Register (LR) Type Approval	•	•	★
Sensor fill fluid and O-ring options				
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital display[20]				
M5	PlantWeb LCD display (requires PlantWeb housing)	•	•	★
M7[17][21][22]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	–	★
M8[17][22]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	•	–	★
M9[17][22]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	•	–	★
Transient protection				
T1[23]	Transient terminal block	•	•	★
PlantWeb control functionality				
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	–	★
PlantWeb diagnostic functionality				
D01	FOUNDATION fieldbus Diagnostics Suite	•	–	★
DA2[24]	Advanced HART Diagnostics Suite	•	–	★
PlantWeb enhanced measurement functionality				
H01[25]	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	–	★
Cold temperature				
BRR[26]	-60 °F (-51 °C) Cold Temperature Start-up	–	•	★
Alarm limit[17][18]				
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★

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.

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		**D**	**1-7**	
D1[17][18][27]	Hardware Adjustments (zero, span, alarm, security)	•	–	★
D4[28]	External ground screw assembly	•	•	★
DA[17][18][27]	Hardware adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	–	★
Conduit plug				
DO	316 SST Conduit Plug	•	•	★
Conduit electrical connector				
GE[29]	M12, 4-pin, Male Connector (eurofast)	•	•	
GM[29]	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 codes 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) Only intrinsically safe approval codes apply.

(5) Only available with Measurement Types D and 6.

(6) Only available with output code X.

(7) Only available with output code A.

(8) For detailed specifications see "Specifications" on page 35.

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

(10) Long-life Power Module must be shipped separately, order Power Module 701PBKKF.

(11) Not available with $1\frac{1}{2}$-in. (38 mm) line size.

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

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

(14) Not available for bore sizes 0010, 0014, 0020, 0034, 0066, or 0109.

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

(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 output code X. Only available with Measurement Type D.

(18) Not available with output code F.

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

(20) Not available with housing code 7J.

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

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

(23) Not available with Housing code 5A, 5J, or 7J. The T1 option is not needed with FISCO Product Certifications.

(24) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X. Only available with Measurement Type D.

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

(26) -58 °F (50 °C) for Measurement Type 1-7.

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

(28) This assembly is included with options EP, KP, E1, N1, K1, ND, E4, E7, K7, E3, KA, KC, KD, IA, T1, EM, and KM

(29) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe; Nonincendive (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009.

Specifications

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_A Compact Annubar Flowmeter - Annubar Option A			
		Classic MV (8:1 flow turndown)	Ultra for Flow (14:1 flow turndown)
Ranges 2-3	Standard	±1.60% of Flow Rate	±1.55% of Flow Rate
	Calibrated	±1.00% 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 = 0.50, 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 = 0.50, 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	Bore < 0.160	±2.65% of Flow Rate	±2.55% of Flow Rate
	0.160 ≤ Bore < 0.500	±1.70% of Flow Rate	±1.55% of Flow Rate
	0.500 ≤ Bore ≤ 1.000	±1.25% of Flow Rate	±1.05% of Flow Rate
	1.000 < Bore	±1.70% of Flow Rate	±1.55% of Flow Rate

(1) Measurement Types 2 - 4 assume 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

(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		±1.25% of Flow Rate	±0.95% of Flow Rate	±0.80% of Flow Rate
3051SFC_A Compact Annubar Flowmeter - Annubar Option A				
		Classic (8:1 flow turndown)	Ultra (8:1 flow turndown)	Ultra for Flow (14:1 flow turndown)
Ranges 2-3	Uncalibrated	±1.70% of Flow Rate	±1.65% of Flow Rate	±1.55% of Flow Rate
	Calibrated	±1.25% 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	±1.10% of Flow Rate	±0.9% of Flow Rate	±0.75% of Flow Rate
	β = 0.50, 0.65	±1.40% of Flow Rate	±1.25% of Flow Rate	±1.15% of Flow Rate

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

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	Bore < 0.160	±2.70% of Flow Rate	±2.65% of Flow Rate	±2.60% of Flow Rate
	0.160 ≤ Bore < 0.500	±1.80% of Flow Rate	±1.70% of Flow Rate	±1.60% of Flow Rate
	0.500 ≤ Bore ≤ 1.000	±1.35% of Flow Rate	±1.25% of Flow Rate	±1.15% of Flow Rate
	1.000 < Bore	±1.80% 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.

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 41 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 for 3051SFA, 3051SFC, and 3051SFP

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-1000 Hz test frequency range, 0.15mm displacement peak amplitude, 20m/s2 acceleration amplitude).(1)

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.(2)(3)

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

(1) Stainless steel temperature housing is not recommended with primary element technology A in application with mechanical vibration.

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

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

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)	25.00 inH_2O (62,16 mbar)
2	0 inH_2O (0 bar)	250.00 inH_2O (621,60 mbar)
3	0 inH_2O (0 bar)	1000.00 inH_2O (2,48 bar)

Flowmeter with MultiVariable sensor module

Range	DP Sensor (3051SF1, 2, 5, or 6)	
	Lower (LRL)	Upper (URL)
1	0 inH_2O (0 mbar)	25.00 inH_2O (62,16 mbar)
2	0 inH_2O (0 bar)	250.00 inH_2O (621,60 mbar)
3	0 inH_2O (0 bar)	1000.00 inH_2O (2,48 bar)
Range	**Static Pressure Sensor (GP/AP)**	
	Lower (LRL)	**Upper (URL)(1)**
3	GP(2): -14.20 psig (0,97 bar) AP: 0.50 psia (34,47 mbar)	GP: 800.00 psig (55,15 bar) AP: 800.00 psia (55,15 bar)
4	GP(2): -14.20 psig (0,97 bar) AP: 0.50 psia (34,47 mbar)	GP: 3626.00 psig (250,00 bar) AP: 3626.00 psia (250,00 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 (3,23 mbar)	2.5 inH_2O (6,22 mbar)
3	5.0 inH_2O (12,43 mbar)	10.0 inH_2O (24,86 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 (3,23 mbar)	2.5 inH_2O (6,22 mbar)
3	5.0 inH_2O (12,43 mbar)	10.0 inH_2O (24,86 mbar)
Range	**Static Pressure Sensor (GP/AP)**	
	Ultra for Flow	**Classic MV**
3	4.0 psi (275,79 mbar)	8.0 psi (551,58 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 = 52 °F (11 °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		Fluid types			
	Measurement type	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.

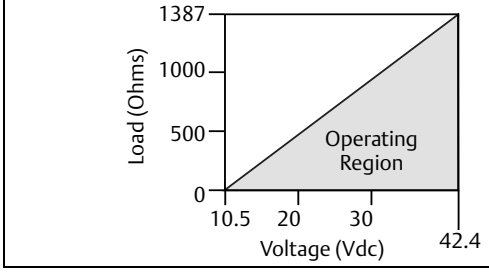
- 3051SF_D: 10.5 to 42.4 Vdc with no load
- 3051SF_D with Advanced HART Diagnostics Suite: 12 to 42.4 Vdc with no load
- 3051SF_1-7: 12 to 42.4 Vdc with no load

Load limitations

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

3051SF_D

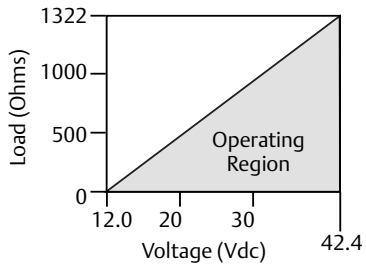
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



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 250W 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 display 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	N/A
Transducer	N/A
LCD display Block	N/A
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 5.5.1 software.

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

*Wireless*HART, 2.4 GHz DSSS.

Local display

The optional 5-digit LCD display 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

*Wireless*HART, 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 (137,90 bar)
2	3626 psi (250,00 bar)
3	3626 psi (250,00 bar)

(1) The overpressure limit of a DP Sensor with the P9 option is 4500 psig (310,26 bar). The overpressure limit of a DP Sensor with the P0 option is 6092 psig (420,00 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 (110,32 bar)	1600 psi (110,32 bar)	1600 psi (110,32 bar)
Range 4 GP/AP	2000 psi (137,90 bar)	3626 psi (250,00 bar)	3626 psi (250,00 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 137,90 bar)
2	0.5 psia to 3626 psig (0,03 to 250,00 bar)
3	0.5 psia to 3626 psig (0,03 to 250,00 bar)

(1) The static pressure limit of a DP Sensor with the P9 option is 4500 psig (310,26 bar). The static pressure limit of a DP Sensor with the P0 option is 6092 psig (420,00 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 (55,15 bar)	800 psi (55,15 bar)	800 psi (55,15 bar)
Range 4 GP/AP	2000 psi (137,90 bar)	3626 psi (250,00 bar)	3626 psi (250,00 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 display 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

3051SFA 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

3051SFC 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

3051SFP process temperature limits

Standard (direct/remote mount)

- –40 to 450 °F (–40 to 232 °C)

Extended (remote mount only with option code G)

- –148 to 850 °F (–100 to 454 °C)

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, G$^1/_2$, 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

3051SFA wetted parts - Annubar sensor material

- 316 Stainless Steel
- Alloy C-276

3051SFC wetted parts - 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.

3051SFP wetted parts - 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

Flange

- A182 Gr 316/316L
- 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
- Alloy 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.

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 omni-directional antenna

Power module

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

Pipe I.D. Range Codes

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			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
	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

	Line size			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
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

Rosemount 3051SMV/3051SFx (Measurement Type 1-7) Certifications

European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at www.rosemount.com.

Ordinary Location Certification from FM Approvals

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

North America

The US National Electrical Code (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

United States of America

E5 FM Explosionproof (XP) and Dust-Ignitionproof (DIP)
Certificate: 3008216
Standards: FM Class 3600 – 2011, FM Class 3615 – 2006, FM Class 3616-2011, 3810 – 2005, ANSI/NEMA 250 – 2003
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(-50°C ≤ Ta ≤ +85°C); Factory Sealed; Type 4X

I5 FM Intrinsic Safety (IS) and Nonincendive (NI)
Certificate: 3031960
Standards: FM Class 3600 – 1998, FM Class 3610 – 2007, FM Class 3611 – 2004, FM Class 3810 – 2005, NEMA 250 – 1991
Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; Class 1, Zone 0 AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D; T4(-50°C ≤ Ta ≤ +70°C) when connected per Rosemount drawing 03151-1206; Type 4x

Note
Transmitters marked with NI CL 1, DIV 2 can be installed in Division 2 locations using general Division 2 wiring methods or Nonincendive Field Wiring (NIFW). See Drawing 03151-1206.

Canada

E6 CSA Explosionproof, Dust-Ignitionproof, and Division 2
Certificate: 1143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 213-M1987, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: Explosionproof Class I, Division 1, Groups B, C, D; Dust-Ignitionproof Class II, Division 1, Groups E, F, G; Class III; suitable for Class I, Division 2, Groups A, B, C, D; Type 4x

I6 CSA Intrinsically Safe
Certificate: 1143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 157-92, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: Intrinsically Safe Class I, Division 1; suitable for Class 1, Zone 0, IIC, T3C; when connected per Rosemount drawing 03151-1207; Type 4x

Europe

E1 ATEX Flameproof
Certificate: KEMA 00ATEX2143X
Standards: EN 60079-0:2012, EN 60079-1: 2007, EN 60079-26:2007
Markings: II 1/2 G Ex d IIC T6...T4 Ga/Gb, T6(-60 °C ≤ Ta ≤ +70 °C), T5/T4(-60 °C ≤ Ta ≤ +80 °C)

Temperature class	Process temperature
T6	-60 °C to +70 °C
T5	-60 °C to +80 °C
T4	-60 °C to +120 °C

Special Conditions for Safe Use (X):

1. 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 installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

I1 ATEX Intrinsic Safety
Certificate: Baseefa08ATEX0064X
Standards: EN 60079-0: 2012, EN 60079-11: 2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga, T4(-60°C ≤ Ta ≤ +70°C)

	HART	SuperModule only	RTD (for 3051SFx)
Voltage U_i	30 V	7.14 V	30 V
Current I_i	300 mA	300 mA	2.31 mA
Power P_i	1 W	887 mW	17.32 mW
Capacitance C_i	12 nF	0.11 µF	0
Inductance L_i	0	0	0

Special Conditions for Safe Use (X):

1. If the equipment is fitted with the optional 90V transient suppressor, it is incapable of withstanding the 500V isolation from earth test and this must be taken into account during installation
2. 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 if located in a Zone 0 environment.

ND ATEX Dust
Certificate: BAS01ATEX1374X
Standards: EN 60079-0: 2012, EN 60079-31: 2009
Markings: ⟨Ex⟩ II 1 D Ex ta IIIC T105°C T_{500}95 °C Da, (-20 °C ≤ Ta ≤ +85 °C), V_{max} = 42.4V

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 SuperModule(s) must be securely screwed in place to maintain the ingress protection of the enclosure(s).

N1 ATEX Type n
Certificate: Baseefa08ATEX0065X
Standards: EN 60079-0: 2012, EN 60079-15: 2010
Markings: ⟨Ex⟩ II 3 G Ex nA IIC T4 Gc, (-40 °C ≤ Ta ≤ 70 °C), V_{max} = 45V

Special Condition for Safe Use (X):

1. If fitted with a 90V transient suppressor, the equipment is not capable of withstanding the 500V electrical strength test as defined in Clause 6.5.1 of EN 60079-15:2010. This must be taken into account during installation.

International

E7 IECEx Flameproof and Dust
Certificate: IECEx KEM 08.0010X (Flameproof)
Standards: IEC 60079-0:2011, IEC 60079-1: 2007, IEC 60079-26:2006
Markings: Ex d IIC T6...T4 Ga/Gb, T6(-60°C ≤ Ta ≤ +70°C), T5/T4(-60°C ≤ Ta ≤ +80°C)

Temperature class	Process temperature
T6	-60 °C to +70 °C
T5	-60 °C to +80 °C
T4	-60 °C to +120 °C

Special Conditions for Safe Use (X):

1. 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 installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Certificate: IECEx BAS 09.0014X (Dust)
Standards: IEC 60079-0:2011, IEC 60079-31:2008
Markings: Ex ta IIIC T105 °C T_{500}95 °C Da, (-20 °C ≤ Ta ≤ +85 °C), V_{max} = 42.4V

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.

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 08.0025X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T4 Ga, T4(-60 °C ≤ Ta ≤ +70 °C)

	HART	SuperModule only	RTD (for 3051SFx)
Voltage U_i	30 V	7.14 V	30 V
Current I_i	300 mA	300 mA	2.31 mA
Power P_i	1 W	887 mW	17.32 mW
Capacitance C_i	12 nF	0.11 µ F	0
Inductance L_i	0	0	0

Special Conditions for Safe Use (X):

1. If the equipment is fitted with the optional 90V transient suppressor, it is incapable of withstanding the 500V isolation from earth test and this must be taken into account during installation.
2. 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 if located in a Zone 0 environment.

N7 IECEx Type n
Certificate: IECEx BAS 08.0026X
Standards:IEC 60079-0: 2011, IEC 60079-15: 2010
Markings:Ex nA IIC T5 Gc, (-40 °C ≤ Ta ≤ 70 °C)

Special Condition for Safe Use (X):

1. If fitted with a 90V transient suppressor, the equipment is not capable of withstanding the 500V electrical strength test as defined in Clause 6.5.1 of IEC 60079-15:2010. This must be taken into account during installation.

Brazil

E2 INMETRO Flameproof
Certificate: CEPEL 03.0140X [Mfg USA, Singapore, Germany], CEPEL 07.1413X [Mfg Brazil]
Standards: ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-1:2009, ABNT NBR IEC 60529:2009
Markings: Ex d IIC T* Ga/Gb, T6(-40 °C ≤ T_a ≤ +65 °C), T5(-40 °C ≤ T_a ≤ +80 °C), IP66(Al)/IP66W(SST)

Special Conditions for Safe Use (X):

1. For ambient temperature above 60 °C, cable wiring must have minimum isolation temperature of 90 °C, to be in accordance to equipment operation temperature.
2. 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 installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

I2 INMETRO Intrinsic Safety
Certificate: NCC 12.1158X [Mfg USA, Germany]
Standards: ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-11:2009, ABNT NBR IEC 60079-26:2008
Markings: Ex ia IIC T4 Ga, T4(-60 °C ≤ T_a ≤ +70 °C), IP66(Al)/IP66W(SST)

Special Conditions for Safe Use (X):

1. If the equipment is fitted with the optional 90V transient suppressor, it is incapable of withstanding the 500V isolation from earth test and this must be taken into account during installation.
2. For processes with temperatures above 135 °C, the user must assess whether the SuperModule temperature class is suitable for such applications, because in this situation there is a risk of the SuperModule temperature being above T4.

	HART	SuperModule only	RTD (for 3051SFx)
Voltage U_i	30 V	7.14 V	30 V
Current I_i	300 mA	300 mA	2.31 mA
Power P_i	1 W	887 mW	17.32 mW
Capacitance C_i	12 nF	0.11 µ F	0
Inductance L_i	0	0	0

China

E3 China Flameproof and Dust Ignition-proof
Certificate: 3051SMV: GYJ14.1039X [Mfg USA, China, Singapore] 3051SFx: GYJ071086 [Mfg USA, China, Singapore]
Standards: 3051SMV: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010
3051SFx: GB3836.1-2000, GB3836.2-2000, GB12476.1-2000
Markings: 3051SMV: Ex d IIC T6/T5 Ga/Gb
3051SFx: Ex d IIC T6/T5; Ex d IIB+H2T3~T5; DIP A21 T_A T3~T5

I3 China Intrinsic Safety
Certificate: 3051SMV: GYJ14.1040X [Mfg USA, China, Singapore]
3051SFx: GYJ11.1707X [Mfg USA, China, Singapore]
Standards: 3051SMV: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
3051SFx: GB3836.1/4-2010, GB3836.20-2010, GB12476.1-2000
Markings: 3051SMV: Ex ia IIC T4 Ga
3051SFx: Ex ia IIC T4 Ga, DIP A20 T_A105 °C IP66

Japan

E4 Japan Flameproof
Certificate:TC19070, TC19071, TC19072, TC19073
Markings: Ex d IIC T6

Technical Regulation Customs Union (EAC)

EM, IM, KM Contact an Emerson Process Management representative for additional information.

Combinations

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, E6, and I6

KC Combination of E1, I1, E5, and I5

KD Combination of E1, I1, E5, I5, E6, and I6

Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval
Certificate: 00-HS145383-6-PDA
Intended Use: Measure gauge or absolute pressure of liquid, gas or vapor applications on ABS classed vessels, marine, and offshore installations.
ABS Rules: 2013 Steel Vessels Rules 1-1-4/7.7, 1-1-A3, 4-8-3/1.7, 4-8-3/1.11.1, 4-8-3/13.1

D3 Custody Transfer – Measurement Canada Accuracy
Approval Certificate: AG-0501, AV-2380C

Rosemount 3051S/3051SFx (Measurement Type D)

European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at www.rosemount.com.

Ordinary Location Certification from FM Approvals

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

North America

The US National Electrical Code (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

United States of America

E5 FM Explosionproof (XP) and Dust-Ignitionproof (DIP)
Certificate: 3008216
Standards: FM Class 3600 – 2011, FM Class 3615 – 2006, FM Class 3616-2011, 3810 – 2005, ANSI/NEMA 250 – 2003
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III;T5(-50 °C ≤ Ta ≤ +85 °C); Factory Sealed; Type 4X

I5 FM Intrinsic Safety (IS) and Nonincendive (NI)
Certificate: 3012350
Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005, NEMA 250 –2003
Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; Class 1, Zone 0 AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D; T4(-50 °C ≤ Ta ≤ +70 °C) [HART]; T4(-50 °C ≤ Ta ≤ +60 °C) [fieldbus]; when connected per Rosemount drawing 03151-1006; Type 4x

Special Condition for Safe Use (X):

1. The Model 3051S/3051S ERS Pressure Transmitter contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

Note
Transmitters marked with NI CL 1, DIV 2 can be installed in Division 2 locations using general Division 2 wiring methods or Nonincendive Field Wiring (NIFW). See Drawing 03151-1006.

IE FM FISCO Field Device
Certificate:3012350
Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005, NEMA 250 –2003
Markings: IS CL I, DIV 1, GP A, B, C, D; (-50 °C ≤ Ta ≤ +60 °C); when connected per Rosemount drawing 03151-1006; Type 4x

Special Condition for Safe Use (X):

1. The Model 3051S/3051S ERS Pressure Transmitter contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

Canada

E6 CSA Explosionproof, Dust-Ignitionproof, and Division 2
Certificate: 143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 213-M1987, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: Explosionproof Class I, Division 1, Groups B, C, D; Dust-Ignitionproof Class II, Division 1, Groups E, F, G; Class III; suitable for Class I, Zone 1, Group IIB+H2, T5; suitable for Class I, Division 2, Groups A, B, C, D; suitable for Class I, Zone 2, Group IIC, T5; when connected per Rosemount drawing 03151-1013; Type 4x

I6 CSA Intrinsically Safe
Certificate: 1143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA} Std C22.2 No. 142-M1987, CSA Std C22.2 No. 157-92, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: Intrinsically Safe Class I, Division 1; suitable for Class 1, Zone 0, IIC, T3C; when connected per Rosemount drawing 03151-1016; Type 4x

IF CSA FISCO Field Device
Certificate: 1143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 157-92, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: FISCO Intrinsically Safe Class I, Division 1; suitable for Class I, Zone 0; T3C; when installed per Rosemount drawing 03151-1016; Type 4X

Europe

E1 ATEX Flameproof
Certificate: KEMA 00ATEX2143X
Standards: EN 60079-0:2012, EN 60079-1: 2007, EN 60079-26:2007 (3051SFx models with RTD are certified to EN60079-0:2006)
Markings: ⟨Ex⟩ II 1/2 G Ex d IIC T6...T4 Ga/Gb, T6(-60 °C ≤ Ta ≤ +70 °C), T5/ T4(-60 °C ≤ Ta ≤ +80 °C)

Temperature class	Process temperature
T6	-60 °C to +70 °C
T5	-60 °C to +80 °C
T4	-60 °C to +120 °C

Special Conditions for Safe Use (X):

1. 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 installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For information on the dimensions of the flameproof joints, the manufacturer shall be contacted.

I1 ATEX Intrinsic Safety
Certificate: BAS01ATEX1303X
Standards: EN 60079-0: 2012, EN 60079-11: 2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga, T4(-60 °C ≤ Ta ≤ +70 °C)

Input Parameters

Model	Ui	Ii	Pi	Ci	Li
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	12 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.3 W	0	0
3051S ...F...IA; 3051SF ...F...IA	17.5 V	380 mA	5.32 W	0	0
3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	11.4 nF	60 µ H
3051SAL or 3051SAM	30 V	300 mA	1.0 W	11.4 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9	30 V	300 mA	1.0 W	11.4 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	-	-

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.

IA ATEX FISCO Field Device
Certificate: BAS01ATEX1303X
Standards: EN 60079-0: 2012, EN 60079-11: 2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga, T4(-60 °C ≤ Ta ≤ +70 °C)

	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	0
Inductance L_i	0

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.

ND ATEX Dust
Certificate: BAS01ATEX1374X
Standards: EN 60079-0: 2012, EN 60079-31: 2009
Markings: ⟨Ex⟩ II 1 D Ex ta IIIC T105 °C T_{500}95 °C Da, (-20 °C ≤ Ta ≤ +85 °C), V_{max} = 42.4V

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 SuperModule(s) must be securely screwed in place to maintain the ingress protection of the enclosure(s).

N1 ATEX Type n
Certificate: BAS01ATEX3304X
Standards: EN 60079-0: 2012, EN 60079-15: 2010
Markings: ⟨Ex⟩ II 3 G Ex nA IIC T5 Gc, (-40 °C ≤ Ta ≤ +85 °C), V_{max} = 45V

Special Condition for Safe Use (X):

1. The equipment is not capable of withstanding the 500V insulation test required by clause 6.5 of EN 60079-15:2010. This must be taken into account when installing the equipment.

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

International

E7 IECEx Flameproof and Dust
Certificate: IECEx KEM 08.0010X (Flameproof)
Standards: IEC 60079-0:2011, IEC 60079-1: 2007, IEC 60079-26:2006, (3051SFx models with RTD are certified to IEC 60079-0:2004)
Markings: Ex d IIC T6...T4 Ga/Gb, T6(-60 °C ≤ Ta ≤ +70 °C), T5/T4(-60 °C ≤ Ta ≤ +80 °C)

Temperature class	Process temperature
T6	-60 °C to +70 °C
T5	-60 °C to +80 °C
T4	-60 °C to +120 °C

Special Conditions for Safe Use (X):

1. 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 installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Certificate: IECEx BAS 09.0014X (Dust)
Standards: IEC 60079-0:2011, IEC 60079-31:2008
Markings: Ex ta IIIC T105°C T_{500}95 °C Da, (-20 °C ≤ Ta ≤ +85 °C), Vmax = 42.4V

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.

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 04.0017X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T4 Ga, T4(-60 °C ≤ Ta ≤ +70 °C)

Model	Ui	Ii	Pi	Ci	Li
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	12 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.3 W	0	0
3051S ...F...IA; 3051SF ...F...IA	17.5 V	380 mA	5.32 W	0	0
3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	11.4 nF	60 µ H
3051SAL or 3051SAM	30 V	300 mA	1.0 W	11.4 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7 , M8, or M9	30 V	300 mA	1.0 W	11.4 nF	93 µ H
RTD Option for 3051SF	5 V	500 mA	0.63 W	-	-

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500V test as defined in Clause 6.3.13 of IEC 60079-11:2011. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Model 3051S 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 if located in a zone 0 area.

I7 IECEx Intrinsic Safety – Group I - Mining (I7 with Special A0259)
Certificate: IECEx TSA 14.0019X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia I Ma (-60 °C ≤ Ta ≤ +70 °C)

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 6.6.13 of IEC60079-11. This must be taken into account when installing the apparatus.
2. It is a condition of safe use that the following parameters shall be taken into account during installation.

Input parameters

Model	Ui	Ii	Pi	Ci	Li
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	12 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.3 W	0	0
3051S ...F...IA; 3051SF ...F...IA	17.5 V	380 mA	5.32 W	0	0
3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	11.4 nF	60 µ H
3051SAL or 3051SAM	30 V	300 mA	1.0 W	11.4 nF	33 µ H
3051SAL...M7, M8, or M9 3051SAM...M7 , M8, or M9	30 V	300 mA	1.0 W	11.4 nF	93 µ H
RTD Option for 3051SF	5 V	500 mA	0.63 W	-	-

3. It is a condition of manufacture that only the apparatus fitted with housings, junction boxes, covers and sensor module housings made out of stainless steel are used in Group I applications.

IG IECEx FISCO
Certificate: IECEx BAS 04.0017X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T4 Ga, T4(-60 °C ≤ Ta ≤ +70 °C)

	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	0
Inductance L_i	0

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500V test as defined in Clause 6.3.13 of IEC 60079-11:2011. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Model 3051S 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 if located in a zone 0 area.

N7 IECEx Type n
Certificate: IECEx BAS 04.0018X
Standards: IEC 60079-0: 2011, IEC 60079-15: 2010
Markings: Ex nA IIC T5 Gc, (-40 °C ≤ Ta ≤ +85 °C)

Special Conditions for Safe Use (X):

1. The equipment is not capable of withstanding the 500V insulation test required by clause 6.5 of IEC 60079-15:2010. This must be taken into account when installing the equipment.

Brazil

E2 INMETRO Flameproof
Certificate: CEPEL 03.0140X [Mfg USA, Singapore, Germany], CEPEL 07.1413X [Mfg Brazil]
Standards: ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-1:2009, ABNT NBR IEC 60529:2009
Markings: Ex d IIC T* Ga/Gb, T6(-40 °C ≤ Ta ≤ +65 °C), T5(-40 °C ≤ Ta ≤ +80 °C), IP66(Al)/IP66W(SST)

Special Conditions for Safe Use (X):

1. For ambient temperature above 60 °C, cable wiring must have minimum isolation temperature of 90 °C, to be in accordance to equipment operation temperature.
2. 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 installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

I2 INMETRO Intrinsic Safety
Certificate: CEPEL 05.0722X [Mfg USA, Singapore, Germany], CEPEL 07.1414X [Mfg Brazil]
Standards: ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-11:2009, ABNT NBR IEC 60079-26:2008, ABNT NBR IEC 60529:2009
Markings: Ex ia IIC T4 Ga, T4(-20 °C ≤ Ta ≤ +70 °C), IP66(Al)/IP66W(SST)

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection 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.

	HART	Fieldbus	RTD (for 3051SFx)
Voltage U_i	30 V	30 V	5 V
Current I_i	300 mA	300 mA	500 mA
Power P_i	1 W	1.3 W	0.63 W
Capacitance C_i	12 nF	0	0
Inductance L_i	0	0	0

IB INMETRO FISCO
Certificate: CEPEL 05.0722X [Mfg USA, Singapore, Germany], CEPEL 07.1414X [Mfg Brazil]
Standards: ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-11:2009, ABNT NBR IEC 60079-26:2008, ABNT NBR IEC 60529:2009
Markings: Ex ia IIC T4 Ga, T4(-20 °C ≤ Ta ≤ +40 °C), IP66(Al)/IP66W(SST)

	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	0
Inductance L_i	0

Special Condition for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection 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.

China

E3 China Flameproof and Dust Ignition-proof
Certificate: 3051S: GYJ091035 [Mfg USA], GYJ111400X [Mfg China, Singapore]
3051SFx: GYJ071086 [Mfg USA, China, Singapore]
Standards: 3051S: GB3836.1-2000, GB3836.2-2000, GB12476.1-20003051SFx: GB3836.1-2000, GB3836.2-2000, GB12476.1-2000
Markings: 3051S: Ex d IIC T5/T6; DIP A20T_A105°C; IP66
3051SFx: Ex d IIC T5/T6; Ex d IIB+H_2T3~T5; DIP A21 T_A T3~T5

Special Conditions for Safe Use (X):

1. Only the pressure transmitters, consisting of 3051SC Series, 3051ST Series, 3051SL Series and 300S Series, are certified.
2. The ambient temperature range is (-20 ~+60) °C.
3. The relation between temperature class and maximum temperature of process medium is as follows:

Temperature class	Temperature of process medium (°C)
T5	≤ 95 °C
T4	≤ 130 °C
T3	≤ 190 °C

4. The earth connection facility in the enclosure should be connected reliably.
5. During installation, use and maintenance of transmitter, observe the warning "Don't open the cover when the circuit is alive."
6. During installation, there should be no mixture harm to flameproof housing.
7. Cable entry, certified by NEPSI with type of protection Ex d IIC in accordance with GB3836.1-2000 and GB3836.2-2000, should be applied when installation in hazardous location. 5 full threads should be in engagement when the cable entry is assembled onto the transmitter. When pressure transmitter is used in the presence of combustible dust, the ingress of protection of the cable entry should be IP66.
8. The diameter of cable should observe the instruction manual of cable entry. The compressing nut should be fastened. The aging of seal ring should be changed in time.
9. Maintenance should be done in non-hazardous location.
10. End users are not permitted to change any components inside.
11. When installation, use and maintenance of transmitter, observe following standards:

- GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"
- GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"
- GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"
- GB15577-1995 "Safe regulation for explosive dust atmospheres"
- GB12476.2-2006 "Electrical apparatus for use in the presence of combustible dust – Part 1-2: Electrical apparatus protected by enclosures and surface temperature limitation – Selection, installation and maintenance"

I3 China Intrinsic Safety

Certificate: 3051S: GYJ111401X [Mfg USA, China, Singapore]
3051SF: GYJ11.1707X [Mfg USA, China, Singapore]
Standards: 3051S: GB3836.1-2000, GB3836.4-2000
3051SF: GB3836.1/4-2010, GB3836.20-2010 GB12476.1-2000
Markings: 3051S: Ex ia IIC T4
3051SF: Ex ia IIC T4 Ga, DIP A20 T_A105 °C IP66

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:
For output code A and F: This apparatus is not capable of withstanding the 500V r.m.s. insulation test required by Clause 6.4.12 of GB3836.4-2000.

2. The ambient temperature range is:

Output code	Ambient temperature
A	-50 °C ≤ Ta ≤+70 °C
F	-50 °C ≤ Ta ≤+60 °C

3. Intrinsically safe parameters:

Output code	Housing code	Display code	Maximum input voltage: U_i (V)	Maximum input current: I_i (mA)	Maximum input power: P_i (W)	Maximum internal parameters: C_i (nF)	Maximum internal parameters: L_i (uH)
A	=00	/	30	300	1	38	0
A	≠00	/	30	300	1	11.4	2.4
A	≠00	M7/M8 /M9	30	300	1	0	58.2
F	≠00	/	30	300	1.3	0	0
F FISCO	≠00	/	17.5	500	5.5	0	0

4. The product should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
5. The cable between this product and associated apparatus should be shielded cables (the cables must have insulated shield). The shield has to be grounded reliably in non-hazardous area.
6. The product complies to the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance FISCO model, FISCO parameters of this product are as above.
7. End users are not permitted to change any components inside, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
8. When installation, use and maintenance of this product, observe the following standards:

- GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
- GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
- GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)”
- GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”

N3 China Type n

Certificate: 3051S: GYJ101112X [Mfg China]
3051SF: GYJ101125X [Mfg China]
Standards: GB3836.1-2000, GB3836.8-2003
Markings: Ex nL IIC T5

Special Conditions for Safe Use (X):

1. Symbol “X” is used to denote specific conditions of use: The apparatus is not capable of withstanding the 500V test to earth for one minute. This must be taken into consideration during installation.
2. The ambient temperature range is: -40 °C ≤ Ta ≤ 70 °C.
3. Cable glands, conduit or blanking plugs, certified by NEPSI with Ex e or Ex n protection type and IP66 degree of protection provided by enclosure, should be used on external connections and redundant cable entries.
4. Energy limiting parameters:

Model	Terminal	Maximum input voltage: U_i (V)	Maximum input current: I_i (mA)	Maximum input power: P_i (W)	Maximum internal parameters: C_i (nF)	Maximum internal parameters: L_i (uH)
3051S-C/T	1 to 5	30	300	1	30	0
3051S HART, 4-20mA/SIS	+,- and CAN	30	300	1	11.4	0
3051S fieldbus/Profibus	+ and -	30	300	1.3	0	0
3051S FISCO	+ and -	17.5	380	5.32	0	0
Remote Mount Housing	+ and -	30	300	1	24	60

Note
Remote Mount Housing is for direct connection to the Model 3051S HART Terminals +,- and CAN by a cable whose maximum capacitance and inductance do not exceed 24nF and 60uH respectively.

5. 3051S type Pressure Transmitter comply to the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance FISCO model, FISCO parameters of 3051S type Pressure Transmitter are listed in the table above.
6. The product should be used with associated energy-limited apparatus certified by NEPSI in accordance with GB 3836.1-2000 and GB 3836.8-2003 to establish explosion protection system that can be used in explosive gas atmospheres.
7. The cables between this product and associated energy-limited apparatus should be shielded cables (the cables must have insulated shield). The shielded has to be grounded reliably in non-hazardous area.
8. Maintenance should be done in non-hazardous location.

9. End users are not permitted to change any components inside, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
10. When installation, use and maintenance of this product, observe following standards:

- GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
- GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
- GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)”
- GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”.

Japan

E4 Japan Flameproof

Certificate: TC15682, TC15683, TC15684, TC15685, TC15686, TC15687, TC15688, TC15689, TC15690, TC17099, TC17100, TC17101, TC17102, TC18876
Markings: Ex d IIC T6

Republic of Korea

EP Republic of Korea Flameproof
Certificate: 12-KB4BO-0180X [Mfg USA], 11-KB4BO-0068X [Mfg Singapore]
Markings: Ex d IIC T5 or T6

IP Republic of Korea Intrinsic Safety
Certificate: 12-KB4BO-0202X [HART – Mfg USA], 12-KB4BO-0204X [Fieldbus – Mfg USA], 12-KB4BO-0203X [HART – Mfg Singapore], 13-KB4BO-0296X [Fieldbus – Mfg Singapore]
Markings: Ex d IIC T4

Technical Regulation Customs Union (EAC)

EM, IM, KM Contact an Emerson Process Management representative for additional information.

Combinations

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, E6, and I6

KC Combination of E1, I1, E5, and I5

KD Combination of E1, I1, E5, I5, E6, and I6

KG Combination of IA, IE, IF, and IG

KM Combination of EM and IM

KP Combination of EP and IP

Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval
Certificate: 00-HS145383-6-PDA
Intended Use: Measure gauge or absolute pressure of liquid, gas or vapor applications on ABS classed vessels, marine, and offshore installations.
ABS Rules: 2013 Steel Vessels Rules 1-1-4/7.7, 1-1-A3, 4-8-3/1.7,
4-8-3/1.11.1, 4-8-3/13.1

SBV Bureau Veritas (BV) Type Approval
Certificate: 31910/A0 BV
Requirements: Bureau Veritas Rules for the Classification of Steel Ships
Application: Class Notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS

SDN Det Norske Veritas (DNV) Type Approval
Certificate: A-13243
Intended Use: Det Norske Veritas’ Rules for Classification of Ships, High Speed & Light Craft, and Det Norske Veritas’ Offshore Standards

Application:

Location classes	
Type	3051S
Temperature	D
Humidity	B
Vibration	A
EMC	A
Enclosure	D / IP66 / IP68

SLL Lloyds Register (LR) Type Approval
Certificate: 11/60002(E3)
Application: Environmental categories ENV1, ENV2, ENV3, and ENV5

D3 Custody Transfer – Measurement Canada Accuracy Approval Certificate: AG-0501, AV-2380C

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 America

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 llC
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.

Europe

I1 ATEX Intrinsic Safety
Certificate: 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 Condition for Safe Use (X):

1. 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 ⊕

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

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 04.0017X
Ex ia IIC T4(T_a = -60 °C to 70 °C)
For use with Rosemount SmartPower options 00753-9220-0001 only.
IP66

Special Condition for Safe Use (X):

1. 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 3051CFA Annubar® Flowmeter

The Rosemount 3051CFA Annubar Flowmeter utilizes the T-shaped sensor design that delivers best in class accuracy and performance while meeting the needs of diverse process applications, whether it is high accuracy for precision control or high strength for severe flow applications. Main capabilities include:

- Up to 1.8% of flow rate accuracy
- Available in 2 to 96-in. (50 - 2400 mm) line sizes
- Fully assembled and leak tested for out-of-the-box installation
- Power Advisory can proactively detect degraded electrical loop integrity issues (Option Code DA0)
- Local Operator Interface with straightforward menus and built-in configuration buttons (Option Code M4)

See "Specifications" on page 83 and options for more details on each configuration.

Additional information:
Specifications: page 83
Certifications: page 91
Dimensional Drawings: page 205

Table 1. 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(1)	Annubar Flowmeter	
Measurement type		
D	Differential Pressure	★
Fluid type		
L	Liquid	★
G	Gas	★
S	Steam	★
Line size		
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)	★

Table 1. 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.

070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
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		
C	Range C from the Pipe I.D. Range Codes table	★
D	Range D from the Pipe I.D. Range Codes table	★
A	Range A from the Pipe I.D. Range Codes table	
B	Range B from the Pipe I.D. Range Codes table	
E	Range E from the Pipe I.D. Range Codes table	
Z	Non-standard Pipe I.D. Range Codes or Line Sizes greater than 12 inches	
Pipe material/mounting assembly material		
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0	No Mounting (customer supplied)	★
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	

Table 1. 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.

Piping orientation		
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar type		
P	Pak-Lok	★
F	Flanged with opposite side support	★
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	
Sensor material		
S	316 Stainless Steel	★
H	Alloy C-276	
Sensor size		
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		
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	★
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		
0	No opposite side support or packing gland (required for Pak-Lok and Flange-Lok models)	★

Table 1. 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.

	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			
	Packing Gland Material	*Rod Material*	*Packing Material*	
J[3]	Stainless Steel Packing Gland/Cage Nipple	Carbon Steel	PTFE	
K[3]	Stainless Steel Packing Gland/Cage Nipple	Stainless Steel	PTFE	
L[3]	Stainless Steel Packing Gland/Cage Nipple	Carbon Steel	Graphite	
N[3]	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				
0	Not Applicable or Customer Supplied			★
1	Gate Valve, Carbon Steel			
2	Gate Valve, Stainless Steel			
5	Ball Valve, Carbon Steel			
6	Ball Valve, Stainless Steel			
Temperature measurement				
T	Integral RTD – not available with Flanged model greater than class 600#			★
0	No Temperature Sensor			★
R	Remote Thermowell and RTD			
Transmitter connection platform				
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)			★
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				
1	0 to 25 in H_2O (0 to 62,16 mbar)			★
2	0 to 250 in H_2O (0 to 621,60 mbar)			★
3	0 to 1000 in H_2O (0 to 2,48 bar)			★
Transmitter output				
A[4]	4–20 mA with digital signal based on HART Protocol			★
F	FOUNDATION™ fieldbus Protocol			★
W[5]	PROFIBUS® PA Protocol			★
X[6]	Wireless (requires wireless options and engineered polymer housing)			★
M[7]	Low-Power 1-5 Vdc with Digital Signal Based on HART® Protocol			

Table 1. 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 housing material		**Conduit entry size**	
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
P[8]	Engineered polymer	No conduit entries	★
D[9]	Aluminum	G1/2	
M[9]	SST	G1/2	
Transmitter performance class			
1	1.8% flow rate accuracy, 8:1 flow turndown, 5-yr. stability		★

Wireless options (requires Wireless Output Code X and Engineered Polymer Housing Code P)

Wireless transmit rate, operating frequency, and protocol		
WA3	User Configurable Transmit Rate, 2.4GHz *Wireless*HART®	★
Antenna and SmartPower™		
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

HART Revision configuration (requires HART Protocol Output Code A)

HR5[4]	Configured for HART Revision 5	★
HR7[4]	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Pressure testing		
P1[10]	Hydrostatic Testing with Certificate	
PX[10]	Extended Hydrostatic Testing	
Special cleaning		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing		
V1	Dye Penetrant Exam	

Table 1. 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.

Material examination		
V2	Radiographic Examination	
Flow calibration		
W1	Flow Calibration (Average K)	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface finish		
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★
Material traceability certification		
Q8[(11)]	Material Traceability Certification per EN 10474:2004 3.1	★
Code conformance[(12)]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance		
J5[(13)]	NACE MR-0175 / ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Installed in flanged pipe spool section		
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		
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
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		
Y1	Mounting Hardware Shipped Separately	★

Table 1. 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.

Special dimensions		
VM	Variable Mounting	
VT	Variable Tip	
VS	Variable length Spool Section	
PlantWeb control functionality		
A01[14]	FOUNDATION fieldbus Control Function Block Suite	★
PlantWeb diagnostic functionality		
DA0[15]	Power Advisory HART Diagnostic	★
D01[14]	FOUNDATION fieldbus Diagnostics Suite	★
Product certifications		
E8	ATEX Flameproof, Dust	★
I1[16]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[17]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of E5 and I5)	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6 [8]	CSA Intrinsically Safe	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	CSA, FM, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★

Table 1. 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		
L1[18]	Inert Sensor Fill Fluid (silicone fill fluid is standard)	★
L2	Graphite-Filled (PTFE) O-ring	★
LA[18]	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Shipboard approvals		
SBS[18]	American Bureau of Shipping	★
SLL[18][19]	Lloyds Register (LR)	
Display and interface options		
M4[20]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★
Quality certification for safety		
QS[15]	Prior-use certificate of FMEDA data	★
QT[15]	Safety certified to IEC 61508 with certificate of FMEDA	★
Transient protection		
T1[18][21]	Transient terminal block	★
Manifold for remote mount option		
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
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	
Lower power output		
C2	0.8-3.2 Vdc Output with Digital Signal based on HART Protocol (Available with Output code M only)	
Alarm levels		
C4[15]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[15]	NAMUR Alarm and Saturation Levels, Low Alarm	★
CR[15]	Custom alarm and saturation signal levels, high alarm	★
CS[15]	Custom alarm and saturation signal levels, low alarm	★
CT[15]	Rosemount Standard low alarm	★
Configuration buttons		
D4[15]	Analog Zero and Span	★
DZ[22]	Digital Zero Trim	★

Table 1. 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.

Ground screw		
V5[18][23]	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) Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.

(2) Available in remote mount applications only.

(3) The cage nipple is constructed of 304 SST.

(4) Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.

(5) For local addressing and configuration, M4 (Local Operator Interface) is required.

(6) Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(7) Only available with C6, E2, E5, I5, K5, KB and E8 approval. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, CT.

(8) Only available with Wireless Output (output code X).

(9) Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, KD.

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

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

(12) Not available with Transmitter Connection Platform 6.

(13) 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.

(14) Only valid with FOUNDATION fieldbus output (output code F).

(15) Only available with 4-20 mA HART Output (output Code A).

(16) Dust approval not applicable to output code X. See "IEC 62591 (WirelessHART Protocol)" on page 97 for wireless approvals

(17) Nonincendive certification not provided with Wireless output option code (X).

(18) Not available with Wireless Output (output code X).

(19) Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7

(20) Not available with FOUNDATION Fieldbus (Output Code F) or Wireless Output (output code X) or Low Power (output code M).

(21) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification codes IA, IB, and IE.

(22) Only available with 4-20 mA HART Output (output code A) and Wireless output (Output Code X).

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

Rosemount 3051CFC Compact Flowmeter ordering information

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

Table 2. 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[(1)]	Compact Flowmeter	
Measurement type		
D	Differential Pressure	★
Primary element technology		
A	Annubar Averaging Pitot Tube	★
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material type		
S	316 SST	★
Line size		
005[(2)]	1/2-in. (15 mm)	★
010[(2)]	1-in. (25 mm)	★
015[(2)]	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[(3)(4)]	10-in. (250 mm)	★
120[(3)(4)]	12-in. (300 mm)	★
Primary element type		
N000	Annubar Sensor Size 1	★
N040	0.40 Beta Ratio	★
N050	0.50 Beta Ratio	
N065[(5)]	0.65 Beta Ratio	★
Temperature measurement		
0	No Temperature Sensor	★
R	Remote Thermowell and RTD	
T[(6)]	Integral Temperature	

Table 2. 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 connection platform		
3	Direct-mount	★
7	Remote-mount, NPT Connections	★
Differential pressure range		
1	0 to 25 in H_2O (0 to 62,16 mbar)	★
2	0 to 250 in H_2O (0 to 621,60 mbar)	★
3	0 to 1000 in H_2O (0 to 2,48 bar)	★
Transmitter output		
A[7]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION fieldbus Protocol	★
W[8]	PROFIBUS PA Protocol	★
X[9]	Wireless (requires wireless options and engineered polymer housing)	★
M[10]	Low-Power 1-5 Vdc with Digital Signal Based on HART Protocol	

Transmitter housing material		**Conduit entry size**	
A	Aluminum	$^1/_2$-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	$^1/_2$-14 NPT	★
K	SST	M20 x 1.5	★
P[11]	Engineered polymer	No conduit entries	★
D[12]	Aluminum	G$^1/_2$	
M[12]	SST	G$^1/_2$	

Transmitter performance class		
1	Up to ±1.65% flow rate accuracy, 8:1 flow turndown, 5-year stability	★

Wireless options **(requires Wireless Output Code X and Engineered Polymer Housing Code P)**

Wireless transmit rate, operating frequency, and protocol		
WA3	User Configurable Transmit Rate, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

HART Revision Configuration **(requires HART Protocol Output Code A)**

HR5[7]	Configured for HART Revision 5	★
HR7[7]	Configured for HART Revision 7	★

Table 2. 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.

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Installation accessories		
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)	★
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote adapters		
FE	Flange Adapters 316 SST (1/2-in NPT)	★
High temperature application		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow calibration		
WC[13]	Flow Calibration, 3 pt, Conditioning Orifice Option C (all pipe schedules)	
WD[13][14]	Flow Calibration, 10 pt, Conditioning Option C (all schedules), Annubar Option A (Schedule 40)	
Pressure testing		
P1	Hydrostatic Testing with Certificate	
Special cleaning		
P2[15]	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★
Quality certification for safety		
QS[16]	Prior-use certificate of FMEDA data	★
QT[16]	Safety certified to IEC 61508 with certificate of FMEDA	★

Table 2. 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.

Material traceability certification		
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance		
J5[17]	NACE MR-0175/ISO 15156	
Country certification		
J1	Canadian Registration	
Product certifications		
E8	ATEX Flameproof, Dust	★
I1[18]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[19]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of E5 and I5)	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[11]	CSA Intrinsically Safe	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	CSA, FM, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★

Table 2. 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.

Sensor fill fluid and O-ring options		
L1[20]	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA[20]	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Shipboard approvals		
SBS[20]	American Bureau of Shipping	★
SLL[20][21]	Lloyds Register (LR)	
Display and interface options		
M4[22]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient protection		
T1[20][23]	Transient terminal block	★
Manifold for remote mount option		
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
PlantWeb control functionality		
A01[24]	FOUNDATION fieldbus Control Function Block Suite	★
PlantWeb diagnostic functionality		
DA0[15]	Power Advisory HART Diagnostic	★
D01[24]	FOUNDATION fieldbus Diagnostic Suite	★
Low power output		
C2	0.8-3.2 Vdc Output with Digital Signal Based on HART Protocol (available with Output code M only)	
Alarm levels		
C4[16]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[16]	NAMUR Alarm and Saturation Levels, Low Alarm	★
CR[16]	Custom alarm and saturation signal levels, high alarm	★
CS[16]	Custom alarm and saturation signal levels, low alarm	★
CT[16]	Rosemount Standard low alarm	★
Ground screw		
V5[20][25]	External Ground Screw Assembly	★

Table 2. 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.

Configuration buttons		
D4[16]	Analog Zero and Span	★
DZ[26]	Digital Zero Trim	★
Typical model number: 3051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

(1) Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.

(2) Available with Primary Element Technology P only.

(3) 10-in. (250 mm) and 12-in. (300 mm) line sizes not available with Primary Element Technology A.

(4) For the 10-in. (250 mm) and 12-in. (300 mm) line size, the alignment ring must be ordered (Installation Accessories).

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

(6) Available with Primary Element Technology A only.

(7) Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.

(8) For local addressing and configuration, M4 (Local Operator Interface) is required.

(9) Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(10) Only available with C6, E2, E5, I5, K5, KB and E8 approval. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, CT.

(11) Only available with Wireless Output (output code X).

(12) Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, KD.

(13) Available with Primary Element Technology C only.

(14) For Annubar option A, consult factory for pipe schedules other than schedule 40.

(15) Available with Primary Element Technology C or P only.

(16) Only available with HART 4-20 mA Output (output code A).

(17) 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.

(18) Dust approval not applicable to output code X. See "IEC 62591 (WirelessHART Protocol)" on page 97 for wireless approvals

(19) Nonincendive certification not provided with Wireless output option code (X).

(20) Not available with Wireless output (output code X).

(21) Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7

(22) Not available with output code F - FOUNDATION fieldbus or Wireless output (output code X) or Low Power (output code M).

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

(24) Only valid with FOUNDATION fieldbus (output code F).

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

(26) Only available with 4-20 mA HART Output (output code A) and Wireless output (output code X).

Rosemount 3051CFP Integral Orifice Flowmeter ordering information

- 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 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[(1)]	Integral Orifice Flowmeter	
Measurement type		
D	Differential Pressure	★
Body material		
S	316 SST	★
Line size		
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process connection		
T1	NPT Female Body (not available with Thermowell and RTD)	★
S1[(2)]	Socket Weld Body (not available with 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	★
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		
S	316 SST	★
H	Alloy C-276	
M	Alloy 400	

Table 3. 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.

Bore size option		
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	★
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		
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	★
D4	Direct-mount, 3-Valve Manifold, Alloy C-276	
D6	Direct-mount, 5-Valve Manifold, Alloy C-276	
R4	Remote-mount, 3-Valve Manifold, Alloy C-276	
R6	Remote-mount, 5-Valve Manifold, Alloy C-276	
Differential pressure ranges		
1	0 to 25 in H_2O (0 to 62,16 mbar)	★
2	0 to 250 in H_2O (0 to 621,60 mbar)	★
3	0 to 1000 in H_2O (0 to 2,48 bar)	★

Table 3. 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.

Transmitter output			
A[3]	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W[4]	PROFIBUS PA Protocol		★
X[5]	Wireless		★
M[6]	Low-Power 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter housing material		**Conduit entry size**	
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
P[7]	Engineered polymer	No conduit entries	★
D[8]	Aluminum	G1/2	
M[8]	SST	G1/2	
Transmitter performance class			
1	up to ±1.8% flow rate accuracy, 8:1 flow turndown, 5-year stability		★

Wireless options (requires Wireless Output Code X and Engineered Polymer Housing Code P)

Wireless transmit rate, operating frequency, and protocol		
WA3	User Configurable Transmit Rate, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

HART revision configuration (requires HART Protocol Output Code A)

HR5[3]	Configured for HART Revision 5	★
HR7[3]	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Transmitter body/bolt material		
GT	High Temperature (850 °F/454 °C)	
Temperature sensor		
RT[9]	Thermowell and RTD	

Table 3. 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.

Optional connection		
G1	DIN 19213 Transmitter Connection	★
Pressure testing		
P1[(10)(11)]	Hydrostatic Testing with Certificate	
Special cleaning		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing		
V1	Dye Penetrant Exam	
Material examination		
V2	Radiographic Examination	
Flow calibration		
WD[(12)]	Discharge Coefficient Verification	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material traceability certification		
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code conformance		
J2[(13)]	ANSI/ASME B31.1	
J3[(13)]	ANSI/ASME B31.3	
J4[(13)]	ANSI/ASME B31.8	
Materials conformance		
J5[(14)]	NACE MR-0175 / ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★
Quality certification for safety		
QS[(15)]	Prior-use certificate of FMEDA data	★
QT[(15)]	Safety certified to IEC 61508 with certificate of FMEDA	★

Table 3. 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		
E8	ATEX Flameproof, Dust	★
I1[16]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[17]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of E5 and I5)	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[7]	CSA Intrinsically Safe	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	CSA, FM, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Sensor fill fluid and O-ring options		
L1[18]	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA[18]	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Shipboard approvals		
SBS[18]	American Bureau of Shipping	★
SLL[18][19]	Lloyds Register (LR)	
Display and interface options		
M4[20]	LCD Display with Local Operator Interface	★
M5	LCD Display	★

Table 3. 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.

Transient protection		
T1[18][21]	Transient terminal block	★
PlantWeb control functionality		
A01[22]	FOUNDATION fieldbus Control Function Block Suite	★
PlantWeb diagnostic functionality		
DA0[15]	Power Advisory HART Diagnostic	★
D01[22]	FOUNDATION fieldbus Diagnostic Suite	★
Low power output		
C2	0.8-3.2 Vdc Output with Digital Signal Based on HART Protocol (available with Output code M only)	
Alarm levels		
C4[15]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[15]	NAMUR Alarm and Saturation Levels, Low Alarm	★
CR[15]	Custom alarm and saturation signal levels, high alarm	★
CS[15]	Custom alarm and saturation signal levels, low alarm	★
CT[15]	Rosemount Standard low alarm	★
Ground screw		
V5[18][23]	External Ground Screw Assembly	★
Configuration buttons		
D4[15]	Analog Zero and Span	★
DZ[24]	Digital Zero Trim	★
Typical model number: 3051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

(1) Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.

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

(3) Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.

(4) For local addressing and configuration, M4 (Local Operator Interface) is required.

(5) Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(6) Only available with C6, E2, E5, I5, K5, KB and E8 approval. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, CT.

(7) Only available with Wireless Output (output code X).

(8) Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, KD.

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

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

(11) Option P1 may not be ordered in combination with P2 or PA.

(12) Not available for bore sizes 0010, 0014, 0020, 0034, 0066, or 0109.

(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) Only available with HART 4-20 mA output (Option code A).

(16) Dust approval not applicable to output code X. See "IEC 62591 (WirelessHART Protocol)" on page 97 for wireless approvals

(17) Nonincendive certification not provided with Wireless output option code (X).

(18) Not available with Wireless Output (output code X).

(19) Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7.

(20) Not available with FOUNDATION fieldbus (Output Code F) or Wireless output (output code X) or Low Power (output code M).

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

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

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

(24) Only available with 4-20 mA output (Output Code A) and Wireless output (Output Code X).

Specifications

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_A Compact Annubar Flowmeter - Annubar Option A		
Ranges 2-3	Standard	±2.10% of Flow Rate at 8:1 flow turndown
	Calibrated	±1.80% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β = 0.40	±1.75% of Flow Rate at 8:1 flow turndown
	β = 0.50, 0.65	±1.95% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter - Orifice Option P		
Ranges 2-3	β = 0.4	±2.00% of Flow Rate at 8:1 flow turndown
	β = 0.50, 0.65	±2.00% of Flow Rate at 8:1 flow turndown
3051CFP Integral Orifice Flowmeter		
Ranges 2-3	Bore < 0.160	±3.00% of Flow Rate at 8:1 flow turndown
	0.160 ≤ Bore < 0.500	±1.95% of Flow Rate at 8:1 flow turndown
	0.500 ≤ Bore ≤ 1.000	±1.75% of Flow Rate at 8:1 flow turndown
	1.000 < Bore	±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.

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

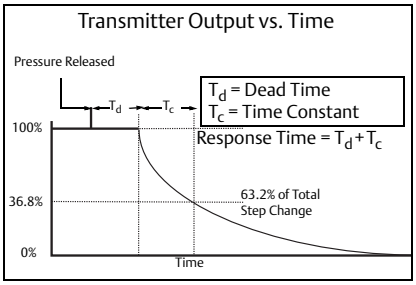
Long term stability

Models	Long term stability
3051CF Ranges 2-5	±0.2% of URL for 10 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: Range 1: Range 0:	100 ms 255 ms 700 ms	152 ms 307 ms N/A	
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 for 3051CFA, 3051CFC, and 3051CFP

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-1000 Hz test frequency range, 0.15mm displacement peak amplitude, 20 m/s2 acceleration amplitude).[1]

Power supply effect

Less than ±0.005% of calibrated span per volt.

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)

(1) Stainless steel temperature housing is not recommended with primary element technology A in applications with mechanical vibration.

Functional specifications

Range and sensor limits

Table 4. 3051CF Range and Sensor Limits

Range	Minimum span	Upper (URL)	Lower (LRL)
1	0.50 inH_2O (1,24 mbar)	25.00 inH_2O (62,16 mbar)	-25.00 inH_2O (-62,16 mbar)
2	1.67 inH_2O (4,15 mbar)	250.00 inH_2O (621,60 mbar)	-250.00 inH_2O (-621,60 bar)
3	6.67 inH_2O (16,58 mbar)	1000.00 inH_2O (2,48 bar)	-1000.00 inH_2O (-2,48 bar)

4-20 mA HART (output code A)

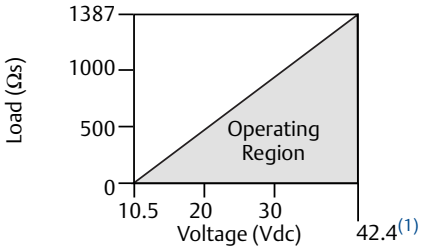
Power supply

External power supply required. Standard transmitter (4-20mA) operates on 10.5-42.4 Vdc with no load

Load limitations

Maximum loop resistance is determined by the voltage level of the external power supply 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.

Indication

Optional two line LCD/LOI Display

Optional configuration buttons

Configuration buttons need to be specified:
Digital Zero trim (option code DZ) changes digital value of the transmitter and is used for performing a sensor zero trim.
Analog Zero Span (option code D4) changes analog value and can be used to rerange the transmitter with an applied pressure.

Output

Two-wire 4-20mA, user selectable for linear or square root output. Digital process variable superimposed on 4-20 mA signal, available to any host that conforms to HART protocol. The 3051 comes with Selectable HART Revisions. Digital communications based on HART Revision 5 (default) or Revision 7 (option code HR7) protocol can be selected. The HART revision can be switched in the field using any HART based configuration tool or the optional local operator interface (M4).

Power advisory diagnostics

Power Advisory Diagnostics pro-actively detect and notify you of degraded electrical loop integrity before it can affect your process operation. Example loop problems that can be detected include water in the terminal compartment, corrosion of terminals, improper grounding, and unstable power supplies. The Device Dashboard presents the diagnostics in a graphical, task-based interface that provides single-click access to critical process/device information and descriptive graphical troubleshooting.

Local operator interface

The LOI utilizes a 2 button menu with internal and external configuration buttons. Internal buttons are always configured for Local Operator Interface. External Buttons can be configured for either LOI (option code M4), Analog Zero and Span (option code D4) or Digital Zero Trim (option code DZ). See Rosemount 3051 product manual (00809-0100-4007) for LOI configuration menu.

FOUNDATION fieldbus (output code F)

Power supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage. FISCO transmitters operate on 9.0 to 17.5 V dc.

Current draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional 2-line LCD display

FOUNDATION fieldbus block execution times

Block	Execution time
Resource	N/A
Sensor and SPM Transducer	N/A
LCD Display	N/A
Analog Input 1, 2	20 milliseconds
PID	25 milliseconds
Input Selector	20 milliseconds
Arithmetic	20 milliseconds
Signal Characterizer	20 milliseconds
Integrator	20 milliseconds
Output Splitter	20 milliseconds
Control Selector	20 milliseconds

FOUNDATION fieldbus parameters

Links	25 (max.)
Virtual Communications Relationships (VCR)	20 (max.)

FOUNDATION fieldbus function blocks (option A01)

Resource block

The resource block contains diagnostic, hardware, and electronics information. There are no linkable inputs or outputs to the Resource Block.

Sensor transducer block

The sensor transducer block contains sensor information and the ability to calibrate the pressure sensor or recall factory calibration.

LCD transducer block

The LCD transducer block is used to configure the LCD display meter.

Analog input (AI) block

The AI block processes the measurements from the sensor and makes them available to other function blocks. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement. The AI Block is widely used for scaling functionality.

Input selector (ISEL) block

The ISEL block can be used to select the first good, hot backup, maximum, minimum, or average of as many as eight input values and place it at the output. The block supports signal status propagation.

Integrator (INT) block

The INT block integrates one or two variables over time. The block compares the integrated or accumulated value to pre-trip and trip limits and generates discrete output signals when the limits are reached.

The INT block is used as a totalizer. This block will accept up to two inputs, has six options how to totalize the inputs, and two trip outputs.

Arithmetic (ARTH) block

The ARTH block provides the ability to configure a range extension function for a primary input. It can also be used to compute nine different arithmetic functions including flow with partial density compensation, electronic remote seals, hydrostatic tank gaging, ratio control, and others.

Signal characterizer (SGCR) block

The SGCR block characterizes or approximates any function that defines an input/output relationship. The function is defined by configuring as many as twenty X,Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates. Two separate analog input signals can be processed simultaneously to give two corresponding separate output values using the same defined curve.

PID block

The PID function block combines all of the necessary logic to perform proportional/integral/derivative (PID) control. The block supports mode control, signal scaling and limiting, feed forward control, override tracking, alarm limit detection, and signal status propagation.

Control selector block

The control selector function block selects one of two or three inputs to be the output. The inputs are normally connected to the outputs of PID or other function blocks. One of the inputs would be considered normal and the other two overrides.

Output splitter block

The output splitter function block provides the capability to drive two control outputs from a single input. It takes the output of one PID or other control block to control two valves or other actuators.

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.

FOUNDATION fieldbus Diagnostics Suite (option code D01)

The 3051C FOUNDATION fieldbus Diagnostics Suite features SPM technology to detect changes in the process, process equipment, or installation conditions (such as plugged impulse lines) of the transmitter. This is done by modeling the process noise signature (using the statistical values of mean and standard deviation) under normal conditions and then comparing the baseline values to current values over time. If a significant change in the current values is detected, the transmitter can generate an alert.

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 2-line LCD display

Local operator interface

Optional external configuration buttons

Wireless (output code X)

Output

IEC 62591 (*Wireless*HART), 2.4 GHz DSSS

Wireless radio (internal antenna, WP5 option)

- Frequency: 2.400 - 2.485 GHz
- Channels: 15
- Modulation: IEEE 802.15.4 compliant DSSS
- Transmission: Maximum of 10 dBm EIRP

Local display

The optional 3-line, 7-digit LCD display can display user-selectable information such as primary variable in engineering units, scaled variable, percent of range, sensor module temperature, and electronics temperature. The display updates based on the wireless update rate.

Digital zero trim

Digital Zero trim (option DZ) is an offset adjustment to compensate for mounting position effects, up to 5% of URL.

Update rate

User selectable 1 sec. to 60 min.

Wireless sensor module for in-line transmitters

The 3051 Wireless transmitter requires the engineered polymer housing to be selected. The standard sensor module will come with aluminum material. If stainless steel is required, the option WSM must be selected.

Power module

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

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

- 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

Static pressure limit

Rosemount 3051CD

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)

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

Low power output

1-5 Vdc HART Low Power (output code M)

Output

Three-wire 1-5 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

Output code F, W, and X

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

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])

Remote mount transmitter

- Up to 2500# ANSI (6000 psig at 100 °F [416 bar at 38 °C]).
- Integral temperature measurement is not available with Flanged mounting type greater than class 600

(1) Static pressure selection may effect pressure limitations.

For 3051CFC temperature limits

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).

For 3051CFP temperature limits

Process temperature limits

Standard (direct/remote mount)

- –40 to 450 °F (–40 to 232 °C)

Extended (remote mount only with option code G)

- –148 to 850 °F (–100 to 454 °C)

Table 5. 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 60 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

Physical specifications

Electrical connections

$^1/_2$–14 NPT, PG 13.5, G$^1/_2$, and M20 × 1.5 (CM20) conduit. *HART* interface connections fixed to terminal block.

Process connections

For 3051CFA-Annubar sensor material

- 316 Stainless Steel
- Alloy C-276

For 3051CFC-material of construction

- 316/316L SST

For 3051CFP-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

Flange

- A182 Gr 316/316L
- 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
- Alloy 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.

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
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

TM 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)

Paint

Polyurethane

Cover O-rings

Nitirile Butadiene (NBR)

3051 Product Certifications

European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at www.rosemount.com.

Ordinary Location Certification for FM Approvals

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

North America

E5 FM Explosionproof (XP) and Dust-Ignitionproof (DIP)
Certificate: 0T2H0.AE

Standards: FM Class 3600 – 1998, FM Class 3615 – 2006, FM Class 3810 – 2005, ANSI/NEMA 250 – 2003

Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(-50 °C ≤ Ta ≤ +85 °C); Factory Sealed; Type 4X

I5 FM Intrinsic Safety (IS) and Nonincendive (NI)
Certificate: 1Q4A4.AX

Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005

Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; DIV 1 when connected per Rosemount drawing 03031-1019; NI CL 1, DIV 2, GP A, B, C, D; T4(-50 °C ≤ Ta ≤ +70 °C) [HART], T5(-50 °C ≤ Ta ≤ +40 °C) [HART]; T4(-50 °C ≤ Ta ≤ +60 °C) [Fieldbus/PROFIBUS]; Type 4x

Special Conditions for Safe Use (X):

1. The Model 3051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.
2. The Model 3051 transmitter with the transient terminal block (Option code T1) will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

IE FM FISCO
Certificate: 1Q4A4.AX

Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005

Markings: IS CL I, DIV 1, GP A, B, C, D when connected per Rosemount drawing 03031-1019 (-50 °C ≤ Ta ≤ +60 °C); Type 4x

Special Conditions for Safe Use (X):

1. The Model 3051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.
2. The Model 3051 transmitter with the transient terminal block (Option code T1) will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

C6 CSA Explosionproof, Dust-Ignitionproof, Intrinsic Safety and Nonincendive
Certificate: 1053834

Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92, CSA Std. C22.2 No. 213 - M1987, CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CAN/CSA-C22.2 No. 94-M91, CAN/CSA-E60079-0-07, CAN/CSA-E60079-1-07

Markings: Explosionproof for Class I, Division 1, Groups B, C and D; Suitable for Class I, Zone 1, Group IIB+H2, T5; Dust-Ignitionproof Class II, Division 1, Groups E, F, G; Class III Division 1; Intrinsically Safe Class I, Division 1 Groups A, B, C, D when connected in accordance with Rosemount drawing 03031-1024, Temperature Code T3C; Suitable for Class I, Zone 0; Class I Division 2 Groups A, B, C and D, T5; Suitable for Class I Zone 2, Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

E6 CSA Explosionproof, Dust-Ignitionproof and Division 2
Certificate: 1053834

Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2 No. 213 - M1987, CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CAN/CSA-C22.2 No. 94-M91, CAN/CSA-C22.2 No. 157-92, CAN/CSA-E60079-0-07, CAN/CSA-E60079-1-07

Markings: Explosionproof Class I, Division 1, Groups B, C and D; Suitable for Class I, Zone 1, Group IIB+H2, T5; Dust-Ignitionproof for Class II and Class III, Division 1, Groups E, F and G; Class I, Division 2, Groups A, B, C and D; Suitable for Class I Zone 2, Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

Europe

E8 ATEX Flameproof and Dust

Certificate: KEMA00ATEX2013X; Baseefa11ATEX0275X

Standards Used: EN60079-0:2012, EN60079-1:2007, EN60079-26:2007, EN60079-31:2009

Markings: ⟨Ex⟩ II 1/2 G, Ex d IIC T6/T5 Ga/Gb, T6(-50 °C ≤ Ta ≤ +65 °C), T5(-50 °C ≤ Ta ≤ +80 °C); ⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (-20 °C ≤ Ta ≤ +85 °C)

Process Temperature

Temperature class	Process temperature
T6	-50 °C to +65 °C
T5	-50 °C to +80 °C

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 information on the dimensions of the flameproof joints the manufacturer shall be contacted.
3. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

I1 ATEX Intrinsic Safety and Dust

Certificate: BAS97ATEX1089X; Baseefa11ATEX0275X

Standards: EN60079-0:2012, EN60079-11:2012, EN60079-31:2009

Markings: HART: ⟨Ex⟩ II 1 G Ex ia IIC T5/T4 Ga T5(-60 °C ≤ Ta ≤ +40 °C), T4(-60 °C ≤ Ta ≤ +70 °C)
Fieldbus/PROFIBUS: ⟨Ex⟩ II 1 G Ex ia Ga IIC T4(-60°C ≤ Ta ≤ +60°C)
DUST: ⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (-20 °C ≤ Ta ≤ +85 °C)

Input parameters

	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	0.9 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Conditions for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.
2. 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 if located in Zone 0.
3. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

IA ATEX FISCO

Certificate: BAS97ATEX1089X

Standards: EN60079-0:2012, EN60079-11:2009

Markings: ⟨Ex⟩ II 1 G Ex ia IIC Ga T4(-60 °C ≤ Ta ≤ +60 °C)

Input parameters

	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	<5 nF
Inductance L_i	<10 µH

Special Conditions for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.
2. 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 if located in Zone 0.

N1 ATEX Type n and Dust

Certificate: BAS00ATEX3105X; Baseefa11ATEX0275X

Standards: EN60079-0:2012, EN60079-15:2010, EN60079-31:2009

Markings: ⟨Ex⟩ II 3 G Ex nA IIC T5 Gc (-40 °C ≤ Ta ≤ +70 °C); ⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (-20 °C ≤ Ta ≤ +85 °C)

Special Conditions for Safe Use (X):

1. This apparatus is not capable of withstanding the 500V insulation test that is required by EN60079-15. This must be taken into account when installing the apparatus.
2. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

International

E7 IECEx Flameproof and Dust

Certificate: IECEx KEM 09.0034X; IECEx BAS 10.0034X

Standards: IEC60079-0:2011, IEC60079-1:2007-04, IEC60079-26:2006, IEC60079-31:2008

Markings: Ex d IIC T6/T5 Ga/Gb, T6(-50 °C ≤ Ta ≤ +65 °C), T5(-50 °C ≤ Ta ≤ +80 °C);
Ex ta IIIC T95 °C T_{500}105 °C Da (-20 °C ≤ Ta ≤ +85 °C)

Process Temperature

Temperature class	Process temperature
T6	-50 °C to +65 °C
T5	-50 °C to +80 °C

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 information on the dimensions of the flameproof joints the manufacturer shall be contacted.
3. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

I7 IECEx Intrinsic Safety

Certificate: IECEx BAS 09.0076X

Standards: IEC60079-0:2011, IEC60079-11:2011

Markings: HART: Ex ia IIC T5/T4 Ga, T5(-60 °C ≤ Ta ≤ +40 °C), T4(-60 °C ≤ Ta ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC Ga T4(-60 °C ≤ Ta ≤ +60 °C)

Input parameters

	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	0.9 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

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 IEC 60079-11. This must be taken into account when installing the apparatus.
2. 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 if located in Zone 0.

IECEx Mining (Special A0259)

Certificate: IECEx TSA 14.0001X

Standards: IEC60079-0:2011, IEC60079-11:2011

Markings: Ex ia I Ma (-60 °C ≤ Ta ≤ +70 °C)

Input parameters

	HART	Fieldbus/PROFIBUS	FISCO
Voltage U_i	30 V	30 V	17.5 V
Current I_i	200 mA	300 mA	380 mA
Power P_i	0.9 W	1.3 W	5.32 W
Capacitance C_i	0.012 µF	0 µF	<5 nF
Inductance L_i	0 mH	0 mH	<10 µH

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by IEC60079-11. This must be taken into account when installing the apparatus.
2. It is a condition of safe use that the above input parameters shall be taken into account during installation.
3. It is a condition of manufacture that only the apparatus fitted with housing, covers and sensor module housing made out of stainless steel are used in Group I applications.

N7 IECEx Type n
Certificate: IECEx BAS 09.0077X
Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIC T5 Gc (-40 °C ≤ Ta ≤ +70 °C)

Special Condition for Safe Use (X):

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

Brazil

E2 INMETRO Flameproof

Certificate: UL-BR 13.0643X

Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-1:2009 + Errata 1:2011, ABNT NBR IEC60079-26:2008 + Errata 1:2008

Markings: Ex d IIC T6/T5 Ga/Gb, T6(-50 °C ≤ Ta ≤ +65 °C), T5(-50 °C ≤ Ta ≤ +80 °C)

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. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.
3. The capacitance of the wrap around label, being 1.6nF, exceeds the limit in Table 9 of ABNT NBR IEC 60079-0. The user shall determine suitability for the specific application.

I2 INMETRO Intrinsic Safety

Certificate: UL-BR 13.0584X

Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-11:2009

Markings: HART: Ex ia IIC T5/T4 Ga, T5(-60 °C ≤ Ta ≤ +40 °C), T4(-60 °C ≤ Ta ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC T4 Ga (-60 °C ≤ Ta ≤ +60 °C)

Input parameters

	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	0.9 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by ABNT NBR IRC 60079-11:2008. This must be taken into account when installing the equipment.
2. 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 if located in Zone 0.

IB INMETRO FISCO

Certificate: UL-BR 13.0584X

Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-11:2009

Markings: Ex ia IIC T4 Ga (-60 °C ≤ Ta ≤ +60 °C)

Input parameters

	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	<5 nF
Inductance L_i	<10 µH

Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by ABNT NBR IRC 60079-11:2008. This must be taken into account when installing the equipment.
2. 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 if located in Zone 0.

China

E3 China Flameproof

Certificate: GYJ14.1041X; GYJ10.1313X [Flowmeters]

Standards: GB3836.1-2000, GB3836.2-2010, GB12476-2000

Markings: Ex d IIC T6/T5, T6(-50 °C ≤ Ta ≤ +65 °C), T5(-50 °C ≤ Ta ≤ +80 °C)

Special Conditions for Safe Use (X):

1. The relation between ambient temperature arrange and temperature class is as follows:

Ta	Temperature class
-50 °C~+80 °C	T5
-50 °C~+65 °C	T6

When used in a combustible dust environment, the maximum ambient temperature is 80°C.

2. The earth connection facility in the enclosure should be connected reliably.

3. Cable entry certified by notified body with type of protection Ex d IIC in accordance with GB3836.1-2000 and GB3836.2-2000, should be applied when installed in a hazardous location. When used in combustible dust environment, cable entry in accordance with IP66 or higher level should be applied.
4. Obey the warning "Keep tight when the circuit is alive."
5. End users are not permitted to change any internal components.
6. During installation, use and maintenance of this product, observe the following standards:

   GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"
   GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"
   GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"
   GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".
   GB12476.2-2006 "Electrical apparatus for use in the presence of combustible dust Part 1-2: Electrical apparatus protected by enclosures and surface temperature limitation-Selection, installation and maintenance"
   GB15577-2007 "Safety regulations for dust explosion prevention and protection"

I3 China Intrinsic Safety

Certificate: GYJ13.1362X; GYJ101312X [Flowmeters]

Standards: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010, GB12476.1-2000

Markings: Ex ia IIC Ga T4/T5

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:
   a. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test for 1 minute. This must be taken into account when installing the apparatus.
   b. 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 if located in Zone 0.
2. The relation between T code and ambient temperature range is:

Model	T code	Temperature range
HART	T5	-60 °C ≤ Ta ≤ +40 °C
HART	T4	-60 °C ≤ Ta ≤ +70 °C
Fieldbus/PROFIBUS/ FISCO	T4	-60 °C ≤ Ta ≤ +60 °C
Flowmeter with 644 Temp Housing	T4	-40 °C ≤ Ta ≤ +60 °C

3. Intrinsically Safe parameters
   Input parameters

	HART	Fieldbus/ PROFIBUS	FISCO
Voltage U_i	30 V	30 V	17.5 V
Current I_i	200 mA	300 mA	380 mA
Power P_i	0.9 W	1.3 W	5.32 W
Capacitance C_i	0.012 μF	0 μF	<5 nF
Inductance L_i	0 mH	0 mH	<10 μH

Note 1: FISCO parameters apply to both Group IIC and IIB.
Note 2: [For Flowmeters] When 644 Temperature Transmitter is used, it should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of both 644 Temperature Transmitter and associated apparatus. The cables between 644 Temperatures Transmitter and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded cable has to be grounded reliably in a non-hazardous area.

4. Transmitters comply with the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance with FISCO Model, FISCO parameters are listed in the table above.
5. The product should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
6. The cables between this product and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded cable has to be grounded reliably in a non-hazardous area.
7. End users are not permitted to change any intern components but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
8. During installation, use and maintenance of this product, observe the following standards:
   GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus

used in explosive gas atmospheres"
GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"
GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"
GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".
GB12476.2-2006 "Electrical apparatus for use in the presence of combustible dust Part 1-2: Electrical apparatus protected by enclosures and surface temperature limitation-Selection, installation and maintenance"
GB15577-2007 "Safety regulations for dust explosion prevention and protection"

N3 China Type n

Certificate: GYJ101111X

Standards: GB3836.1-2000, GB3836.8-2003

Markings: Ex nA IIC T5 (-40 °C ≤ Ta ≤ +70 °C)

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use: The apparatus is not capable of withstanding the 500V test to earth for one minute. The must be taken into consideration during installation.
2. The ambient temperature range is -40 °C ≤ Ta ≤ +70 °C.
3. Maximum input voltage: 55V
4. Cable glands, conduit or blanking plugs, certified by NEPSI with Ex e or Ex n protection type and IP66 degree of protection provided by enclosure, should be used on external connections and redundant cable entries.
5. Maintenance should be done in non-hazardous location.
6. End users are not permitted to change any internal components but to settle the problem in conjunction with manufacturer to avoid damage to the product.
7. During installation, use and maintenance of this product, observe the following standards:
GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"
GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"
GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"
GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"

Japan

E4 Japan Flameproof

Certificate: TC20577, TC20578, TC20583, TC20584 [HART]; TC20579, TC20580, TC20581, TC20582 [Fieldbus]

Markings: Ex d IIC T5

Technical Regulations Customs Union (EAC)

EM, IM, KM Contact an Emerson Process Management representative for further information.

Combinations

K2 Combination of E2 and I2

K5 Combination of E5 and I5

K6 Combination of C6, E8, and I1

K7 Combination of E7, I7, and N7

K8 Combination of E8, I1, and N1

KB Combination of E5, I5, and C6

KD Combination of E8, I1, E5, I5, and C6

Conduit Plugs and Adapters

IECEx Flameproof and Increased Safety

Certificate: IECEx FMG 13.0032X

Standards: IEC60079-0:2011, IEC60079-1:2007, IEC60079-7:2006-2007

Markings: Ex de IIC Gb

ATEX Flameproof and Increased Safety

Certificate: FM13ATEX0076X

Standards: EN60079-0:2012, EN60079-1:2007, IEC60079-7:2007

Markings:  II 2 G Ex de IIC Gb

Conduit plug thread sizes

Thread	Identification mark
M20 x 1.5	M20
1/2 - 14 NPT	1/2 NPT
G1/2A	G1/2

Thread adapter thread sizes

Male thread	Identification mark
M20 x 1.5 – 6H	M20
1/2 - 14 NPT	1/2 – 14 NPT
3/4 - 14 NPT	3/4 – 14 NPT
Female thread	**Identification mark**
M20 x 1.5 – 6H	M20
1/2 - 14 NPT	1/2 – 14 NPT
PG 13.5	PG 13.5

Special Conditions for Safe Use (X):

1. When the thread adapter or blanking plug is used with an enclosure in type of protection increased safety "e" the entry thread shall be suitably sealed in order to maintain the ingress protection rating (IP) of the enclosure.
2. The blanking plug shall not be used with an adapter.
3. Blanking Plug and Threaded Adapter shall be either NPT or Metric thread forms. G½ and PG 13.5 thread forms are only acceptable for existing (legacy) equipment installations.

Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval

Certificate: 09-HS446883A-PDA

Intended Use: Measure gauge or absolute pressure of liquid, gas or vapor applications on ABS classed vessels, marine, and offshore installations.

ABS Rules: 2011 Steel Vessels Rules 1-1-4/7.7, 4-8-3/13.1, 1-1-A3, 4-8-3/1.7, 4-8-3/1.11.1

SBV Bureau Veritas (BV) Type Approval

Certificate: 23155/A3 BV

Requirements: Bureau Veritas Rules for the Classification of Steel Ships

Application: Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS; Pressure transmitter type 3051 cannot be installed on diesel engines

SDN Det Norske Veritas (DNV) Type Approval

Certificate: A-13245

Intended Use: Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards

Application:

Location classes	
Type	3051
Temperature	D
Humidity	B
Vibration	A
EMC	B
Enclosure	D

SLL Lloyds Register (LR) Type Approval

Certificate: 11/60002

Application: Environmental categories ENV1, ENV2, ENV3 and ENV5

C5 Custody Transfer - Measurement Canada Accuracy Approval

Certificate: AG-0226; AG-0454; AG-0477

IEC 62591 (*Wireless*HART Protocol)

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Fisher-Rosemount GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European Directive Information

The most recent revision of the EC declaration of conformity can be found at www.rosemount.com.

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

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device 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).

North American Certifications

Factory Mutual (FM) approvals

I5 FM Intrinsically Safe
Certificate No: 3046325
Applicable Standards: Class 3600:2011, Class 3610:2010, Class 3810: 2005, Add: ANSI/ISA 60079-0 2009,ANSI/ISA 60079-11:2009 ANSI/NEMA 250:2003, ANSI/IEC 60529:2004
Markings: Intrinsically Safe for Class I, Division I, Groups A, B, C, D
Zone Marking: Class I Zone 0, AEx ia IIC
T4 (-40 °C to 70 °C)
Intrinsically Safe when installed according to Rosemount Drawing 03031-1062
Enclosure Type 4X/IP66/IP67/IP68

Special Conditions for Safe Use (X):

1. The In-Line pressure sensor may contain more than 10% aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.
2. The surface resistivity of the transmitter is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.
3. The Model 3051 Wireless Pressure Transmitter shall only be used with the 701PGNKF Rosemount SmartPower Battery Pack.

CSA - Canadian Standards Association

I6 CSA Intrinsically Safe
Certificate No: 2526009
Applicable Standards: CSA C22.2 No. 0-M91, CSA C22.2 No. 159-92, CSA C22.2 No. 94-M91, CSA C22.2 No. 142-M1987, CSA C22.2 No. 157-92, CSA C22.2 No. 60529-05
Markings: Intrinsically Safe For Class I, Division I, Groups A, B, C, D
T4 (-40 °C to 70 °C)
Intrinsically safe when installed according to Rosemount drawing 03031-1063
Enclosure Type 4X/IP66/IP68

European Certifications

I1 ATEX Intrinsic Safety
Certificate No: Baseefa12ATEX0228X
Applicable Standards: EN60079-11:2012, EN60079-0:2012
Markings: Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ 70 °C)
Ⓔx II 1G
IP66/68
CE 1180

Special Conditions for Safe Use (X):

1. The plastic enclosure may constitute a potential electrostatic ignition risk and must not be rubbed or cleaned with a dry cloth.
2. The Model 701PGNKF Power Module may be replaced in a hazardous area. The Power Module has a surface resistivity greater than 1GΩ and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

I7 IECEx Intrinsic Safety
Certificate No: IECEx BAS 12.0124X
Applicable Standards: IEC60079-11:2011, IEC60079-0:2011
Markings: Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ 70 °C)
IP66/68

Special Conditions for Safe Use (X):

1. The plastic enclosure may constitute a potential electrostatic ignition risk and must not be rubbed or cleaned with a dry cloth.
2. The Model 701PGNKF Power Module may be replaced in a hazardous area. The Power Module has a surface resistivity greater than 1GΩ and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

Pipe I.D. Range Codes

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			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
	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

	Line size			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
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 Z2	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

Rosemount 2051CF Flowmeter Series

Configuration	Transmitter output code
4-20 mA HART® 2051 2051 with Selectable HART(1)	A
Lower Power 2051 2051 with Selectable HART(1)	M
FOUNDATION™ fieldbus	F
PROFIBUS®	W
Wireless	X

Rosemount 2051CFA Annubar® Flowmeter

(1) The 4-20 mA with Selectable HART device can be ordered with Transmitter Output option code A plus any of the following options codes: M4, QT, DZ, CR, CS, CT, HR5, HR7.

Additional information

Specifications: page 122

Certifications: page 129

Dimensional Drawings: page 213

Rosemount 2051CFA Annubar Flowmeter ordering information

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 128 for more information on Material Selection.

Table 1. 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		
D	Differential Pressure	★
Fluid type		
L	Liquid	★
G	Gas	★
S	Steam	★
Line size		
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)	★

Table 1. 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.

Line size		
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		
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
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.	
Pipe material/mounting assembly material		
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0[(1)]	No Mounting (customer supplied)	
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping orientation		
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar type		
P	Pak-Lok	★
F	Flanged with opposite side support	★
Sensor material		
S	316 Stainless Steel	★
Sensor size		
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)	★

Table 1. 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.

Mounting type		
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	★
R1	150# RTJ Flange	
R3	300# RTJ Flange	
R6	600# RTJ Flange	
Opposite side support or packing gland		
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		
0	Not Applicable or Customer Supplied	★
Temperature measurement		
T	Integral RTD – not available with Flanged model greater than class 600#	★
0	No Temperature Sensor	★
R	Remote Thermowell and RTD	
Transmitter connection platform		
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)	★
8	Remote-mount SW Connections ($^1/_2$-in.)	
Differential pressure range		
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		
A[(2)]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION fieldbus Protocol	★

Table 1. 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 output			
W	PROFIBUS PA Protocol		★
X	Wireless		★
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter housing material		**Conduit entry size**	
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	★
P(4)	Engineered Polymer	No Conduit Entries	★
D	Aluminum	G1/2	
M(3)	SST	G1/2	
Transmitter performance class			
1	2.3% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Wireless options (requires Wireless output code X and Engineered Polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User Configurable Transmit Rate, 2.4GHz *Wireless*HART®	★
Antenna and SmartPower™		
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Special cleaning		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing		
V1	Dye Penetrant Exam	
Material examination		
V2	Radiographic Examination	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★

Table 1. 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.

Surface finish		
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★
Material traceability certification		
Q8[(5)]	Material Traceability Certification per EN 10474:2004 3.1	★
Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance		
J5[(6)]	NACE MR-0175 / ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Instrument connections for remote mount options		
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
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		
Y1	Mounting Hardware Shipped Separately	★
Product certifications		
E1[(3)]	ATEX Flameproof	★
E2[(3)]	INMETRO Flameproof	★
E3[(3)]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[(3)]	IECEx Flameproof	★
I1[(3)]	ATEX Intrinsic Safety	★
I2[(3)]	INMETRO Intrinsically Safe	★
I3[(3)]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★

Table 1. 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.

Product certifications		
I7[3][3]	IECEx Intrinsic Safety	★
IA[3][7]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[3][7]	FM FISCO Intrinsically Safe	★
IF[3][7]	CSA FISCO Intrinsically Safe	★
IG[3][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	★
Sensor fill fluid and O-ring options		
L1[8]	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA[8]	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and interface options		
M4[9]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★
Quality certification for safety		
QS[10]	Prior-use certificate of FMEDA data	★
QT[10]	Safety Certified to IEC 61508 with certificate of FMEDA	★
Transient protection		
T1[8][11]	Transient terminal block	★
Manifold for remote mount option		
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★

Table 1. 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.

Manifold for remote mount option		
F1	3-Valve Manifold, Carbon Steel	
F5	5-Valve Manifold, Carbon Steel	
PlantWeb control functionality		
A01[7]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Hardware adjustments		
D4[12]	Zero and Span Hardware Adjustments	★
DZ[13]	Digital Zero Trim	★
Alarm limit		
C4[12][14]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[12][14]	NAMUR Alarm and Saturation Levels, Low Alarm	★
CR[12]	Custom Alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS[12]	Custom Alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT[12]	Low Alarm (standard Rosemount alarm and saturation levels)	★
Ground screw		
V5[8][15]	External Ground Screw Assembly	★
HART revision configuration		
HR5[12][16]	Configured for HART Revision 5	★
HR7[12][17]	Configured for HART Revision 7	★
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 214) and Pak-Lok (page 213).

(2) HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.

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

(4) Only available with output code X.

(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 code X.

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

(10) Only available with 4-20 mA HART (Output Code A).

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

(12) Only available with 4-20 mA HART (output codes A and M).

(13) Only available with HART 4-20 mA Output (output codes A and M) and Wireless Output (output code X).

(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.

(16) Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.

(17) Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.

Rosemount 2051CFC Compact Flowmeter ordering information

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

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 128 for more information on Material Selection.

Table 2. 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		
D	Differential Pressure	★
Primary element technology		
A	Annubar Averaging Pitot Tube	★
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material type		
S	316 SST	★
Line size		
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(2)(3)	10-in. (250 mm)	★
120(2)(3)	12-in. (300 mm)	★
Primary element type		
N000	Annubar Sensor Size 1	★
N040	0.40 Beta Ratio	★
N050	0.50 Beta Ratio	★
N065(4)	0.65 Beta Ratio	★
Temperature measurement		
0	No Temperature Sensor	★
T(5)	Integral RTD	

Table 2. 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.

R	Remote Thermowell and RTD	
3	Direct-mount	★
Transmitter connection platform		
7	Remote-mount, NPT Connections	★
Differential pressure range		
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		
A(6)	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION fieldbus Protocol	★
W	PROFIBUS PA Protocol	★
X	Wireless	★
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol	

Transmitter housing material		**Conduit entry size**	
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K(7)	SST	M20 x 1.5	★
P(8)	Engineered Polymer	No Conduit Entries	★
D	Aluminum	G1/2	
M(7)	SST	G1/2	

Transmitter performance class		
1	up to ±2.00% flow rate accuracy, 5:1 flow turndown, 2-year stability	★

Wireless options (requires Wireless output code X and Engineered Polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User Configurable Transmit Rate, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★

Table 2. 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.

Installation accessories		
AB	ANSI Alignment Ring (150#) (only required for 10-in. [250 mm] and 12-in. [300 mm] line sizes)	★
AC	ANSI Alignment Ring (300#) (only required for 10-in. [250 mm] and 12-in. [300 mm] line sizes)	★
AD	ANSI Alignment Ring (600#) (only required for 10-in. [250 mm] and 12-in. [300 mm] line sizes)	★
Installation accessories		
DG	DIN Alignment Ring (PN16)	★
DH	DIN Alignment Ring (PN40)	★
DJ	DIN Alignment Ring (PN100)	★
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote adapters		
FE	Flange Adapters 316 SST ($^1/_2$-in NPT)	★
High temperature application		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow calibration		
WC[9]	Flow Calibration, 3 Pt, Conditioning Orifice Option C (all pipe schedules)	
WD[10][11]	Flow Calibration, 10 Pt, Conditioning Option C (all schedules), Annubar Option A (Schedule 40)	
Pressure testing		
P1	Hydrostatic Testing with Certificate	
Special cleaning		
P2[12]	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★
Quality certification for safety		
QS[13]	Prior-use certificate of FMEDA data	★
QT[14]	Safety Certified to IEC 61508 with certificate of FMEDA	★
Material traceability certification		
Q8	Material Traceability Certification per EN 10204:2004 3.1	★

Table 2. 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.

Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance		
J5[15]	NACE MR-0175 / ISO 15156	
Country certification		
J1	Canadian Registration	
Product certifications		
E1[7]	ATEX Flameproof	★
E2[7]	INMETRO Flameproof	★
E3[7]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[7]	IECEx Flameproof	★
I1[7]	ATEX Intrinsic Safety	★
I2[7]	INMETRO Intrinsically Safe	★
I3[7]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[7]	IECEx Intrinsic Safety	★
IA[7]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[7][16]	FM FISCO Intrinsically Safe	★
IF[7][13]	CSA FISCO Intrinsically Safe	★
IG[7][13]	IECEx FISCO Intrinsically Safe	★
K1[7]	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[7]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[7]	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[7]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[7]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[7]	ATEX Type n	★
N7[7]	IECEx Type n	★
ND[7]	ATEX Dust	★

Table 2. 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.

Sensor fill fluid and O-ring options		
L1[17]	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA[17]	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and interface options		
M4[18]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient protection		
T1[17][19]	Transient terminal block	★
Manifold for remote mount option		
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Alarm limit		
C4[20][21]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[20][21]	NAMUR Alarm and Saturation Levels, Low Alarm	★
CR[20]	Custom Alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS[20]	Custom Alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT[20]	Low Alarm (standard Rosemount alarm and saturation levels)	★
PlantWeb control functionality		
A01[13]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Hardware adjustments		
D4[20]	Zero and Span Hardware Adjustments	★
DZ[22]	Digital Zero Trim	★
Ground screw		
V5[23]	External Ground Screw Assembly	★
HART revision configuration		
HR5[20][24]	Configured for HART Revision 5	★
HR7[20][25]	Configured for HART Revision 7	★
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 the 10-in. (250 mm) and 12-in. (300 mm) line size, the alignment ring must be ordered (Installation Accessories).

(3) 10-in. (250 mm) and 12-in. (300 mm) line sizes not available with Primary Element Technology A.

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

(5) Available with Primary Element Technology A only.

(6) HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.

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

(8) Only available with output code X.

(9) Available with primary element technology C only.

(10) Available with primary element technology C or A only.

(11) For Annubar Option A, consult factory for pipe schedules other than Sch. 40.

(12) Available with primary element technology C or P only.

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

(14) Only available with 4-20 mA HART output (output code A).

(15) 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.

(16) Not available with Primary Element Technology P.

(17) Not available with output code X.

(18) Not available with FOUNDATION fieldbus (Output Code F) or Wireless (Output Code X).

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

(20) Only available with 4-20 mA HART (output codes A and M).

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

(22) Only available with HART 4-20 mA (Output Codes A and M) and Wireless (Output Code X).

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

(24) Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.

(25) Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if 14 needed.

Rosemount 2051CFP Integral Orifice Flowmeter ordering information

- 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.

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment.
See page 128 for more information on Material Selection.

Table 3. 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		
D	Differential Pressure	★
Material type		
S	316 SST	★
Line size		
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process connection		
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, 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	★
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	

Table 3. 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.

Orifice plate material		
S	316 SST	★
Bore size option		
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	★
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		
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		
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 3. 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.

Transmitter output			
A[2]	4–20 mA with digital signal based on HART protocol		★
F	FOUNDATION fieldbus protocol		★
W	PROFIBUS PA Protocol		★
X	Wireless		★
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter housing material		**Conduit entry size**	
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	★
P[4]	Engineered Polymer	No Conduit Entries	★
D	Aluminum	G1/2	
M[3]	SST	G1/2	
Transmitter performance class			
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Wireless options (requires Wireless output code X and Engineered Polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User Configurable Transmit Rate, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Temperature sensor		
RT[5]	Thermowell and RTD	
Optional connection		
G1	DIN 19213 Transmitter Connection	★
Pressure testing		
P1[6]	Hydrostatic Testing with Certificate	
Special cleaning		
P2	Cleaning for Special Services	

Table 3. 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		
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing		
V1	Dye Penetrant Exam	
Material examination		
V2	Radiographic Examination	
Flow calibration		
WD[7]	Discharge Coefficient Verification	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material traceability certification		
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code conformance		
J2[8]	ANSI/ASME B31.1	
J3[8]	ANSI/ASME B31.3	
J4[8]	ANSI/ASME B31.8	
Materials conformance		
J5[9]	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★
Quality certification for safety		
QS[10]	Prior-use certificate of FMEDA data	★
QT[11]	Safety Certified to IEC 61508 with certificate of FMEDA	★
Product certifications		
E1[3]	ATEX Flameproof	★
E2[3]	INMETRO Flameproof	★
E3[3]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[3]	IECEx Flameproof	★

Table 3. 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.

Product certifications		
I1[3]	ATEX Intrinsic Safety	★
I2[3]	INMETRO Intrinsically Safe	★
I3[3]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[3]	IECEx Intrinsic Safety	★
IA[3][12]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[3][12]	FM FISCO Intrinsically Safe	★
IF[3][12]	CSA FISCO Intrinsically Safe	★
IG[3][12]	IECEx FISCO Intrinsically Safe	★
K1[3][12]	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	★
Sensor fill fluid and O-ring options		
L1[10]	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA[10]	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and interface options		
M4[13]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient protection		
T1[10][13]	Transient terminal block	★
Alarm limit		
C4[14][15]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[14][15]	NAMUR Alarm and Saturation Levels, Low Alarm	★

Table 3. 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.

Alarm limit		
CR[14]	Custom Alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS[14]	Custom Alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT[14]	Low Alarm (standard Rosemount alarm and saturation levels)	★
PlantWeb control functionality		
A01[12]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Hardware adjustments		
D4[14]	Zero and Span Hardware Adjustments	★
DZ[16]	Digital Zero Trim	★
Ground screw		
V5[10][17]	External Ground Screw Assembly	★
HART revision configuration		
HR5[14][18]	Configured for HART Revision 5	★
HR7[14][19]	Configured for HART Revision 7	★
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) HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.

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

(4) Only available with output code X.

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

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

(7) Not available for bore sizes 0010, 0014, 0020, 0034, 0066, or 0109.

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

(9) 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.

(10) Not available with output code X.

(11) Only available with 4-20 mA HART output (output Code A).

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

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

(14) Only available with 4-20 mA HART (output codes A and M).

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

(16) Only available with HART 4-20 mA (Output Codes A and M) and Wireless (Output Code X).

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

(18) Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.

(19) Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.

Specifications

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. Flow performance - Flow reference accuracy[1]

2051CFA Annubar Flowmeter		
Ranges 2-3		±2.30% of Flow Rate at 5:1 flow turndown
2051SFC_A Compact Annubar Flowmeter - Annubar Option A		
Ranges 2-3	Standard	±2.60% of Flow Rate at 5:1 flow turndown
	Calibrated	±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 =0.50, 0.65	±2.45% of Flow Rate at 5:1 flow turndown
2051CFC Compact Orifice Flowmeter - Orifice Option P[2]		
Ranges 2-3	β =0.4	±2.50% of Flow Rate at 5:1 flow turndown
	β =0.50, 0.65	±2.50% of Flow Rate at 5:1 flow turndown
2051CFP Integral Orifice Flowmeter		
Ranges 2-3	Bore < 0.160	±3.10% of Flow Rate at 5:1 flow turndown
	0.160 ≤ Bore < 0.500	±2.75% of Flow Rate at 5:1 flow turndown
	0.500 ≤ Bore ≤ 1.000	±2.25% of Flow Rate at 5:1 flow turndown
	1.000 < Bore	±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.

Functional specifications

Range and sensor limits

Range	2051CF minimum span	Range and sensor limits
1	0.5 inH_2O (1,24 mbar)	0 to 25 inH_2O (62,16 mbar)
2	2.5 inH_2O (4,14 mbar)	0 to 250 inH_2O (0,62 bar)
3	6.67 inH_2O (16,58 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.

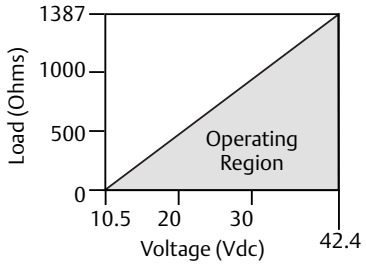
Turn-on time

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 for non-I.S. applications, 9.0 to 30 Vdc for entity model intrinsically safe applications and 9.0 to 17.5 Vdc for FISCO intrinsically safe applications.

Current draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional 2-line LCD display

FOUNDATION fieldbus function block

Execution times

Block	Execution time
Resource	N/A
Transducer	N/A
LCD Display Block	N/A
Analog Input 1, 2	20 milliseconds
PID	25 milliseconds
Arithmetic	20 milliseconds
Input Selection	20 milliseconds
Signal Characterizer	20 milliseconds
Integrator	20 milliseconds
Output Splitter	20 milliseconds
Control Selector	20 milliseconds

FOUNDATION fieldbus parameters

Schedule Entries	7 (max.)
Links	25 (max.)
Virtual Communications Relationships (VCR)	20 (max.)

Standard function blocks

Resource block

The resource block contains diagnostic, hardware and electronics information. There are no linkable inputs or outputs to the Resource Block.

Sensor transducer block

The sensor transducer block contains sensor information including the sensor diagnostics and the ability to trim the pressure sensor or recall factory calibration.

LCD display transducer block

The LCD display transducer block is used to configure the LCD display meter.

Analog input (AI) block

The AI block processes the measurements from the sensor and makes them available to other function blocks. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement. The AI block is widely used for scaling functionality.

Note

The channel, Set XD_Scale, Set L_Type, and sometimes Set Out_Scale are typically configured by instrument personnel. Other AI block parameters, block links, and schedule are typically configured by the control systems configuration engineer.

Input selector (ISEL) block

The ISEL block can be used to select the first good, Hot Backup™, maximum, minimum, or average of as many as eight input values and place it at the output. The block supports signal status propagation.

Integrator (INT) block

The INT block integrates one or two variables over time. The block compares the integrated or accumulated value to pre-trip and trip limits and generates discrete output signals when the limits are reached.

The INT block is used as a totalizer. This block will accept up to two inputs, has six options how to totalize the inputs, and two trip outputs.

Arithmetic (ARTH) block

The ARTH block provides the ability to configure a range extension function for a primary input. It can also be used to compute nine different arithmetic functions including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal characterizer (SGCR) block

The SGCR block characterizes or approximates any function that defines an input/output relationship. The function is defined by configuring as many as twenty X,Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates. Two separate analog input signals can be processed simultaneously to give two corresponding separate output values using the same defined curve.

PID block

The PID function block combines all of the necessary logic to perform proportional/integral/derivative (PID) control. The block supports mode control, signal scaling and limiting, feed forward control, override tracking, alarm limit detection, and signal status propagation.

Control selector block

The control selector Function Block selects one of two or three inputs to be the output. The inputs are normally connected to the outputs of PID or other function blocks. One of the inputs would be considered Normal and the other two overrides.

Output splitter block

The output splitter function block provides the capability to drive two control outputs from a single input. It takes the output of one PID or other control block to control two valves or other actuators.

Backup Link Active Scheduler (LAS)

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

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 for non-I.S. applications, 9.0 to 30 Vdc for entity model intrinsically safe applications and 9.0 to 17.5 Vdc for FISCO intrinsically safe applications.

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 2-line LCD display

LOI

Optional external configuration buttons.

Wireless (Output Code X)

Output

IEC 62591 (*Wireless*HART), 2.4 GHz DSSS

Wireless radio (internal antenna, WP5 option)

- Frequency: 2.400 - 2.485 GHz
- Channels: 15
- Modulation: IEEE 802.15.4 compliant DSSS
- Transmission: Maximum of 10 dBm EIRP

Local display

The optional 3-line, 7-digit LCD display can display user-selectable information such as primary variable in engineering units, scaled variable, percent of range, sensor module temperature, and electronics temperature. The display updates based on the wireless update rate.

Digital zero trim

Digital Zero trim (option DZ) is an offset adjustment to compensate for mounting position effects, up to 5% of URL.

Update rate

User selectable 1 sec. to 60 min.

Wireless sensor module for In-Line transmitters

The 2051 Wireless Transmitter requires the engineered polymer housing to be selected. The standard sensor module will come with aluminum material. If stainless steel is required, the option WSM must be selected.

Power module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT/PC 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 to 185 °F (-40 °C to 85 °C) may reduce specified life by less than 20 percent.

HART 1-5 Vdc 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.

2051

Digital communications based on HART Revision 5 protocol.

2051 with selectable HART

The 2051 with Selectable HART comes with Selectable HART Revisions. Digital communications based on HART Revision 5 (default) or Revision 7 (option code HR7) protocol can be selected. The HART revision can be switched in the field using any HART based configuration tool or the optional local operator interface (LOI).

LOI

The LOI utilizes a 2 button menu with internal and external configuration buttons. Internal buttons are always configured for Local Operator Interface. External Buttons can be configured for either LOI, (option code M4), Analog Zero and Span (option code D4) or Digital Zero Trim (option code DZ). See 2051 with Selectable HART product manual (00809-0100-4107) for LOI configuration menu.

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 (meter input impedance)

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-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.

For 2051CFC temperature limits-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

For 2051CFP temperature limits-process temperature limits

Standard (direct/remote mount)

- –40 to 450 °F (–40 to 232 °C)

Extended (remote mount only with option code G):

- –148 to 850 °F (–100 to 454 °C)

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 display updates will be slower at temperatures below -4 °F (-20 °C).

Remote mount transmitter temperature limits

At atmospheric pressures and above.

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.

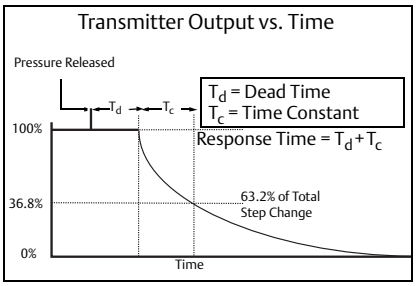
Long term stability

Models	Standard	Performance option, P8
2051CF Range 1 (CF)	±0.2% of URL for 1 year, Reference Stability	±0.125% of URL for 5 years, Operating Stability
Ranges 2-5	±0.1% of URL for 2 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: Range 1: Range 2:	 115 milliseconds 270 milliseconds 130 milliseconds	 152 milliseconds 307 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 for 2051CFA, 2051CFC, and 2051CFP

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).

Vibration effect for 2051CFC_A

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz, 0.15mm displacement peak amplitude/ 60-2000 Hz 2g).[1]

(1) Stainless steel temperature housing is not recommended with primary element technology A in applications with mechanical vibration.

Physical specifications

Electrical connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit.

2051CF process-wetted parts

For 2051CFA wetted parts-Annubar sensor material

- 316 Stainless Steel
- Alloy C-276

For 2051CFC wetted parts-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.

For 2051CFP wetted parts-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

Flange

- A182 Gr 316/316L
- 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
- Alloy 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.

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

Paint

Polyurethane

Cover O-rings

Nitirile Butadiene (NBR)

Product Certifications

Approved manufacturing locations

Rosemount Inc. — Chanhassen, Minnesota US
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.

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 America

FM approvals

E5 Explosion-Proof and Dust-Ignition-Proof
Certificate: 3032938
Standards Used: FM Class 3600 – 1998, FM Class 3615 – 2006, FM Class 3810 – 2005, ANSI/NEMA 250 – 1991, ANSI/IEC 60529 – 2004
Markings: Explosion-Proof for Class I, Division 1, Groups B, C, and D
Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G; and Class III, Division 1.
T5(T_a= -50 °C to +85 °C), Factory Sealed, Enclosure Type 4X

I5 Intrinsically-Safe and Non-incendive
Certificate: 3033457
Standards Used: FM Class 3600 – 1998, FM Class 3610 – 2007, FM Class 3611 – 2004, FM Class 3810 – 2005
Markings: 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; Nonincendive for use in Class I, Division 2, Groups A, B, C and D; in accordance with Control Drawing 02051-1009
T4(-50 °C to +70 °C) Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Special Conditions for Safe Use (X):

1. The Model 2051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.
2. The Model 2051 transmitter with the transient terminal block (Option code T1) will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

Canadian Standards Association (CSA)

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

E6 Explosion-Proof, Dust Ignition Proof
Certificate: 2041384
Standards Used: CSA Std. C22.2 No. 142 - M1987, CSA Std. C22.2 No. 30 - M1986, CSA Std. C22.2 No. 213 - M1987, CAN/CSA-E60079-0:07, CAN/CSA-E60079-1:07
Markings: 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. Class I Zone 1 Ex d IIC T5. Enclosure type 4X, factory sealed. Single Seal.

I6 Intrinsically Safe
Certificate: 2041384
Standards Used: CSA Std. C22.2 No. 142 - M1987, CSA Std. C22.2 No. 213 - M1987, CSA Std. C22.2 No. 157 - 92, CSA Std. C22.2 No. 213 - M1987, ANSI/ISA 12.27.01 - 2003, CAN/CSA-E60079-0:07, CAN/CSA-E60079-11:02
Markings: 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. Class I Zone 1 Ex ia IIC T3C. Single Seal. Enclosure Type 4X.

Europe

I1 ATEX Intrinsic Safety
Certificate: Baseefa08ATEX0129X
Standards Used: EN60079-0:2012, EN60079-11:2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga(–60 °C ≤ T_a ≤ +70 °C)
IP66 IP68
CE 1180

Table 5. Input Parameters

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

Table 6. RTD Assembly (2051CFx Option T or R)

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

Special Condition for Safe Use (X):

1. When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n
Certificate: Baseefa08ATEX0130X
Standards Used: EN60079-0:2012, EN60079-15:2010
Markings: ⟨Ex⟩ II 3 G
Ex nA IIC T4 Gc(–40 °C ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
IP66
CE

Special Condition for Safe Use (X):

1. 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.

E1 ATEX Flame-Proof
Certificate: KEMA 08ATEX0090X
Standards Used: EN60079-0:2009, IEC60079-0:2011, EN60079-1:2007, EN60079-26:2007
Markings: ⟨Ex⟩ II 1/2 G
Ex d IIC T6 Ga/Gb(–50 °C≤ T_a ≤ 65 °C)
Ex d IIC T5 Ga/Gb(–50 °C≤ T_a ≤ 80 °C)
IP66
CE 1180
U_i = 42.4 Vdc

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. In case of repair, Contact Emerson Process Management for information on the dimensions of flameproof joints.

ND ATEX Dust
Certificate: Baseefa08ATEX0182X
Standards Used: EN60079-0:2012, EN 60079-31:2009
Markings: ⟨Ex⟩ II 1 D Ex t IIIC T50 °C T_{500} 60 °C Da
IP66 IP68
U_i = 42.4 Vdc
CE 1180

Special Condition for Safe Use (X):

1. 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

I7 IECEx Intrinsic Safety
Certificate: IECExBAS08.0045X
Standards Used: IEC60079-0:2011, IEC60079-11:2011
Ex ia IIC T4 Ga(–60 °C ≤ T_a ≤ +70 °C)

Table 7. Input Parameters

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

Table 8. RTD Assembly (2051CFx Option T or R)

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

Special Condition for Safe Use (X):

1. When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Flame-Proof
Certificate: IECEx KEM 08.0024X
Standards Used: IEC60079-0:2011, IEC60079-1:2007-04, IEC60079-26:2006
Ex d IIC T6 Ga/Gb(–50 °C ≤ T_a ≤ 65 °C)
Ex d IIC T5 Ga/Gb(–50 °C ≤ T_a ≤ 80 °C)
U_i = 42.4 Vdc

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. In case of repair, Contact Emerson Process Management for information on the dimensions of flameproof joints.

N7 IECEx Type 'n'
Certificate: IECExBAS08.0046X
Standards Used: IEC60079-0: 2011, IEC60079-15: 2010

Ex nA IIC T4 Gc(–40 °C ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max

Special Condition for Safe Use (X):

1. 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.

Inmetro

E2 Flame-Proof
Certificate: CEPEL 09.1767X
Ex d IIC T* Ga/Gb IP66
T6 = -50 °C ≤ T_{amb} ≤ 65 °C
T5 = -50 °C ≤ T_{amb} ≤ 80 °C

I2 Intrinsic Safety
Certificate: CEPEL 09.1768X
Ex ia IIC T4 Ga(–60 °C ≤ T_{amb} ≤ +70 °C)
IP66

China (NEPSI)

E3 Flameproof
NEPSI Certificate: GYJ101321X
Standards Used: GB3836.1-2000, GB3836.2-2000
Markings: Ex d II C T5/T6,
T5: -50 °C ≤ T_a ≤ +80 °C
T6: -50 °C ≤ T_a ≤ +65 °C

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:

   a. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.

   b. 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.

2. The relation between T code and ambient temperature range is:

Transmitter model	T code	Temperature range
Using 644 temperature transmitter	T4	-40 °C ≤ T_a ≤ +65 °C
No 644 temperature transmitter	T5	-50 °C ≤ T_a ≤ +80 °C
	T6	-50 °C ≤ T_a ≤ +65 °C

3. The earth connection facility in the enclosure should be connected reliably.
4. During installation, use and maintenance of the product, observe the warning "Don't open the cover when the circuit is alive".

   During installation, there should be no present mixture harmful to the flameproof housing.
5. The earth connection facility in the enclosure should be connected reliably.

   During installation, use and maintenance of the product, observe the warning "Don't open the cover when the circuit is alive".
6. The earth connection facility in the enclosure should be connected reliably.
7. During installation, use and maintenance of the product, observe the warning "Don't open the cover when the circuit is alive".
8. The earth connection facility in the enclosure should be connected reliably.
9. During installation, use and maintenance of the product, observe the warning "Don't open the cover when the circuit is alive".
10. The earth connection facility in the enclosure should be connected reliably.
11. During installation, use and maintenance of the product, observe the warning "Don't open the cover when the circuit is alive".
12. During installation, there should be no present mixture harmful to the flameproof housing.
13. Cable entry and conduit, certified by NEPSI with type of protection Ex d IIC and appropriate thread form, should be applied when installed in hazardous locations. Blanking elements should be used on the redundant cable entries.
14. End users are not permitted to change any internal components, but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
15. Maintenance should be done in non-hazardous locations.
16. During installation, use and maintenance of this product, observe the following standards:

    GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"

    GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"

    GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"

    GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".

I3 Intrinsic Safety
NEPSI Certificate: GYJ101320X
Standards Used: GB3836.1-2000, GB3836.4-2000
Markings: Ex ia IIC T4
T4: -60 °C ≤ T_a ≤ +70 °C

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:

   a. If the apparatus is fitted with an optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test for 1 minute. This must be taken into account when installing the apparatus.

2. The relation between T code and ambient temperature range is:

Transmitter model		T code	Temperature range
Using 644 temperature transmitter		T4	-40 °C ≤ T_a ≤ +60 °C
No 644 temperature transmitter	No FISCO Version	T4	-60 °C ≤ T_a ≤ +70 °C
	FISCO Version	T4	-60 °C ≤ T_a ≤ +60 °C

3. Intrinsically safe parameters

Transmitter model	Maximum input voltage: U_i (V)	Maximum input current: I_i (mA)	Maximum input power: P_i (W)	Maximum internal parameters:	
				C_i (nF)	L_i (µH)
4-20mA HART	30	200	1	12	0
FOUNDATION Fieldbus	30	300	1.3	0	0
FISCO	17.5	380	5.32	0	0

Note
FISCO parameters apply to both Group IIC and IIB. When 644 Temperature Transmitter is used, the 644 temperature transmitter should be used with Ex-certified associated apparatus to establish an explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of both 644 Temperature Transmitter and associated apparatus. The cables between 644 temperature transmitter and associated apparatus should be shielded cables (the cables must have an insulated shield). The shield has to be grounded reliably in a non-hazardous area.

4. 2051CF series Flowmeter comply with the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance to the FISCO model, FISCO parameters of 2051CF series Flowmeter are listed in the table above.
5. The product should be used with Ex-certified associated apparatus to establish an explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
6. 2051CF series Flowmeter comply with the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance to the FISCO model, FISCO parameters of 2051CF series Flowmeter are listed in the table above.
7. The product should be used with Ex-certified associated apparatus to establish an explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
8. The cables between this product and associated apparatus should be shielded cables (the cables must have insulated shields). The shield has to be grounded reliably in a non-hazardous area.
9. End users are not permitted to change any internal components, but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
10. During installation, use and maintenance of this product, observe the following standards:

    GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"

    GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"

    GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"

    GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".

Combinations

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

K5 Combination of E5 and I5

K6 Combination of I6 and E6

K7 Combination of E7, I7, and N7

KA Combination of E1, I1, E6, and I6

KB Combination of E5, I5, E6, and I6

KC Combination of E1, I1, E5, and I5

KD Combination of E1, I1, E5, I5, E6, and I6

2051CF Fieldbus protocol

Hazardous locations certifications

North America

FM approvals

E5 Explosion-Proof and Dust-Ignition-Proof
Certificate: 3032938
Standards Used: FM Class 3600 – 1998, FM Class 3615 – 2006, FM Class 3810 – 2005, ANSI/NEMA 250 – 1991, ANSI/IEC 60529 – 2004
Markings: Explosion-Proof for Class I, Division 1, Groups B, C, and D
Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G; and Class III, Division 1.
T5(T_a= -50 °C to +85 °C), Factory Sealed, Enclosure Type 4X

IE/I5 Intrinsically Safe and Non-incendive
Certificate: 3033457
Standards Used: FM Class 3600-1998, FM Class 3610-2007, FM Class 3611-2004, FM Class 3810-2005
Markings: 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; Nonincendive for use in Class I, Division 2, Groups A, B, C and D; in accordance with Control Drawing 02051-1009.

For FOUNDATION fieldbus and PROFIBUS PA, Temperature Code: T4(T_a = -50 °C to +70 °C)

For FISCO,
Temperature Code: T4(T_a = -50 °C to +60 °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, Dust Ignition Proof
Certificate: 2041384
Standards Used: CSA Std. C22.2 No. 142 - M1987, CSA Std. C22.2 No. 30 - M1986, CSA Std. C22.2 No. 213 - M1987, CAN/CSA-E60079-0:07, CAN/CSA-E60079-1:07
Markings: Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignitions 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. Class I Zone 1 Ex d IIC T5. Enclosure type 4X, factory sealed. Single Seal.

I6/IF Intrinsically Safe
Certificate: 2041384
Standards Used: CSA Std. C22.2 No. 142 - M1987, CSA Std. C22.2 No. 213 - M1987, CSA Std. C22.2 No. 157 - 92, CSA Std. C22.2 No. 213 - M1987, ANSI/ISA 12.27.01 - 2003, CAN/CSA-E60079-0:07, CAN/CSA-E60079-11:02
Markings: 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. Class I Zone 1 Ex ia IIC T3C. Single Seal. Enclosure Type 4X.

Europe

I1 ATEX Intrinsic Safety
Certificate: Baseefa08ATEX0129X
Standards Used: EN60079-0:2012, EN60079-11:2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga(–60 °C ≤ T_a ≤ +70 °C)
IP66 IP68
CE 1180

Table 9. Input Parameters

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

Table 10. RTD Assembly (2051CFx Option T or R)

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

Special Condition for Safe Use (X):

1. When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

IA ATEX FISCO Intrinsic Safety
Certificate: Baseefa08ATEX0129X
Standards Used: EN60079-0:2012, EN60079-11:2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga(–60 °C ≤ T_a ≤ +60 °C)
IP66 IP68
1180

Table 11. Input Parameters

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

Table 12. RTD Assembly (2051CFx Option T or R)

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

Special Condition for Safe Use (X):

1. When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n
Certificate: Baseefa08ATEX0130X
Standards Used: EN60079-0:2012, EN60079-15:2010
Markings: ⟨Ex⟩ II 3 G
Ex nA IIC T4 Gc(–40 °C ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
IP66 CE

Special Condition for Safe Use (X):

1. 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.

E1 ATEX Flame-Proof
Certificate: KEMA 08ATEX0090X
Standards Used: EN60079-0:2009, IEC60079-0:2011, EN60079-1:2007, EN60079-26:2007
Markings: ⟨Ex⟩ II 1/2 G
Ex d IIC T6 Ga/Gb(–50 °C ≤ T_a ≤ 65 °C)
Ex d IIC T5 Ga/Gb(–50 °C ≤ T_a ≤ 80 °C)
IP66
CE 1180
Ui = 32 Vdc

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. In case of repair, Contact Emerson Process Management for information on the dimensions of flameproof joints.

ND ATEX Dust
Certificate: Baseefa08ATEX0182X
Standards Used: EN60079-0:2012, EN 60079-31:2009
Markings: ⟨Ex⟩ II 1 D Ex t IIIC T50 °C T_{500} 60 °C Da
IP66 IP68
U_i = 42.4 Vdc
CE 1180

Special Condition for Safe Use (X):

1. 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

I7 IECEx Intrinsic Safety
Certificate: IECExBAS08.0045X
Standards Used: IEC60079-0:2011, IEC60079-11:2011
Ex ia IIC T4 Ga(–60 °C ≤ T_a ≤ +70 °C)

Table 13. Input Parameters

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

Table 14. RTD Assembly (2051CFx Option T or R)

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

Special Condition for Safe Use (X):

1. The device is not capable of withstanding the 500 V insulation test required by IEC60079-11. This must be taken into account when installing the apparatus.

IG IECEx FISCO Intrinsic Safety
Certificate: IECExBAS08.0045X
Standards Used: IEC60079-0:2011, IEC60079-11:2011
Ex ia IIC T4 Ga(-60 °C ≤ T_a ≤ +60 °C)
IP66
CE 1180

Table 15. Input Parameters

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

Table 16. RTD Assembly (2051CFx Option T or R)

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

Special Condition for Safe Use (X):

1. The device is not capable of withstanding the 500 V insulation test required by IEC 60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Flame-Proof
Certificate: IECEx KEM 08.0024X
Standards Used: IEC60079-0:2011, IEC60079-1:2007-04, IEC60079-26:2006
Ex d IIC T6 Ga/Gb(–50 °C ≤ T_a ≤ 65 °C)
Ex d IIC T5 Ga/Gb(–50 °C ≤ T_a ≤ 80 °C)
U_i = 32 Vdc

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. In case of repair, Contact Emerson Process Management for information on the dimensions of flameproof joints.

N7 IECEx Type 'n'
Certificate: IECExBAS08.0046X
Standards Used: IEC60079-0: 2011, IEC60079-15: 2010
Ex nA IIC T4 Gc(–40 °C ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max

Special Condition for Safe Use (X):

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

Inmetro

E2 Flameproof
Certificate: CEPEL 09.1767X
Ex d IIC T* Ga/Gb IP66
T6 = -50 °C < T_{amb} < 65 °C
T5 = -50 °C < T_{amb} < 80 °C

I2 Intrinsic Safety
Certificate: CEPEL 09.1768X
Ex ia IIC T4 Ga(–60 °C ≤ T_{amb} ≤ 70 °C)
IP66

IB FISCO Intrinsic Safety
Certificate: CEPEL 09.1768X
Ex ia IIC T4 Ga(–60 °C ≤ T_{amb} ≤ 60 °C)
IP66

China (NEPSI)

E3 Flameproof
NEPSI Certificate: GYJ101321X
Standards Used: GB3836.1-2000, GB3836.2-2000
Markings: Ex d II C T5/T6,
T5: -50 °C ≤ T_a ≤ +80 °C
T6: -50 °C ≤ T_a ≤ +65 °C

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:

   a. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.

   b. 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.
2. The relation between T code and ambient temperature range is:

Transmitter model	T code	Temperature range
Using 644 temperature transmitter	T4	-40 °C ≤ T_a ≤ +65 °C
No 644 temperature transmitter	T5	-50 °C ≤ T_a ≤+80 °C
	T6	-50 °C ≤ T_a ≤ +65 °C

3. The earth connection facility in the enclosure should be connected reliably.
4. During installation, use and maintenance of the product, observe the warning "Don't open the cover when the circuit is alive".
5. During installation, there should be no present mixture harmful to the flameproof housing.
6. Cable entry and conduit, certified by NEPSI with type of protection Ex d IIC and appropriate thread form, should be applied when installed in hazardous locations. Blanking elements should be used on the redundant cable entries.
7. End users are not permitted to change any internal components, but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
8. Maintenance should be done in non-hazardous locations.
9. During installation, use and maintenance of this product, observe the following standards:

   GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"

   GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"

   GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"

   GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".

I3 Intrinsic Safety
NEPSI Certificate: GYJ101320X
Standards Used: GB3836.1-2000, GB3836.4-2000
Markings: Ex ia IIC T4
T4: -60 °C ≤ T_a ≤ +70 °C
T4: -60 °C ≤ T_a ≤ +60 °C (FISCO)

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:

   a. If the apparatus is fitted with an optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test for 1 minute. This must be taken into account when installing the apparatus.

2. The relation between T code and ambient temperature range is:

Transmitter model		T code	Temperature range
Using 644 temperature transmitter		T4	-40 °C ≤ T_a ≤ +60 °C
No 644 temperature transmitter	No FISCO Version	T4	-60 °C ≤ T_a ≤ +70 °C
	FISCO Version	T4	-60 °C ≤ T_a ≤ +60 °C

3. Intrinsically safe parameters

Transmitter model	Maximum input voltage: U_i (V)	Maximum input current: I_i (mA)	Maximum input power: P_i (W)	Maximum internal parameters	
				C_i (nF)	L_i (µH)
4-20mA HART	30	200	1	12	0
FOUNDATION fieldbus	30	300	1.3	0	0
FISCO	17.5	380	5.32	0	0

Note
FISCO parameters apply to both Group IIC and IIB.

When 644 Temperature Transmitter is used, the 644 temperature transmitter should be used with Ex-certified associated apparatus to establish an explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of both 644 temperature transmitter and associated apparatus. The cables between 644 temperature transmitter and associated apparatus should be shielded cables (the cables must have an insulated shield). The shield has to be grounded reliably in a non-hazardous area.

4. 2051CF Series Flowmeter comply with the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance to the FISCO model, FISCO parameters of 2051CF series Flowmeter are listed in the table above.
5. The product should be used with Ex-certified associated apparatus to establish an explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
6. The cables between this product and associated apparatus should be shielded cables (the cables must have insulated shields). The shield has to be grounded reliably in a non-hazardous area.
7. End users are not permitted to change any internal components, but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
8. During installation, use and maintenance of this product, observe the following standards:

   GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"

   GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"

   GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"

   GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".

Combinations

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

K5 Combination of E5 and I5

K6 Combination of I6 and E6

K7 Combination of E7, I7, and N7

KA Combination of E1, I1, E6, and I6

KB Combination of E5, I5, E6, and I6

KC Combination of E1, I1, E5, and I5

KD Combination of E1, I1, E5, I5, E6, and I6

Pipe I.D. Range Codes

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			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
	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

	Line size			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
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

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 145
Dimensional Drawings: page 217
Installation and Flowmeter Orientation: page 189

Ordering information

Table 1. 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		
L	Liquid	★
G	Gas	★
S	Steam	★
Line size		
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)	★
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)	

Table 1. 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.

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 (see “Pipe I.D. Range Code” on page 148**)**		
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
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		
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0[(1)]	No mounting (customer supplied)	★
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping orientation		
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar type		
P	Pak-Lok	★
F	Flanged with opposite side support	★
T[(2)]	Threaded	★
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	

Table 1. 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.

Sensor material				
S	316 Stainless Steel			★
H	Alloy C-276			
Sensor size				
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				
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			★
Mounting type				
A9[3]	900# RF ANSI			
AF[3]	1500# RF ANSI			
AT[3]	2500 # RF ANSI			
R1	150# RTJ Flange			
R3	300# RTJ Flange			
R6	600# RTJ Flange			
R9[3]	900# RTJ Flange			
RF[3]	1500# RTJ Flange			
RT[3]	2500# RTJ Flange			
Opposite side support or packing gland				
0	No opposite side support or Packing Gland (required for Pak-Lok, Flange-Lok, and Threaded 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			
	Packing Gland Material	*Rod Material*	*Packing Material*	
J[4]	Stainless Steel Packing Gland/Cage Nipple	Carbon Steel	PTFE	
K[4]	Stainless Steel Packing Gland/Cage Nipple	Stainless Steel	PTFE	

Table 1. 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.

L[(4)]	Stainless Steel Packing Gland/Cage Nipple	Carbon Steel	Graphite	
N[(4)]	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				
0[(1)]	Not Applicable or Customer Supplied			★
1	Gate Valve, Carbon Steel			
2	Gate Valve, Stainless Steel			
5	Ball Valve, Carbon Steel			
6	Ball Valve, Stainless Steel			
Temperature measurement				
T	Integral RTD – not available with Flanged model greater than class 600#			★
0	No Temperature Sensor			★
R	Remote Thermowell and RTD			
Transmitter connection platform				
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			★
6	Direct-mount, High Temperature 5-valve Manifold– not available with Flanged model greater than class 600			
8	Remote-mount SW Connections			
A	Remote-mount NPT Connections, integral needle valves			★
B	Remote-mount SW Connections, integral needle valves			★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Pressure testing		
P1[(5)]	Hydrostatic Testing with Certificate	
PX[(5)]	Extended Hydrostatic Testing	
Special cleaning		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 level D (section 11.4)	
Material testing		
V1	Dye Penetrant Exam	

Table 1. 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 examination		
V2	Radiographic Examination	
Flow calibration		
W1	Flow Calibration (Average K)	
WZ	Special Calibration	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface finish		
RL	Surface finish for Low Pipe Reynolds Number in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	★
Material traceability certification		
Q8[(6)]	Material Traceability Certificate per EN 10204:2004 3.1	★
Code conformance		
J2[(7)]	ANSI/ASME B31.1	
J3[(7)]	ANSI/ASME B31.3	
Materials conformance		
J5[(8)]	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Installed in flanged pipe spool section		
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[(9)]		
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
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		
Y1	Mounting Hardware Shipped Separately	★

Table 1. 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.

Attach to		
H1	Attach to Transmitter	
Special dimensions		
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) For Pak-Lok, Flanged, Threaded, and Flange-Lok, this note is only applicable if pipe material/assembly material is 0. For Flo-Taps, this note is applicable if either pipe material/assembly material is 0, or if Isolation valve is 0. Provide the "A" dimension for Flanged (page 220), Flange-Lok (page 219), Pak-Lok (page 217), Threaded (page 218) and Threaded Flo-Tap models (page 223). Provide the "B" dimension for Flanged Flo-Tap models (page 221).

(2) Only available in China.

(3) Available in remote mount applications only.

(4) The cage nipple is constructed of 304SST.

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

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

(7) Not available with Transmitter Connection Platform 6.

(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.

(9) Not available with transmitter connections platforms A and B.

Specifications

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 2. 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. To complete the Configuration Data Sheet go to:
http://www3.emersonprocess.com/Rosemount/DP_Flow/Application/Pages/PCDefault.aspx

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.

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
- 600 °F (315 °C) for Threaded Annubar Type

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.

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).

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 217.

Pak-Lok model (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)

Threaded model (Option T)

- Provided with a compression sealing mechanism rated up to 600# ANSI (1440 psig at 100 °F [99 bar at 38 °C])
- -20 to 600 °F (-28 to 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). Standard bolting provided is Carbon Steel (A193 B7/A194 2H). Standard gaskets provided are spiral wound 304SST flexible graphite filled.
- 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). Standard bolting provided is Carbon Steel (A193 B7/A194 2H). Standard gaskets provided are spiral wound 304SST flexible graphite filled.
- –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]	Threaded	Flange-Lok	Flange	Manual and gear drive Flo-Tap
T1[1]	Pak-Lok Body	X				
	Threaded Body[2]		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 and electronics connection platform temperature ranges

Table 3. 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)
A	Integral Needle Valves, Stainless Steel, Remote-mount NPT Connections	–20 to 450 °F (–29 to 232 °C)
B	Integral Needle Valves, Stainless Steel, Remote-mount SW Connections	–20 to 450 °F (–29 to 232 °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 4. Flanged Pipe Spool Section Schedule

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

Table 5. 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)

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			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
	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

	Line size			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
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

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 156
Dimensional Drawings: page 224
Installation and Flowmeter Orientation: page 189

Ordering information

Table 6. 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		
S[(1)(2)]	Severe Service Annubar	★
M[(3)]	Main Steam Line Annubar	
Fluid type		
L	Liquid	★
G	Gas	★
S	Steam	★
Annubar type		
F	Flanged with Opposite Side Support	★
L	Main Steam Annubar with Opposite Side Support	
G	Gear-Drive Flo-Tap	
Line size		
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)	★
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	

Table 6. 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.

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)	
Line size		
480	48-in. (1210 mm)	
600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
840	84-in. (2100 mm)	
960	96-in. (2400 mm)	
Mounting assembly material		
C	Carbon Steel (A105)	★
S	316/316L Stainless Steel	★
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		
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Sensor material		
S	316/316L Stainless Steel	★
H[5]	Alloy C-276	
W[3][5]	Alloy 800H	
K[5]	PVDF	
Sensor size		
11	Sensor size 11	★
22[6]	Sensor size 22	★
44[2][3]	Sensor size 44	

Table 6. 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.

Mounting type		
A	ANSI B16.5 Raised Face Flanges	★
D[7]	DIN Raised Face Flanges	★
R[8]	ANSI B16.5 Ring Type Joint Flanges	
0[3]	Main Steam Packing Gland	
Mounting pressure class		
1	ANSI 150/DIN PN16	★
3[6]	ANSI 300/DIN PN40	★
6[6]	ANSI 600/DIN PN100	★
N[5][6]	ANSI 900	
F[5][6]	ANSI 1500	
T[5][6]	ANSI 2500	
0[3][5][6]	Main Steam Packing Gland	
Opposite side support		
C[9]	NPT Threaded Opposite Support Assembly	★
D[3]	Welded Opposite Support Assembly	★
Opposite side support		
E	Flanged Opposite Support Assembly	
0[2]	No Opposite Side Support Required	
Packing gland/packing		
0[1]	Not Applicable	★
L[2]	SS Packing Gland/Graphite Packing	
T[3]	Main Steam Packing Gland/Graphite Packing	
Insertion mechanism		
0[1][3]	Not Applicable	★
C	Alloy Steel Insertion Rods/Nuts	
S	Stainless Steel Insertion Rods/Nuts	
Isolation valve		
0[1][3]	Not Applicable or Customer Supplied	★
1	Gate Valve, Carbon Steel	
2	Gate Valve, Stainless Steel	
5	Ball Valve, Carbon Steel	
6	Ball Valve, Stainless Steel	

Table 6. 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.

Temperature measurement		
0	No Temperature Sensor Required	★
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		
3[6][10][11]	Direct-Mount, 3-Valve Manifold	★
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		
A	193 Gr B7 Studs w/ A194 Gr 2H Nuts	★
0	No Flange Studs/Nuts Supplied	★
Mounting flange gasket materials		
1	Spiral Wound, 304SS, Flexible-Graphite Filler	★
0	No Flange Gasket Supplied	★
2	Ring-Joint, ANSI B16.20, Hexagonal, 316L	
3	Spiral Wound, B16.20, 316SS, PTFE Filler	

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Optional mounting for rectangular ducts		
RD	Annubar Mounting for rectangular ducts	
Pressure testing		
P1[13]	Hydrostatic Testing with Certificate	
PX	Extended Hydrostatic Testing	
Special cleaning		
PA[6][14]	Cleaning per ASTM G93 Level D (section 11.4)	
Material testing		
V1	Dye Penetrant Weld Exam	
Material examination		
V2	Radiographic Weld Examination	

Table 6. 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.

Flow calibration		
W1	Flow Calibration (Average K)	
Special inspection		
QC1	Visual & Dimensional Inspection w/ Cert.	★
QC7	Inspection & Performance Certificate	★
Material traceability certification		
Q8[15]	Material Traceability Certification per EN 10204:2004 3.1	★
Positive material testing		
V4[15]	Positive Material Identification	
Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance		
J5[16]	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration Certificate	
Instrument valves for remote mount option		
G2	1/2-in. Needle Valves, SS	★
G6	1/2-in. OS&Y Gate Valve, SS	★
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	
Instrument valve options		
DV[17]	Double Instrument Valves (4 valves total)	★
Special shipment		
Y1	Mounting Hardware Shipped Separately	★
Assemble mounting hardware		
WP[18]	Assemble Weldolet to Packing body	
Special dimensions		
VM	Variable Mounting	
585 packing gland plug		
TP[18]	Packing Gland Plug for Steam Blow Down	

Table 6. 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.

585 installation alignment bar		
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.

Specifications

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 7. 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. To complete the Configuration Data Sheet go to: http://www3.emersonprocess.com/Rosemount/DP_Flow/Application/Pages/PCDefault.aspx

Flow turndown
10:1 or better

Functional specifications

Service

- Liquid
- Gas
- Steam

Process temperature limits

Table 8. 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 9. 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 (Option code K)	250 °F (121 °C)

Pressure and temperature limits

Table 10. 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 11. 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	150# ANSI
Flanged Flo-Tap (Option Code G)	316 SST	600# ANSI

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

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 224.

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: -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 team	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

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 or Annubar® Primary Element Technology
- 405P/C orifice primary elements are based on ASME/ISO corner tap design
- Available in 1/2 to 12-in. (15 - 300 mm) line sizes

Additional information
Specifications: page 162
Dimensional drawings: page 227
Installation and flowmeter orientation: page 189

Ordering information

Table 1. Rosemount 405 Compact 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		
A	Annubar Sensor Size 1	★
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material type		
S	316 SST	★
Line size		
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(2)(3)	10-in. (250 mm)	★
120(2)(3)	12-in. (300 mm)	★
Temperature measurement		
T(4)	Integral RTD	★
N	No Temperature Measurement	★
R	Remote Thermowell and RTD	

Table 1. Rosemount 405 Compact 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.

Primary element type		
000	Annubar Sensor Size 1	★
040	0.40 Beta Ratio (β)	★
050	0.50 Beta Ratio (β)	★
065[5]	0.65 Beta Ratio (β)	★
Transmitter connection		
D3	Direct mount	★
R3	Remote mount, NPT connections	★
A3[6]	Traditional, Direct mount, 3-valve Integral Manifold with adapter plate, SST	

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Installation accessories		
A[2]	ANSI Alignment Ring (150#)	★
C[2]	ANSI Alignment Ring (300#)	★
D[2]	ANSI Alignment Ring (600#)	★
G	DIN Alignment Ring (PN 16)	★
H	DIN Alignment Ring (PN 40)	★
J	DIN Alignment Ring (PN 100)	★
B	JIS Alignment Ring (10K)	
R	JIS Alignment Ring (20K)	
S	JIS Alignment Ring (40K)	
Remote adapters		
E	Flange adapters 316 SST ($^1/_2$-in. NPT)	★
High temperature application		
T	Graphite valve packing (Tmax = 850 °F)	
Flow calibration		
WC[7]	Flow Calibration, 3 Pt, Conditioning Orifice Option C (all pipe schedules)	
WD[8][9]	Flow Calibration, 10 Pt, Conditioning Option C (all schedules), Annubar Option A (Schedule 40)	
Pressure testing		
P1	Hydrostatic testing	

Table 1. Rosemount 405 Compact 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.

Special cleaning		
P2[10]	Cleaning for Special Processes	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Special inspection		
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Material traceability certification		
Q8	Material Traceability Certification per EN10204:2004 3.1	★
Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance		
J5[11]	NACE MR-0175/ISO 15156	
Country certification		
J1	Canadian Registration	
Typical model number: 405 C S 040 N 040 D3		

(1) Available with primary element technology P only.

(2) For the 10-in. (250 mm) and 12-in. (300 mm) line size, the alignment ring must be ordered (Installation Accessories).

(3) 10-in. (250 mm) and 12-in. (300 mm) line sizes not available with Primary Element Technology A.

(4) Available with primary element technology A only.

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

(6) A3 transmitter connection available with primary element technology C or P only.

(7) Available with primary element technology C only.

(8) Available with primary element technology C or A only.

(9) For Annubar Option A, consult factory for pipe schedules other than Sch. 40.

(10) Available with primary element technology C or P only.

(11) 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.

Specifications

Performance specifications

Table 2. 405C Compact Conditioning Orifice Technology

Beta ratio	Discharge coefficient uncertainty
β = 0.40	±0.50%
β = 0.50	±1.00%
β = 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 3. 405P Compact Orifice Technology

Line size	Discharge coefficient uncertainty
1/2-in.(15 mm)	±2.25%
1 to 1 1/2-in. (25 to 40 mm) line size	±1.75%
2 to 12-in. (50 to 300 mm) line size	±1.25%

Table 4. 405A Compact Annubar Technology

K Factor uncertainty		
All Sizes	Standard	±1.50%
	Calibrated	±0.75%

Line sizes

- 1/2-in. (15 mm) – not available for the 405C and 405A
- 1-in. (25 mm) – not available for the 405C and 405A
- 1 1/2-in. (40 mm) – not available for the 405C and 405A
- 2-in. (50 mm)
- 3-in. (80 mm)
- 4-in. (100 mm)
- 6-in. (150 mm)
- 8-in. (200 mm)
- 10-in. (250 mm) – not available for the 405A
- 12-in. (300 mm) – not available for the 405A

Sizing

Contact an Emerson Process Management sales representative assistance. A “Configuration Data Sheet” is required prior to order for application verification. To complete the Configuration Data Sheet go to: http://www3.emersonprocess.com/Rosemount/DP_Flow/Application/Pages/PCDefault.aspx

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 for primary element technology C and P for all sizes

Table 5. Maximum Allowable DP (Measurement in inH_2O [bar])

Max DP < 400 °F (200 °C)	**Max DP = 400-800** °F (200-454 °C)
800 inH_20 (2bar)	400 inH_20 (1bar)

Differential pressure limits for primary element technology A

Table 6. Maximum Allowable DP (Measurement in inH_2O [bar])

Line size	**Max DP @ < 450** °F (200 °C)	**Max DP @ 450-850** °F (200-454 °C)
2-in. (50 mm)	1500 (3.73)	1500 (3.73)
3-in. (80 mm)	900 (2.24)	790 (1.97)
4-in. (100 mm)	570 (1.42)	500 (1.24)
6-in. (150 mm)	290 (0.72)	250 (0.62)
8-in. (200 mm)	190 (0.47)	160 (0.40)
10-in. (250 mm)	130 (0.32)	110 (0.27)
12-in. (300 mm)	100 (0.25)	80 (0.20)

Maximum working pressure

Pressure retention per ANSI B16.5 600# or DIN PN100

Vibration effect for 405A, 405C, and 405P

Qualified per IEC61298-3 (2008) for field with general application or pipeline with low vibration level (10-1000 Hz test frequency range, 0.15 mm displacement peak amplitude, 20 m/s^2 acceleration amplitude).(1)

The weight and length of the transmitter assembly shall not exceed 9.8 lbs (4.45 kg) and 8.60-in. (218.44 mm).

(1) Stainless steel temperature housing is not recommended with primary element technology A in applications with mechanical vibration.

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.

Physical specifications

Temperature measurement for primary element technology P and C

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, 3051CFC, or 2051CFC Compact Orifice Flowmeter models.

Temperature measurement for primary element technology A

Integral RTD

100 Ohm platinum RTD

4-wire RTD (a = 0.00385)

Physical details

Body

- 316/316L SST

Manifold Head/Valves

- 316 SST

Orifice Plate for primary element technologies C and P

- 50 micro-inch Ra surface finish

Annubar Primary Element for primary element technology A

- Roughened surface finish

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.
- Gaskets and O-rings are available as spare parts

Note

Gaskets and O-rings should be replaced when the 405 is disassembled.

Transmitter connections

Direct mount

- Available with 3051SMV, 3051S, 3051, and 2051 transmitters, ranges 1, 2, and 3.

Remote mount

- Primary element technology C or P available with 1/4-in. NPT (standard) or 1/2-in. NPT (Option Code E) connections
- Remote Mount transmitter connections available with 1/2-in. NPT for primary element technology A

Orifice plate design

Orifice type

- Square edged

Orifice pressure Taps

- Corner

Alignment rings

Table 7. 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[1], 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.

(1) Based on Schedule 40.

Table 8. 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)	1.213 (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.

Table 9. β = 0.50 (Measurement in Inches [mm])[1]

Line size	405C	405P
1/2-in. (15 mm)	Not Available	0.311 (7.899)
1-in. (25 mm)	Not Available	0.525 (13.335)
1 1/2-in. (40 mm)	Not Available	0.805 (20.447)
2-in. (50 mm)	0.517 (13.125)	1.034 (26.264)
3-in. (80 mm)	0.767 (19.481)	1.534 (38.963)
4-in. (100 mm)	1.007 (25.565)	2.013 (51.130)
6-in. (150 mm)	1.516 (38.512)	3.033 (77.038)
8-in. (200 mm)	1.995 (50.679)	3.991 (101.371)
10-in. (250 mm)	2.505 (63.627)	5.010 (127.254)
12-in. (300 mm)	3.000 (76.200)	6.000 (152.400)

(1) Tolerance = ±0.002-in.

Table 10. 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)	1.971 (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.

(2) For 2-in. (50 mm) line size, the Beta (β) = 0.60.

Table 11. 405 P or C 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)

Table 12. 405A Weight (Measurement in lb. [kg])

Line size	Direct mount (D3)	Remote mount (R3)
2-in. (50 mm)	5.59 (2.53)	7.26 (3.29)
3-in. (80 mm)	7.41 (3.36)	9.08 (4.12)
4-in. (100 mm)	9.18 (4.16)	10.85 (4.92)
6-in. (150 mm)	13.10 (5.94)	14.76 (6.70)
8-in. (200 mm)	17.12 (7.77)	18.78 (8.52)

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 most flow disturbances
- Suitable for most gas, liquid, and steam applications
- Available in 2 to 24-in. (50 - 600 mm) line sizes

Additional Information
Specifications: page 168
Dimensional Drawings: page 229
Installation and Flowmeter Orientation: page 189

Ordering information

Table 1. 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		
P	Paddle, Square Edged	★
U[(1)(2)]	Universal, Square Edged	★
Line size		
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)	★
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		
A1	ANSI Class 150 Raised Face (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	★

Table 1. 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.

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)			★
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)			
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				
S	316/316L Stainless Steel			★
M	Alloy 400			
H	Alloy C-276			
Orifice plate thickness		**Plate type P**	**Plate type U**	
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)	★
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				
020	0.20 Beta Ratio			★
040	0.40 Beta Ratio			★
050	0.50 Beta Ratio			★
065	0.65 Beta Ratio (0.60 beta ratio for Line Size option 020 only)			★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Flow calibration		
WD	Discharge Coefficient Verification (full 10 points)	
Plate holder		
PH[(1)]	Plate Holder for Universal Type Orifice Plate for use with RTJ flange or section	

Table 1. 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.

Special cleaning		
P2	Cleaning for Special Services	
Special inspection		
QC1	Visual and dimensional Inspection with certification	★
QC7	Inspection and performance certificate	★
Material traceability certification		
Q8	Material Certification per ISO 10474 3.1-B and EN 10204 3.1	★
Code conformance		
J5(3)	NACE MR-0175/ISO 15156	
Country certification		
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.

Specifications

Performance specifications

Flow coefficient uncertainty

Table 2. Discharge Coefficient Uncertainty

Beta ratio (1)	Cd uncertainty(2)	
	With WD calibration	Standard
β = 0.20	±0.50%	± 0.50%
β = 0.40	±0.50%	±1.00%
β = 0.50	±1.00%	±1.50%
β = 0.65	±1.00%	±1.50%

(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. To complete the Configuration Data Sheet go to: http://www3.emersonprocess.com/Rosemount/DP_Flow/Application/Pages/PCDefault.aspx

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 any of 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.

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

Physical specifications

Material of construction

Table 3. 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 N10376	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.

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). Table 4 shows the diameter of each of the four orifice holes.

Table 4. Typical Orifice Hole Sizes

Line size	Pipe ID	Beta (β) = 0.20 d	Beta (β) = 0.40 d	Beta (β) = 0.50 d	Beta (β) = 0.65 d
2-in. (50.8 mm)	2.067-in. (52.502 mm)	0.207 (5.26)	0.413 (10.49)	0.517 (13.13)	0.620 (15.75)(1)
3-in. (76.2 mm)	3.068-in. (77.927 mm)	0.307 (7.80)	0.614 (15.60)	0.767 (19.48)	0.997 (25.32)
4-in. (101.6 mm)	4.026-in. (102.26 mm)	0.403 (10.25)	0.805 (20.45)	1.007 (25.57)	1.308 (32.22)
6-in. (152.4 mm)	6.065-in. (154.051 mm)	0.607 (15.42)	1.213 (30.81)	1.516 (38.52)	1.971 (50.06)
8-in. (203.2 mm)	7.981-in. (202.717 mm)	0.798 (20.27)	1.596 (40.54)	1.995 (50.68)	2.594 (65.89)
10-in. (254.0 mm)	10.02-in. (254.508 mm)	1.002 (25.45)	2.004 (50.90)	2.505 (63.63)	3.257 (82.73)
12-in. (304.8 mm)	12.00-in. (304.8 mm)	1.200 (30.48)	2.400 (60.96)	3.000 (76.2)	3.900 (99.06)
14-in. (355.6 mm)	13.124-in. (333.35 mm)	1.312 (33.32)	2.625 (66.68)	3.281 (83.34)	4.265 (108.33)
16-in. (406.4 mm)	15.000-in. (381.00 mm)	1.500 (38.10)	3.000 (76.20)	3.750 (95.25)	4.875 (123.83)
18-in. (457.2 mm)	16.876-in. (428.65 mm)	1.688 (42.88)	3.375 (85.73)	4.219 (107.16)	5.485 (139.32)
20-in. (508.0 mm)	18.812-in. (477.82 mm)	1.881 (47.78)	3.762 (95.55)	4.703 (119.46)	6.114 (155.30)
24-in. (609.6 mm)	22.624-in. (574.65 mm)	2.262 (57.45)	4.525 (114.94)	5.656 (143.66)	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 175
Dimensional Drawings: page 233
Installation and Flowmeter Orientation: page 189

Ordering information

Table 1. 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		
S	316 SST	★
Line size		
005	$^1/_2$-in. (15 mm)	★
010	1-in. (25 mm)	★
015	$1^1/_2$-in. (40 mm)	★
Process connection		
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	★
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	

Table 1. 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.

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		
S	316 SST	★
H	Alloy C-276	
M	Alloy 400	
Bore size option		
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	★
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		
C	316 SST (1 1/2-in. transmitter studs)	★
G[(2)]	High temperature (850 °F [454 °C])	

Table 1. 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.

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Temperature sensor		
S[(3)]	Thermowell and RTD (SST Temperature Housing)	
T[(3)]	Thermowell and RTD (Aluminum Temperature Housing)	
Assemble to transmitter		
S4[(4)]	Factory assembly – Attach to transmitter and manifold	
Optional bore calculation		
BC	Bore Calculation	★
Optional connection		
G1	DIN 19213 Transmitter Connection	★
Adapters for remote mounting		
G2	1/2–14 NPT Remote Adapters – SST	★
G3	1/2–14 NPT Remote Adapters – Alloy C-276	
Pressure testing		
P1[(5)]	Hydrostatic Testing with Certificate	
Special cleaning		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Material testing		
V1	Dye Penetrant Exam	
Material examination		
V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)	
Flow calibration		
WD[(6)]	Discharge Coefficient Verification	
WZ[(6)]	Special Calibration	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★

Table 1. 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.

Material traceability certification		
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code conformance		
J2(7)	ANSI/ASME B31.1	
J3(7)	ANSI/ASME B31.3	
J4(7)	ANSI/ASME B31.8	
Materials conformance		
J5(8)	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Hardware adjustments and ground screw		
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 or 1.5" Line Option.

(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, 0034, 0066, or 0109.

(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.

Specifications

Performance specifications

Table 2. Discharge Coefficient Uncertainty(1)

Orifice plate bore	Discharge coefficient uncertainty
Bore < 0.160	±2.50%
0.160 ≤ Bore < 0.500	±1.50%
0.500 ≤ Bore ≤ 1.000	±1.00%
1.000 < Bore	±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.

Line sizes

- 1/2-in. (15 mm)
- 1-in. (25 mm)
- 1 1/2-in. (40 mm)

Sizing

Contact an Emerson Process Management sales representative for assistance. A "Configuration Data Sheet" is required prior to order for application verification. To complete the Configuration Data Sheet go to: http://www3.emersonprocess.com/Rosemount/DP_Flow/Application/Pages/PCDefault.aspx

Functional specifications

Service

- Liquid
- Gas
- Steam

Process temperature limits

Standard (direct/remote mount)

- –40 °F to 450 °F (–40 °C to 232 °C)

Extended (remote mount only with option code G):

- –148 °F to 850 °F (–100 °C to 454 °C)

Maximum working pressure

- Pressure retention per ANSI B16.5 600# or DIN PN100

Table 3. 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.

Physical specifications

Material of construction

Orifice Plate

- 316/316L SST
- Alloy C-276
- 316 SST (CF8M)
- A312 Gr 316/316L

Flange

- A182 Gr 316/316L
- Flange pressure limits are per ANSI B16.5
- Flange face finish per ANSI B16.5, 125 to 250 RMS

Body Bolts/Studs

- Alloy 400 Body
- 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
- Alloy X-750 provided for high temperature Option Code G
- Gaskets and O-rings must be replaced each time the 1195 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 4. Overall Length Dimension

Overall length dimension	Line size		
	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).

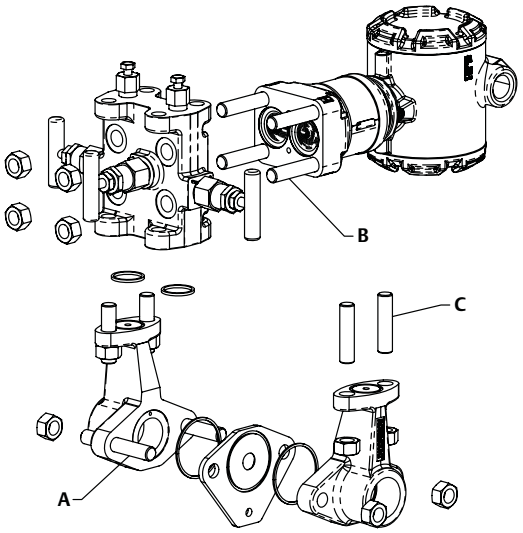
Table 5. Torque Values of Standard Bolts

Stud and 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.

Figure 1. Bolt Types



A. Orifice Body Bolts (2X)
B. Transmitter Bolts (4X)
C. Manifold Bolts (4X)

Table 6. Weight (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.

Ordering information

Table 1. 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		
PC	Paddle, Concentric with better than 50 Ra (1.25 µm) finish	★
PG	Paddle, concentric, with 125-250 Ra (3.2-3.6 µm) surface finish for use with spiral wound gaskets	★
UC	Universal, Concentric	★
Line size		
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		
A1	Flange ANSI Class 150 Raised Face (not typical for ASME B16.36 flange tapped 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(1)	ANSI Class 2500 Raised Face	★

Table 1. 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.

D1	DIN PN10	★
D2	DIN PN16	★
D3	DIN PN25	★
D4	DIN PN40	★
D5[(2)]	DIN PN63	★
D6	DIN PN100	★
Flange rating		
R3	Flange ANSI Class 300 Ring Joint	
R6	Flange ANSI Class 600 Ring Joint	
R9	Flange ANSI Class 900 Ring Joint	
RF	Flange ANSI Class 1500 Ring Joint	
RT	Flange ANSI Class 2500 Ring Joint	
Orifice plate material type		
S	316/316L Stainless Steel	★
T	DIN 1.4571 (316Ti Stainless Steel)	★
L	304/304L Stainless Steel	★
H	Alloy C-276	
M	Alloy 400	
Plate thickness		
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		
XXXXX	Bore (XXXXX = XX.XXX)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Bore calculation		
BC	Bore Calculation	★
Drain/vent hole		
DV[(4)]	Drain/Vent Hole	★

Table 1. 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.

Plate holder		
PH[5]	Plate Holder for RTJ Flanges	★
Alternate bore type		
TC	Conical Entrance Bore	★
TE[4]	Eccentric Bore	★
TS[4]	Segmental Bore	★
TQ	Quadrant Edged Bore	★
RO[6]	Restriction Orifice Plate	★
Alternate pipe schedule[7]		
FA	Schedule 5S	★
FB	Schedule 10	★
FC	Schedule 10S	★
FD	Schedule 20	★
FE	Schedule 30	★
FF	Schedule 40	★
FG	Schedule 40S	★
FH	Schedule Standard (STD)	★
FI	Schedule 60	★
FJ	Schedule 80	★
FK	Schedule 80S	★
FL	Schedule Extra Strong (XS)	★
FM	Schedule 100	★
FN	Schedule 120	★
FP	Schedule 140	★
FQ	Schedule 160	★
FR	Schedule Double Extra Strong (XXS)	★
Special cleaning		
P2	Cleaning for Special Services	
Special inspection		
QC1	Visual & dimensional inspection with certificate	★
QC7	Inspection & performance certificate	★
Material traceability certification		
Q8	Material Traceability Certificate per and EN 10204:2004 3.1	★

Table 1. 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.

Code conformance		
J5[8]	NACE MR-0175/ISO 15156	
Country certification		
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) 3-in. line sizes and below use an integral plate holder. Line sizes 4-in. and above use a screw type plate holder. The plate holder material matches the plate material.

(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 5 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

Ordering information

Table 2. 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		
WN	Raised Face, Weld Neck	★
TH	Raised Face, Threaded	★
SO	Raised Face, Slip-On	★
DN	Raised Face, Weld Neck, DIN 19214 Part 1	★
RJ	Ring Joint, Weld Neck	
Line size		
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)	★

Table 2. 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.

Flange rating		
A3	ANSI Class 300	★
A6	ANSI Class 600	★
A9	ANSI Class 900	★
Flange rating		
AF	ANSI Class 1500	★
AT[(1)]	ANSI Class 2500	★
D1	DIN PN10	★
D2	DIN PN16	★
D3	DIN PN25	★
D4	DIN PN40	★
D5[(2)]	DIN PN63	★
D6	DIN PN100	★
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		
C	Carbon Steel	★
S	316/316L Stainless Steel	★
T	DIN 1.4571 (316Ti Stainless Steel)	★
L	304/304L Stainless Steel	★
H	Alloy C-276	
M	Alloy 400	

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Alternate pipe schedule/wall thickness [(3)(4)]		
FA	Schedule 5S	★
FB	Schedule 10	★
FC	Schedule 10S	★
FD	Schedule 20	★

Table 2. 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.

FE	Schedule 30	★
FF	Schedule 40	★
FG	Schedule 40S	★
FH	Schedule Standard (STD)	★
FI	Schedule 60	★
FJ	Schedule 80	★
FK	Schedule 80S	★
FL	Schedule Extra Strong (XS)	★
FM	Schedule 100	★
FN	Schedule 120	★
FP	Schedule 140	★
FQ	Schedule 160	★
FR	Schedule Double Extra Strong (XXS)	★
High temperature gaskets		
G1[5][6]	High Temperature Gaskets (spiral wound gaskets for use with 125-250 [3.2-3.6 μm] Ra flange surface finish)	★
Alternate bolting material		
SS[7]	316SST Studs/Nuts	★
Alternate pressure tap type		
ST	Socketweld Pressure Taps (not available with Flange Union Type code DN)	★
Special cleaning		
P2	Cleaned for Special Services	
Special inspection		
QC1	Visual & dimensional inspection with certificate	★
Material traceability certification		
Q8	Material Traceability Certificate per and EN 10204:2004 3.1	★
Code conformance		
J5[8]	Materials conforming to NACE MR01-75	
Country certification		
J1	Canadian Registration	★
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 5 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 5. 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) For more gasket information please see the Temperature Limit table in the 1495/1496 Specifications section of the Product Data Sheet.

(7) 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.

(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.

Specifications

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 $170\beta^2$ D (whichever is higher)
ISO-5167[(2)]: 5,000 and $170\beta^2$ D (whichever is higher)

(1) For flange tap applications.

(2) D = pipe I.D. in mm. β = Beta Ratio.

Orifice plate operating limitations

Table 3. 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

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 4. 1496 Temperature Range

1496 material [(1)]	Temperature rating
Carbon Steel (ASTM A105[(2)])	-20 to 800 °F (-29 to 538 °C)
316/316L Stainless Steel (ASTM A182 F316/316L)	-325 to 1000 °F (-198 to 538 °C)
304/304L Stainless Steel (ASTM A182 F304/304L)	-425 to 1000 °F (-254 to 816 °C)
Alloy C-276 (ASTM B564 N10276)	-325 to 1250 °F (-198 to 677 °C)
Alloy 400 (ASTM B564 N04400)	-325 to 900 ° F (-198 to 482 °C)
Carbon Steel | (ASTM A350-LF2[(2)])	-50 to 1000 ° F (-46 to 538 °C)
DIN 1.4571 (316Ti Stainless Steel) (ASTM A182 F316Ti)	-325 to 1000 ° F (-198 to 538 °C)
Alloy C4 (ASTM B574 UNS N06455)	-325 to 800 ° F (-198 to 427 °C)

(1) Depending on World Area, flanges will conform to one or more of the listed material specifications.

(2) When the J6 Option is selected, this material will be supplied as ASTM A350 LF2.

Physical specifications

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 5 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

Standard pipe schedules

Table 5. 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	N/A
3 (76)	Standard	Standard	XS	N/A	N/A
4 (102)	Standard	Standard	XS	N/A	N/A
6 (152)	Standard	Standard	XS	N/A	N/A
8 (203)	Standard	Standard	N/A	N/A	N/A
10 (254)	Standard	XS	N/A	N/A	N/A
12 (305)	Standard	XS	N/A	N/A	N/A
14 (356)	Standard	N/A	N/A	N/A	N/A
16 (406)	Standard	N/A	N/A	N/A	N/A
18 (457)	Standard	N/A	N/A	N/A	N/A
20 (508)	Standard	N/A	N/A	N/A	N/A
24 (610)	XS	N/A	N/A	N/A	N/A

(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 6. 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)	N/A	N/A	2.067 (52.501)
2½ (64)	2.709 (68.81)	2.635 (66.93)	2.635 (66.93)	N/A	N/A	2.469 (62.71)
3 (76)	2.224 (56.49)	3.26 (82.80)	3.26 (82.80)	N/A	N/A	3.068 (77.93)
4 (102)	4.334 (110.08)	4.26 (108.20)	4.26 (108.20)	N/A	N/A	4.026 (102.26)
6 (152)	6.407 (162.74)	6.357 (161.47)	6.357 (161.47)	N/A	N/A	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)	10.02 (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)	N/A	13.5 (342.90)	13.624 (346.05)	13.376 (339.75)	13.25 (336.55)	13.124 (333.35)
16 (406)	N/A	15.5 (393.70)	15.624 (396.85)	15.376 (390.55)	15.25 (387.35)	15.0 (381.0)
18 (457)	N/A	17.5 (444.50)	17.624 (447.65)	17.376 (441.35)	17.126 (435.00)	16.976 (431.19)
20 (508)	N/A	19.5 (495.30)	19.564 (496.93)	19.25 (488.95)	19.0 (482.60)	18.814 (477.88)
24 (610)	N/A	23.5 (596.90)	23.5 (596.90)	23.25 (590.55)	22.876 (581.05)	22.626 (574.70)

Table 6. Dimensions of Pipe Inner Diameter[1]

Nominal pipe size	Schedule					
	40S	Standard	60	80	80S	XS
2 (51)	2.067 (52.501)	2.067 (52.50)	N/A	1.939 (49.25)	1.939 (49.25)	1.939 (49.25)
2½ (64)	2.469 (62.71)	2.469 (62.71)	N/A	2.323 (59.0)	2.323 (59.0)	2.323 (59.0)
3 (76)	3.068 (77.93)	3.068 (77.93)	N/A	2.90 (73.66)	2.90 (73.66)	2.90 (73.66)
4 (102)	4.026 (102.26)	4.026 (102.26)	N/A	3.826 (97.18)	3.826 (97.18)	3.826 (97.18)
6 (152)	6.065 (154.05)	6.065 (154.05)	N/A	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)	10.02 (254.51)	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)	N/A	13.250 (336.55)	12.814 (325.48)	12.50 (317.50)	N/A	13.0 (330.20)
16 (406)	N/A	15.250 (387.35)	14.688 (373.08)	14.314 (363.58)	N/A	15.0 (381.0)
18 (457)	N/A	17.250 (438.15)	16.5 (419.10)	16.126 (409.60)	N/A	17.0 (425.0)
20 (508)	N/A	19.252 (488.95)	18.376 (466.75)	17.938 (455.63)	N/A	19.0 (482.60)
24 (610)	N/A	23.250 (590.55)	22.064 (560.43)	21.564 (547.73)	N/A	23.0 (584.20)
Nominal pipe size	**Schedule**					
	100	**120**	**140**	**160**	**XXS**	
2 (51)	N/A	N/A	N/A	1.689 (42.9)	1.503 (38.18)	
2½ (64)	N/A	N/A	N/A	2.125 (53.98)	1.771 (44.98)	
3 (76)	N/A	N/A	N/A	2.624 (66.65)	2.30 (58.42)	
4 (102)	N/A	3.624 (92.005)	N/A	3.438 (87.33)	3.152 (80.06)	
6 (152)	N/A	5.501 (139.73)	N/A	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)	N/A	
12 (305)	11.064 (281.03)	10.75 (273.05)	10.5 (266.70)	10.126 (257.20)	N/A	
14 (356)	12.126 (308.00)	11.814 (300.08)	11.5 (37.50)	11.188 (284.18)	N/A	
16 (406)	13.938 (354.03)	13.564 (344.53)	13.124 (333.35)	12.814 (325.48)	N/A	
18 (457)	15.688 (398.27)	15.25 (387.35)	14.876 (377.85)	14.438 (366.73)	N/A	
20 (508)	17.44 (443.98)	17.0 (431.80)	16.5 (410.10)	16.064 (408.03)	N/A	
24 (610)	20.938 (531.83)	20.376 (517.55)	19.876 (504.85)	19.314 (490.58)	N/A	

(1) Measurement is in inches (millimeters).

Materials of construction

1495 Orifice Plate

Table 7. 1495 Materials of Construction

1495 material	Material specifications reference
304/304L Stainless Steel	ASTM A240 Grade 304/304L
316/316L Stainless Steel	ASTM A240 Grade 316/316L
DIN 1.4571 (316Ti SST)[1]	ASTM A240 Gr 316Ti (UNS S31635) (DIN Material Number 1.4571)
Alloy C-276	ASTM B575 UNS N10276
Alloy 400	ASTM B127 UNS N04400

(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 $^1/_2$-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 "Rosemount 1495 Orifice Plate" on page 177 specifies the physical parameters of the orifice from a detailed sizing calculation.

1496 Flange Unions

Table 8. 1496 Materials of Construction

1496 material	Material specification reference
Carbon Steel	ASTM A105 / A350
Stainless Steel	ASTM A240 Grade 316/316L
DIN 1.4571 (316Ti SST)(1)	ATSTM A182
DIN 1.0460 (carbon steel)(1)	ASTM A105(2)
Alloy C-276	ASTM B564/575
Alloy 400	ASTM B564/127

(1) May not be available in all world areas.

(2) When the J6 Option is selected, this material will be supplied as ASTM A350 LF2.

Standard 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.

Installation and Flowmeter Orientation

Annubar® installation considerations

Table 1. Annubar Straight Run Requirements[1]

Upstream (inlet) side	Annubar products			
	3051SFC_A, 3051CFC_A, 2051CFC_A, 3051SFA, 3051CFA, 2051CFA, 485, 405A, 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 189.

(4) Use straightening vane to reduce the required straight run length.

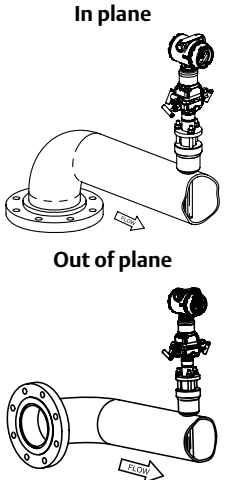
Table 2. 3051SFA, 3051CFA, 2051CFA, 485 Drill Hole Size According to Sensor Size

Sensor size	Diameter
1	3/4-in. (19 mm)
2	1 5/16-in. (34 mm)
3	2 1/2-in. (64 mm)

Table 3. 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 4. 405C Straight Pipe Requirements[1]

	Beta	0.40	0.50	0.65
Upstream (inlet) side of primary	Reducer	2	2	2
	Single 90° bend or tee	2	2	2
	Two or more 90 ° bends in the same plane	2	2	2
	Two or more 90° bends in different planes	2	2	2
	Up to 10° of swirl	2	2	2
	Butterfly valve (75% to 100% open)	2	N/A	N/A
Downstream (outlet) side of primary		2	2	2

(1) Consult an Emerson Process Management representative if a disturbance is not listed.

Table 5. 405P Straight Pipe Requirements[1][2][3]

	Beta	0.40	0.50	0.65
Upstream (inlet)	Reducer	5	8	12
	Single 90° bend or tee	16	22	44
	Two or more 90° bends in the same plane	10	18	44
	Two or more 90° bends in different plane	50	75	60
	Expander	12	20	28
	Ball / Gate valve fully open	12	12	18
Downstream (outlet) side of primary		6	6	7

(1) Consult an Emerson Process Management representative if disturbance is not listed.
(2) Recommended lengths represented in pipe diameters per ISO 5167.
(3) Refer to ISO 5167 for recommended lengths when using flow straighteners.

Table 6. Integral Orifice Plate Straight Run Requirements[1][2][3]

	3051SFP, 3051CFP, 2051CFP, 1195					
Upstream (inlet) side	**<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) For beta ratios not listed, use requirements of next higher beta ratio listed.

Orifice plate pipe orientation

Pipe orientation for both 3051SFC, 3051CFC,2051CFC, 405C, 405P, 3051SFP, 3051CFP, 2051CFP AND 1195.

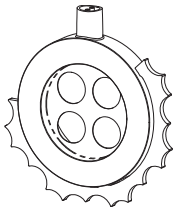
Orientation/ flow direction	Process (1)		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	D/R	R
Vertical Down	D/R	NR	NR

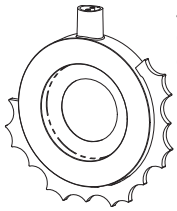
(1) D = Direct mount acceptable (recommended).
R = Remote mount acceptable.
NR = Not recommended.

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:

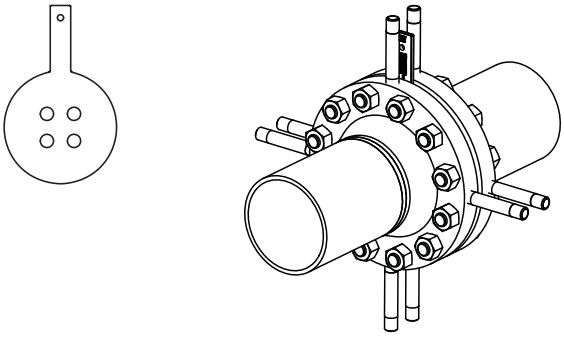
- with less than 6 upstream pipe diameters
- with a 0.65 Beta

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 two of the four holes of the 1595 Orifice Plate 90° from the plane of the elbow. See Figure 3 and Figure 4.

Figure 3. 1595 Pressure Tap Locations

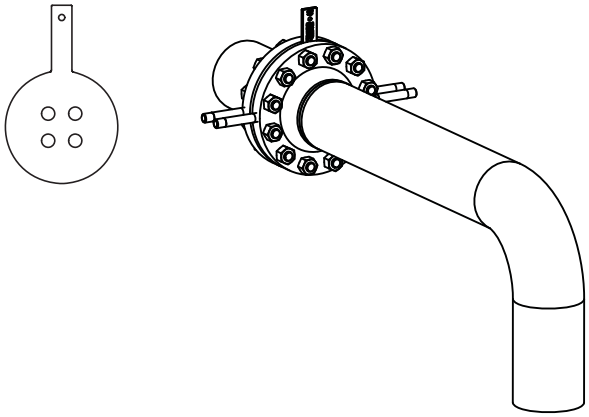
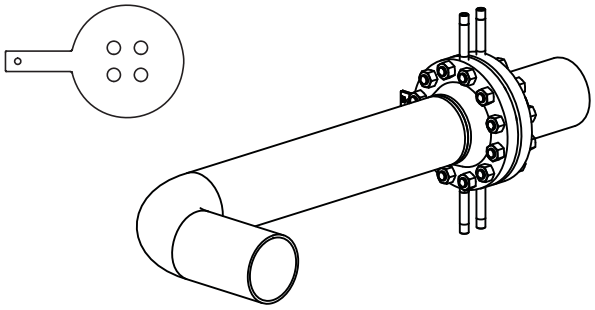


Figure 4. 1595 Pressure Tap Locations

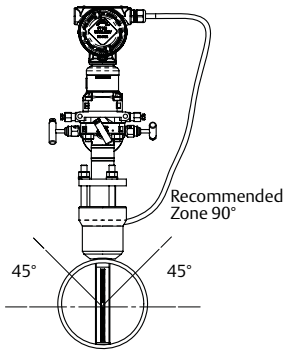


Annubar flowmeter orientation

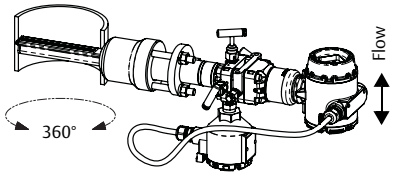
For 3051SFA, 3051CFA, 2051CFA, 485, 585

Annubar Direct Mount Flowmeter orientation (recommended)(1)

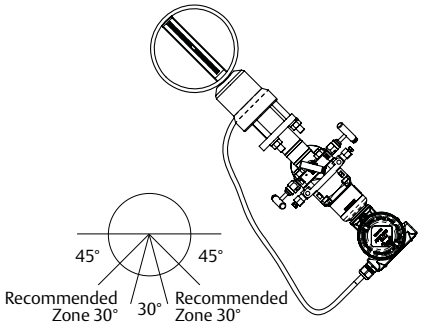
Gas (horizontal)



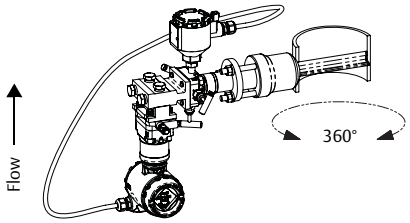
Gas (vertical)



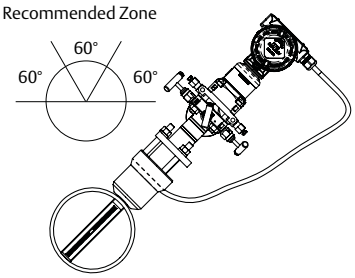
Liquid and steam (horizontal)



Steam (vertical)



Alternate top mounting for steam (horizontal)(2)



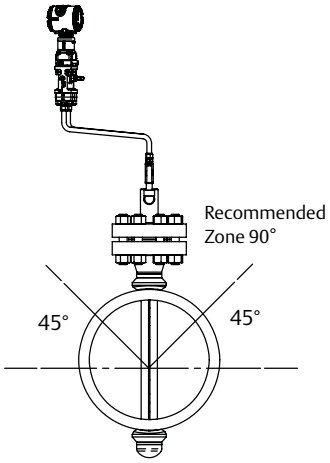
Note: If steam quality is not 100%, mount the Annubar 15° from the vertical position.

(1) The flowmeter orientation recommendations may vary for the Manual and Gear-Drive Flo-Tap Annubar Types.

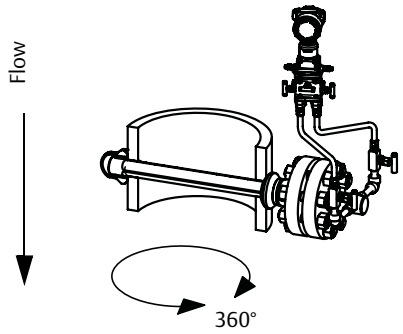
(2) This mounting orientation is not recommended for the 585 Annubar Type L (Main Stream Line). For 585 Main Steam Line, use Liquid and Steam (Horizontal) orientation for mounting recommendations. Contact Rosemount or see Rosemount white paper 00870-0200-4809 for more details.

Annubar Remount Mount Flowmeter orientation (recommended)[1]

Gas (horizontal)

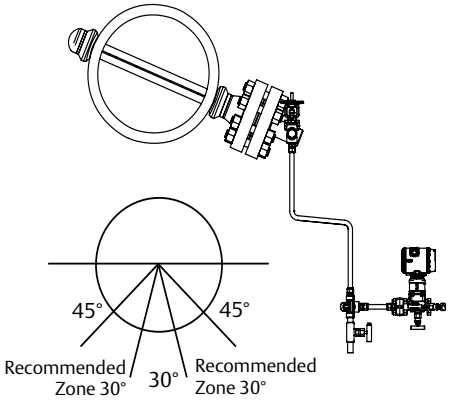


Gas (vertical)

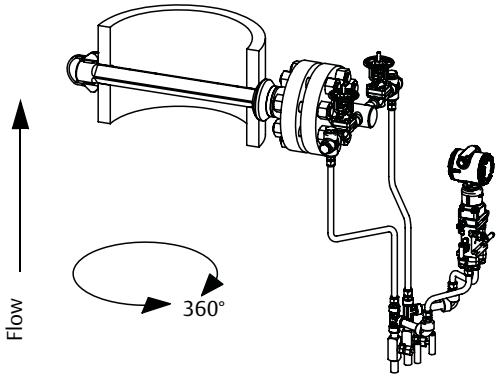


Note: Can also be mounted for Gas Vertical up applications.

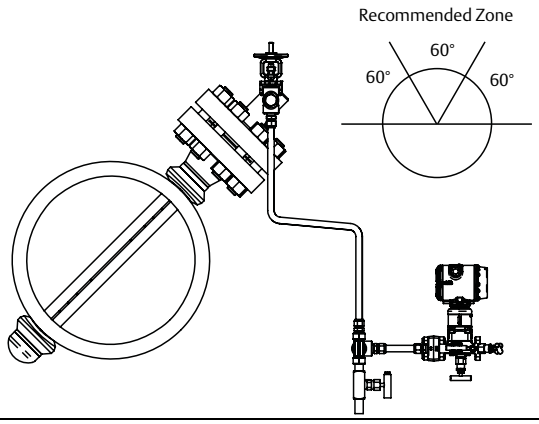
Liquid and steam (horizontal)



Steam (vertical)



Top mounting for steam (horizontal)[2]



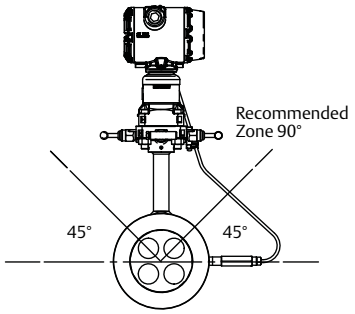
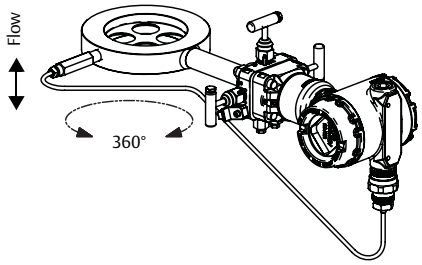
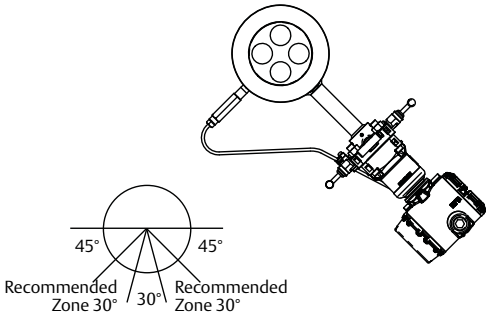
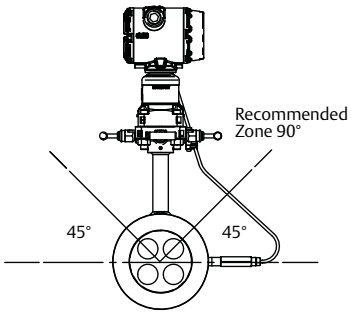
(1) The flowmeter orientation recommendations may vary for the Gear-Drive Flo-Tap Annubar Type.

(2) 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.

405 Flowmeter orientation

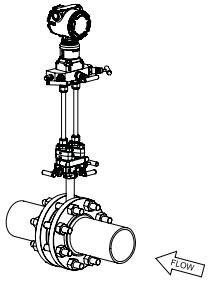
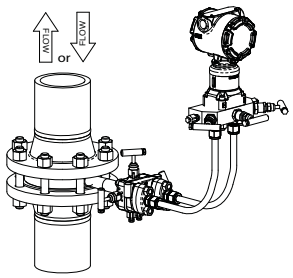
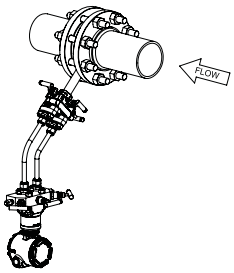
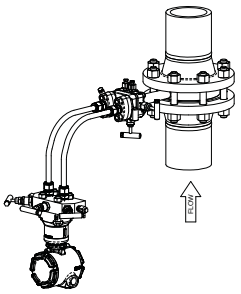
For 3051SFC, 3051CFC, 2051CFC, 405C, 405P

405 Direct Mount Flowmeter orientation (recommended)

Gas (horizontal)	Gas (vertical)
	
Liquid and steam (horizontal)	**Alternate top mounting for steam (horizontal)[(1)]**
	

(1) Contact Rosemount or see Rosemount white paper 00870-0200-4809 for more details.

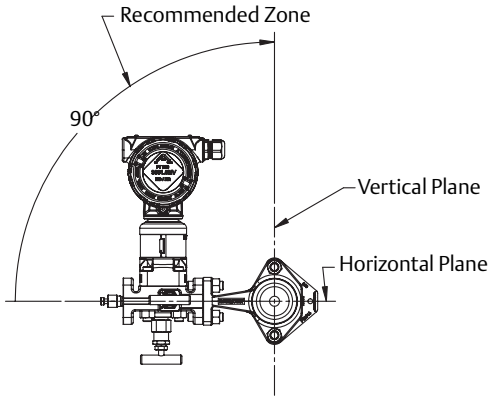
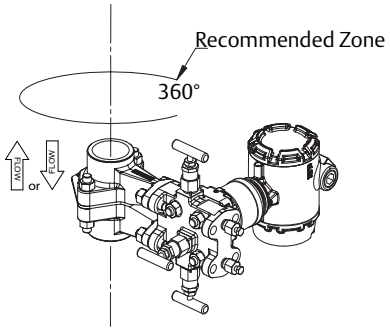
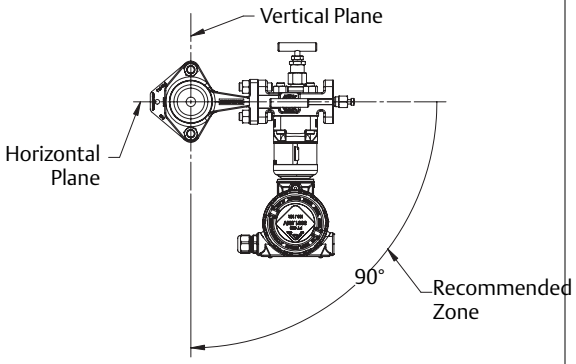
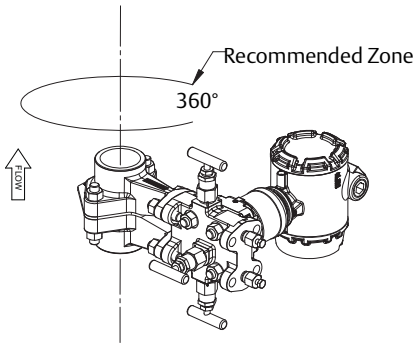
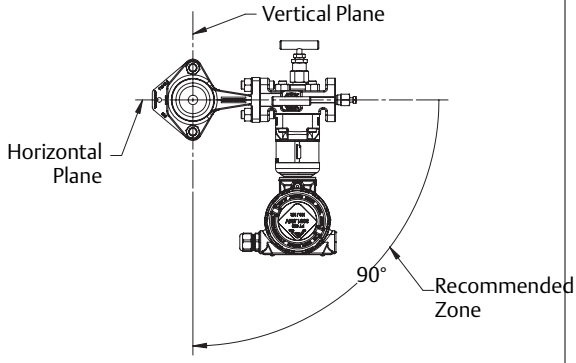
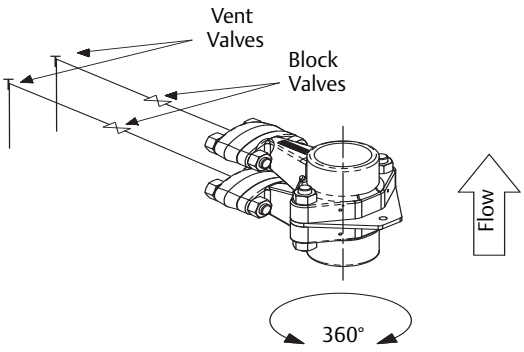
405 Remote Mount Flowmeter orientation (recommended)

Gas (horizontal)	Gas (vertical)
	
Liquid and steam (horizontal)	**Liquid and steam (vertical)**
	

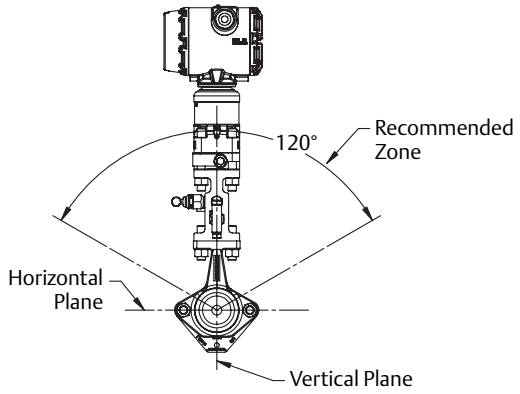
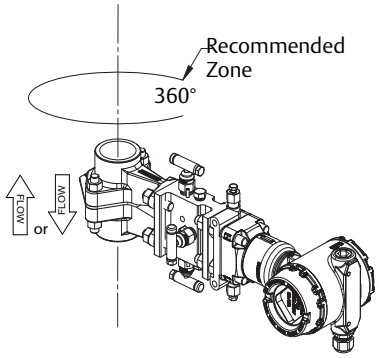
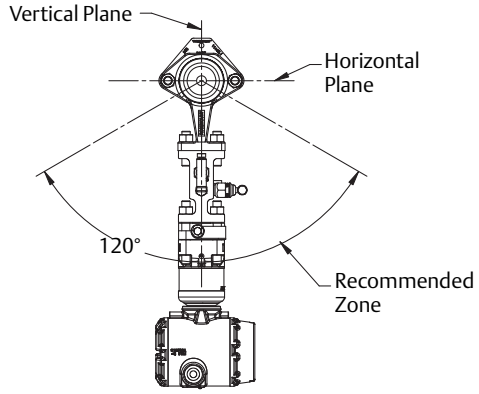
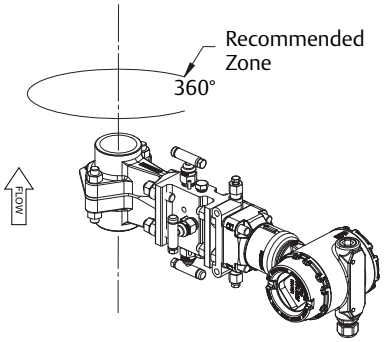
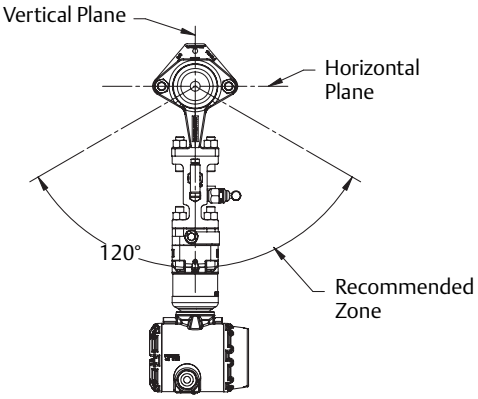
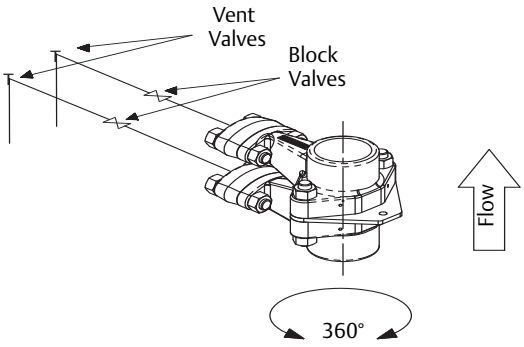
1195 Integral Orifice Flowmeter orientation

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)

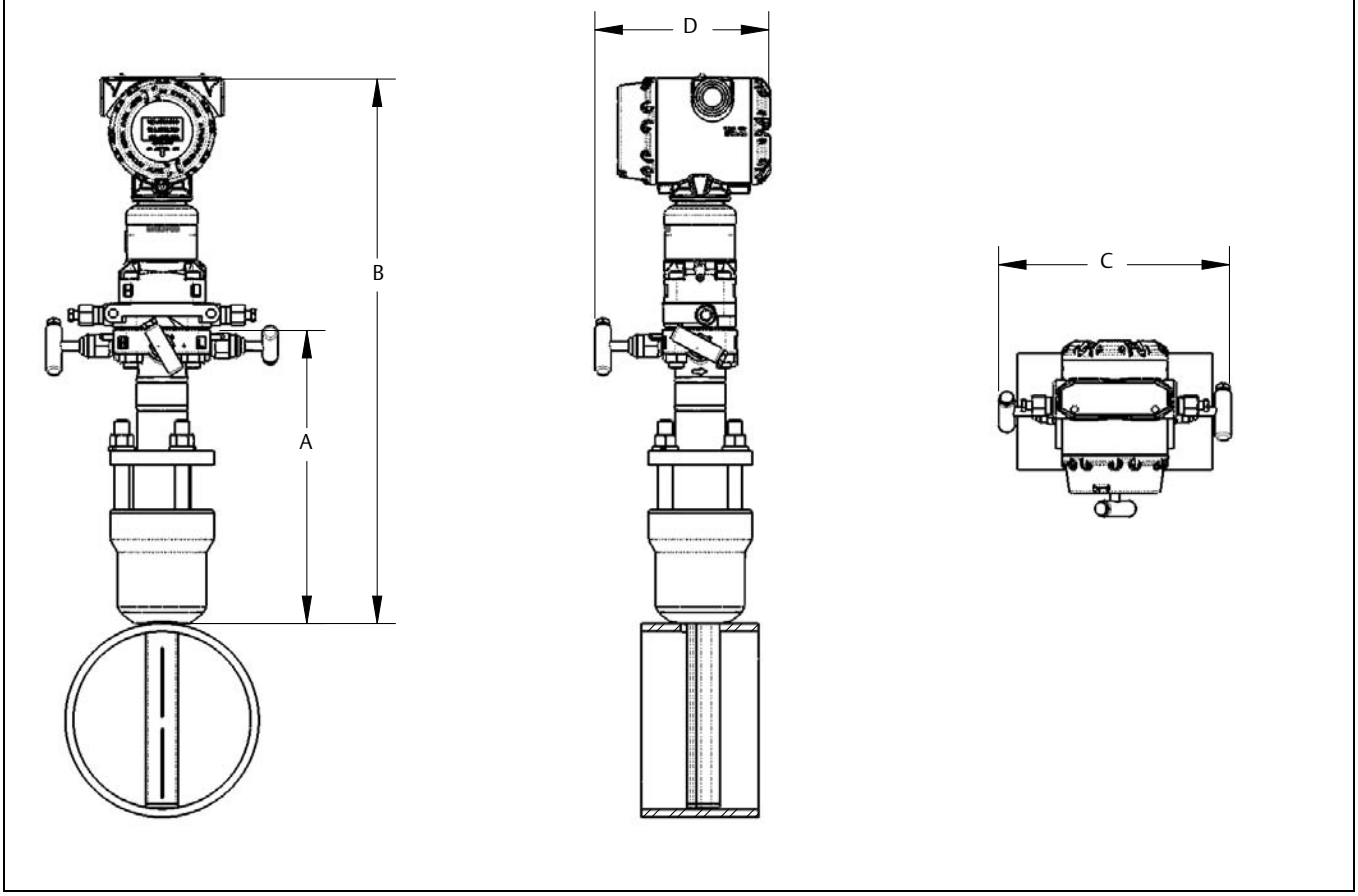
Gas (horizontal)	Gas (vertical)
	
Liquid (horizontal)	**Liquid (vertical)**
	
Steam (horizontal)	**Steam (vertical)**
	

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)).

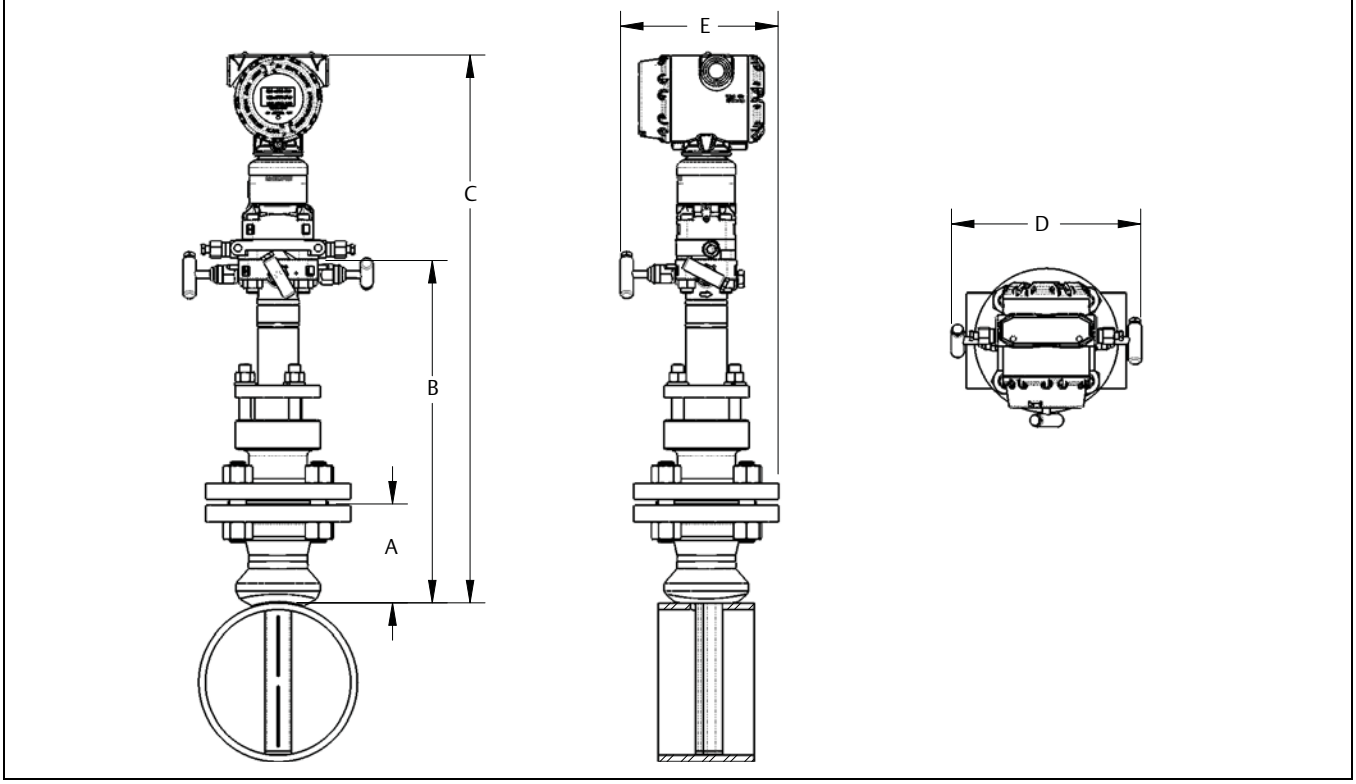
Table 7. 3051SFA Pak-Lok Annubar Flowmeter Dimensional Data

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 8. 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

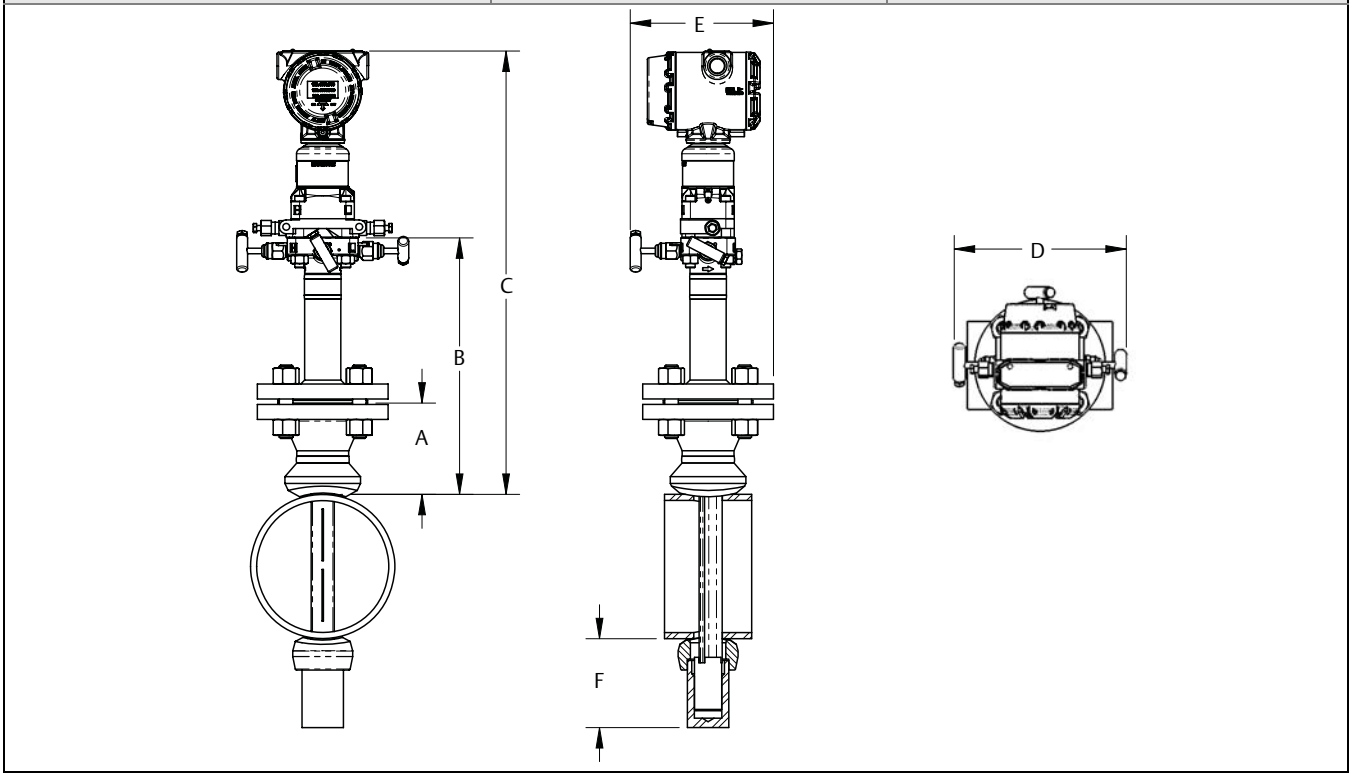


Table 9. 3051SFA Flanged Annubar Flowmeter Dimensional Data

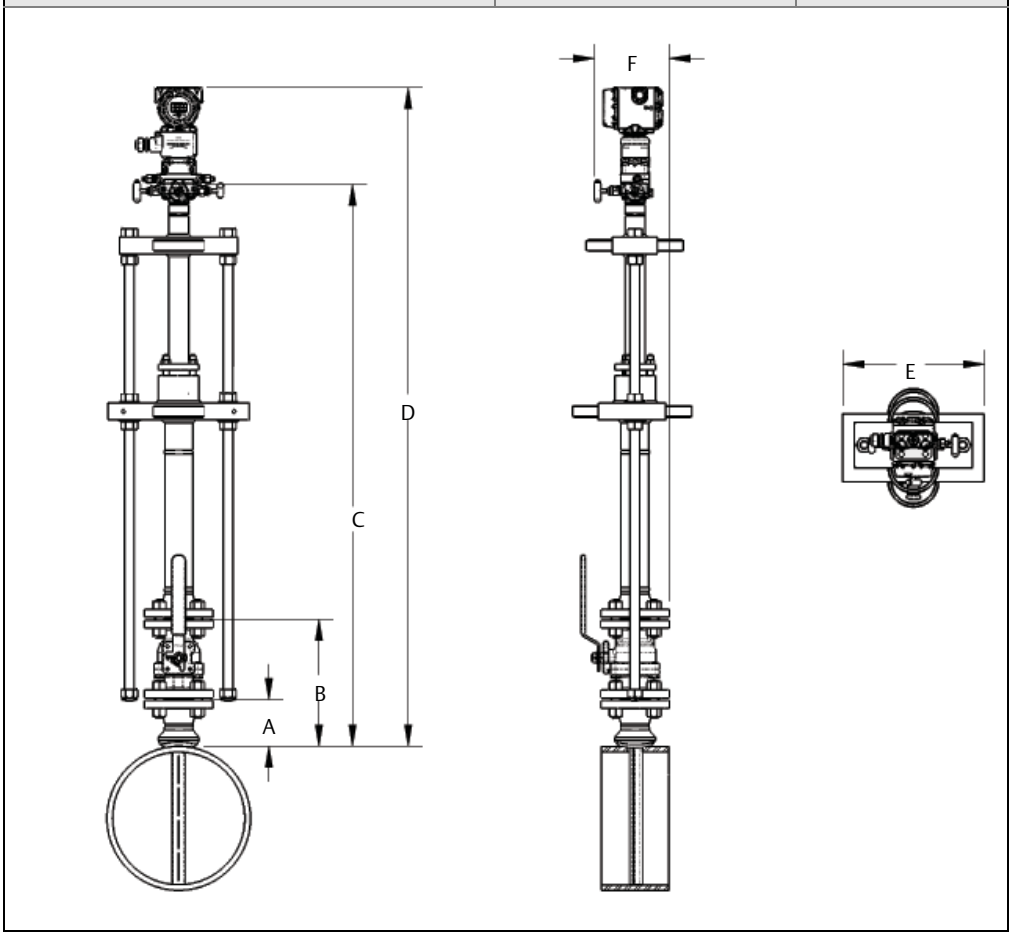
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 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)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	N/A	N/A	N/A	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)	N/A	N/A	N/A	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	N/A	N/A	N/A	4.50 (114.3)
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)

Table 9. 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	4 – 900#	8.19 (208.0)	13.06 (331.7)	N/A	N/A	N/A	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	N/A	N/A	N/A	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	N/A	N/A	N/A	7.00 (177.8)

Dimensions are in inches (millimeters).

Rosemount 3051SFA Flanged Flo-Tap Annubar Flowmeter (1)



(1) The Flanged Flo-Tap Annubar Flowmeter is available with either the manual or gear drive options.

Table 10. 3051SFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data(1)(2)

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)	N/A	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)	N/A	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)	N/A	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN16(3)	3.09 (78.5)	(3)	N/A	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN40(3)	3.21 (81.5)	(3)	N/A	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN100(3)	3.88 (98.6)	(3)	N/A	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)

Table 10. 3051SFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data(1)(2)

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)
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(3)	3.40 (86.4)	(3)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN40(3)	3.52 (89.4)	(3)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN100(3)	4.30 (109.2)	(3)	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(3)	3.85 (97.8)	(3)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN40(3)	4.16 (105.7)	(3)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN100(3)	4.95 (125.7)	(3)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)

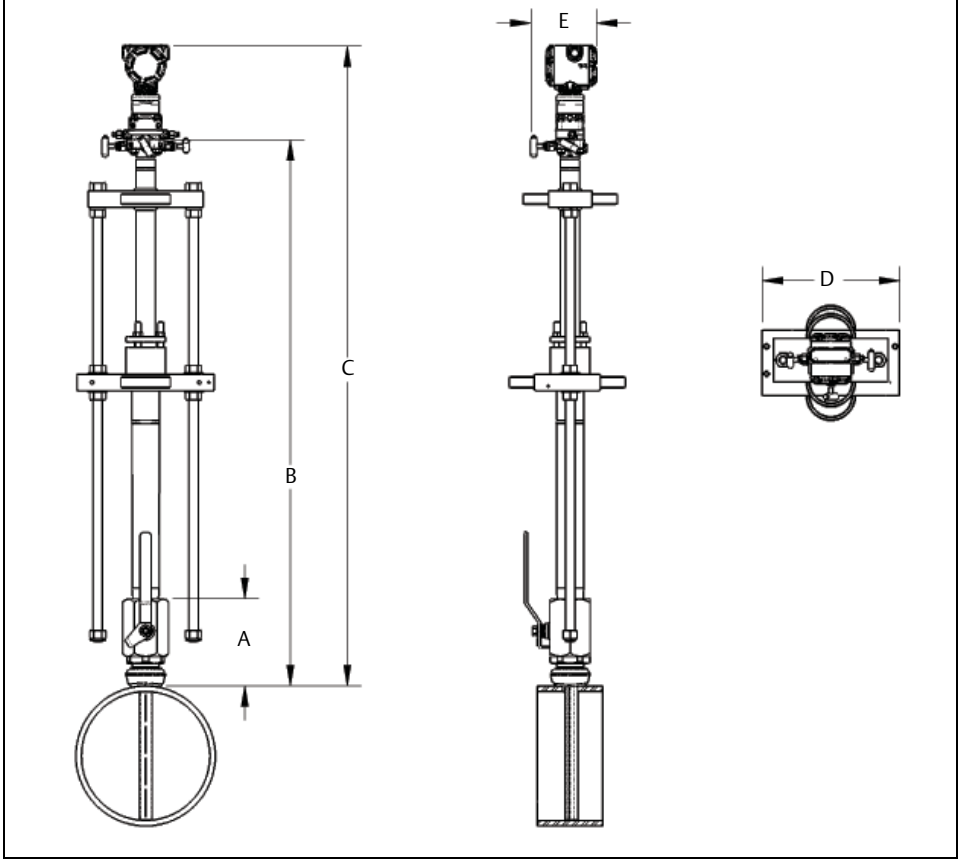
Dimensions are in inches (millimeters).

(1) Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I

(2) Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

(3) DIN Valves are not offered.

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 11. 3051SFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data[1][2]

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)	N/A	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)
3[3]	N/A	N/A	N/A	N/A	N/A	N/A

Dimensions are in inches (millimeters).

(1) Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I

(2) Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

(3) Sensor Size 3 is not available in a Threaded Flo-Tap.

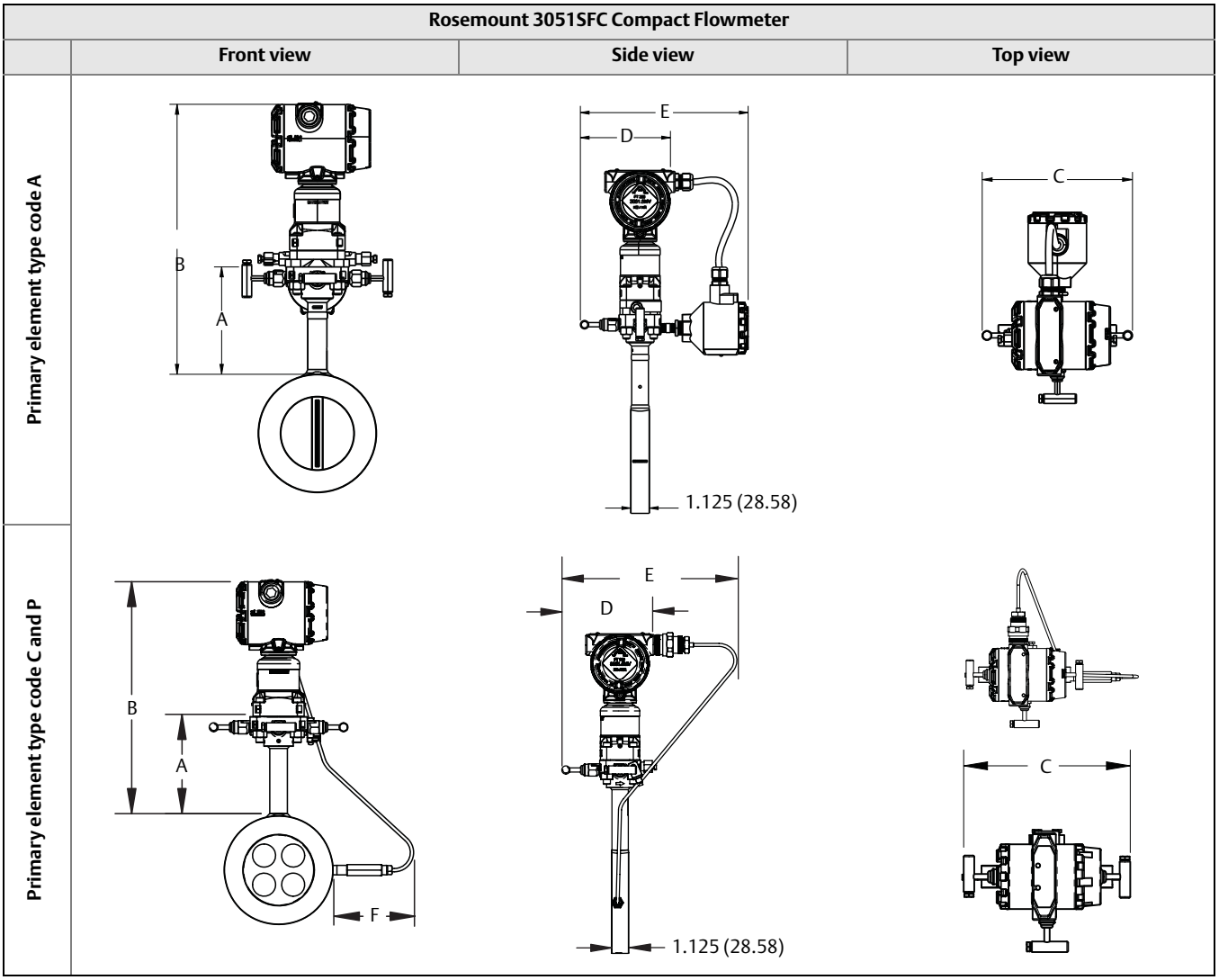


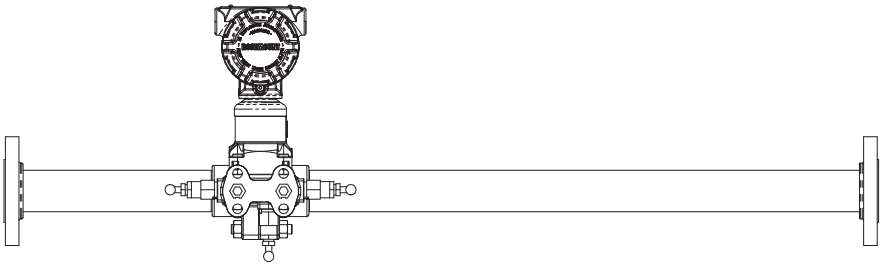
Table 12. 3051SFC Compact Dimensional Data

Primary element type	A	B	Transmitter height	C	D	E	F
A	5.62 (143)	Transmitter Height + A	8.53 (217)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open	10.0 (254) - closed 10.25 (260.3) - open	N/A
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)

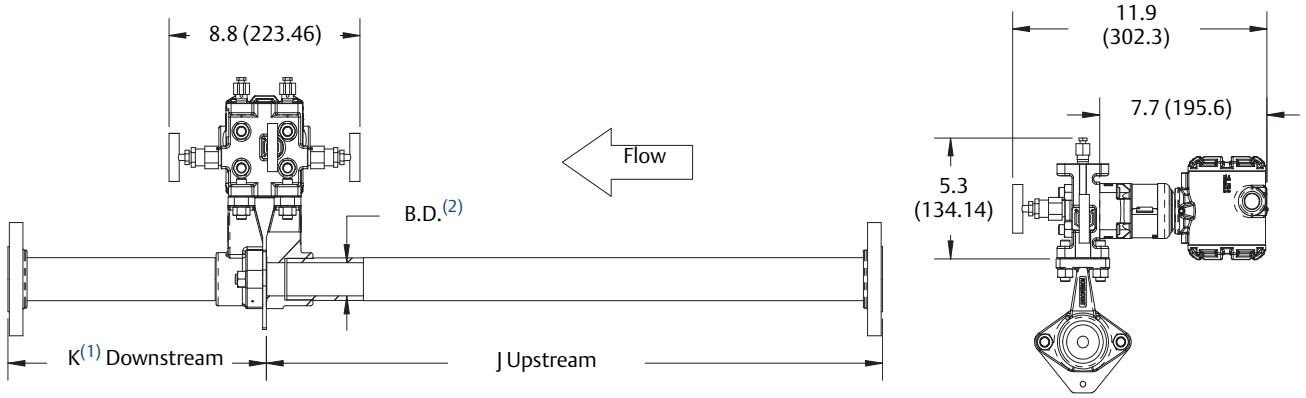
Dimensions are in inches (millimeters).

Rosemount 3051SFP Integral Orifice Flowmeter

Front view



Bottom view | **Side view**



Dimensions are in inches (millimeters).

Table 13. 3051SFP Integral Orifice Flowmeter Dimensional Data

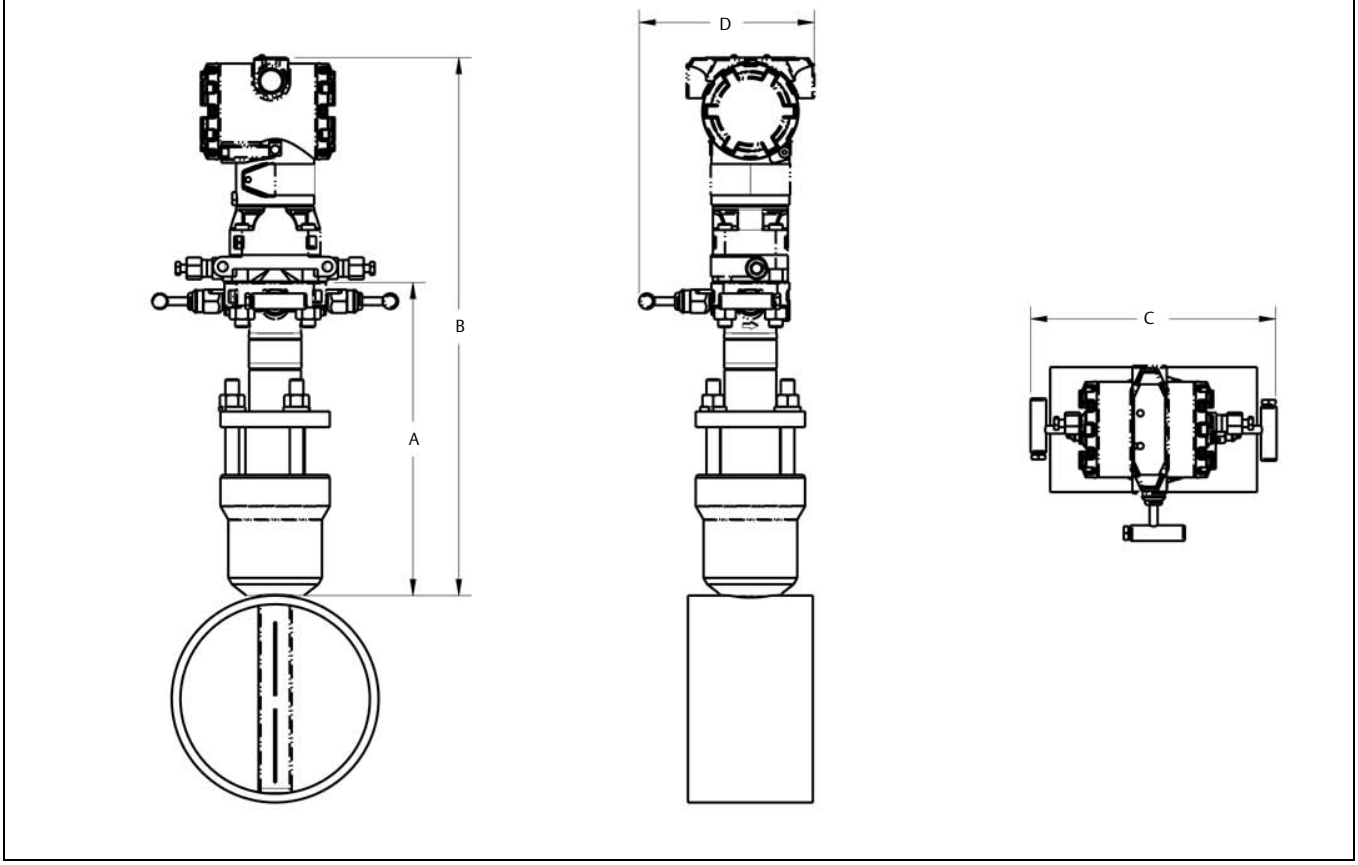
	Line size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
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



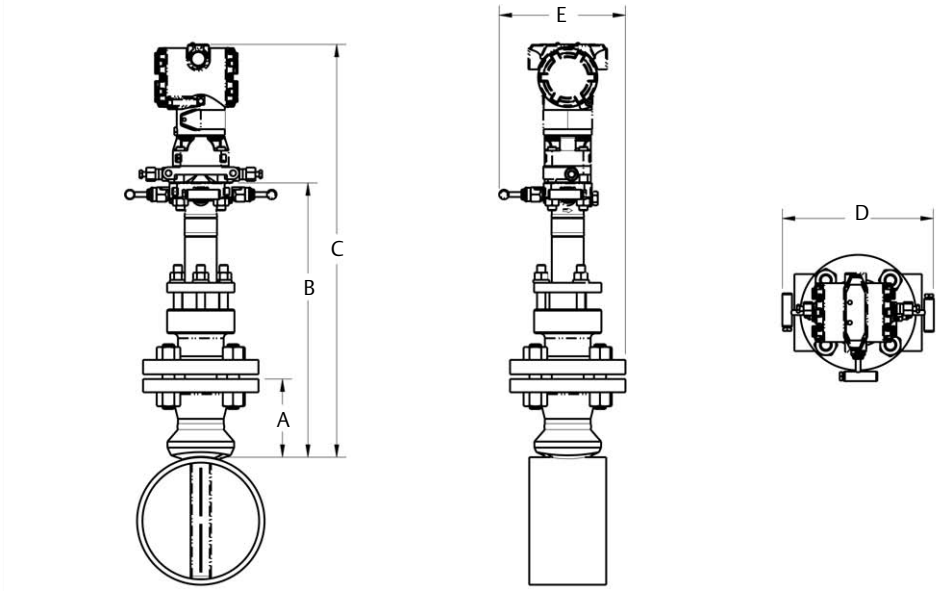
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 14. 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 15. 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

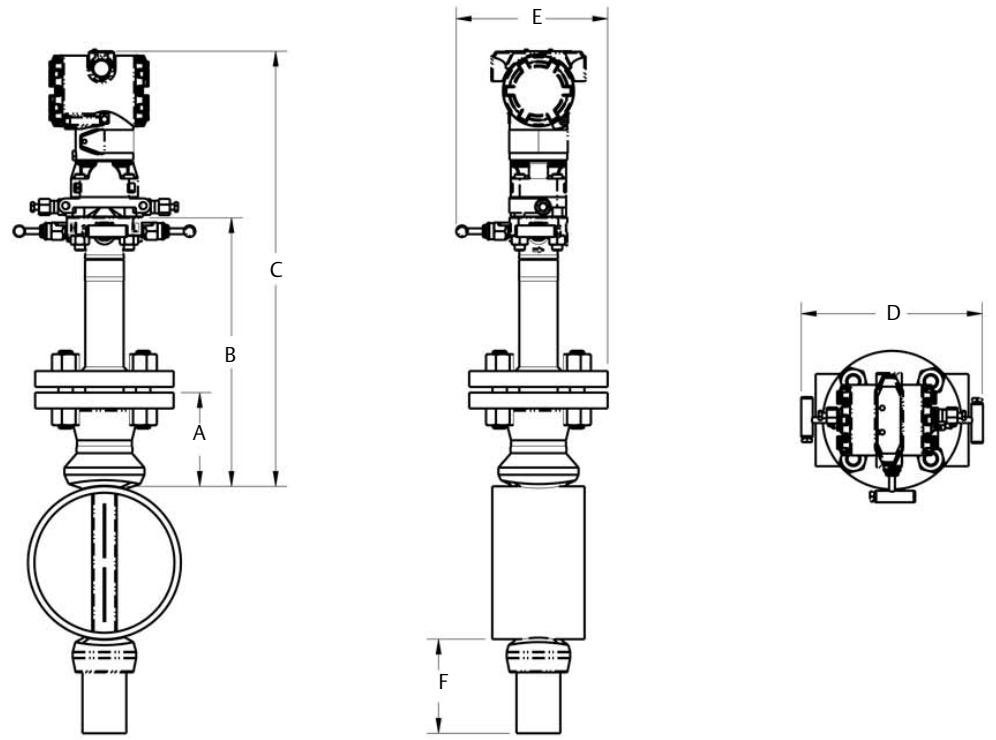


Table 16. 3051CFA Flanged Annubar Flowmeter Dimensional Data

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)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	N/A	N/A	N/A	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)	N/A	N/A	N/A	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	N/A	N/A	N/A	4.50 (114.3)
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)

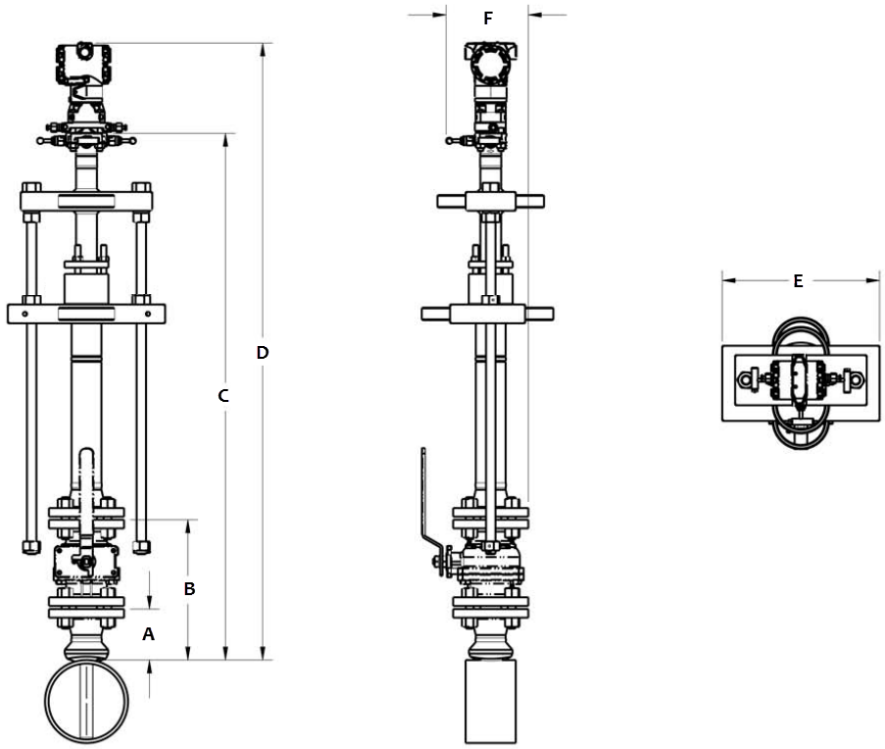
Table 16. 3051CFA Flanged Annubar Flowmeter Dimensional Data

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	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)	N/A	N/A	N/A	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	N/A	N/A	N/A	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	N/A	N/A	N/A	7.00 (177.8)

Dimensions are in inches (millimeters).

Rosemount 3051CFA Flanged Flo-Tap Annubar Flowmeter (1)

Front view	Side view	Top view



(1) The Flanged Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 17. 3051CFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data(1)(2)

Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C' (Max) (gear drive)	C' (Max) (manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	10.50 (266.7)	N/A	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)	N/A	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)	N/A	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN16(3)	3.09 (78.5)	See Note 1.	N/A	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.	N/A	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.	N/A	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)

Table 17. 3051CFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data(1)(2)

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)
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).

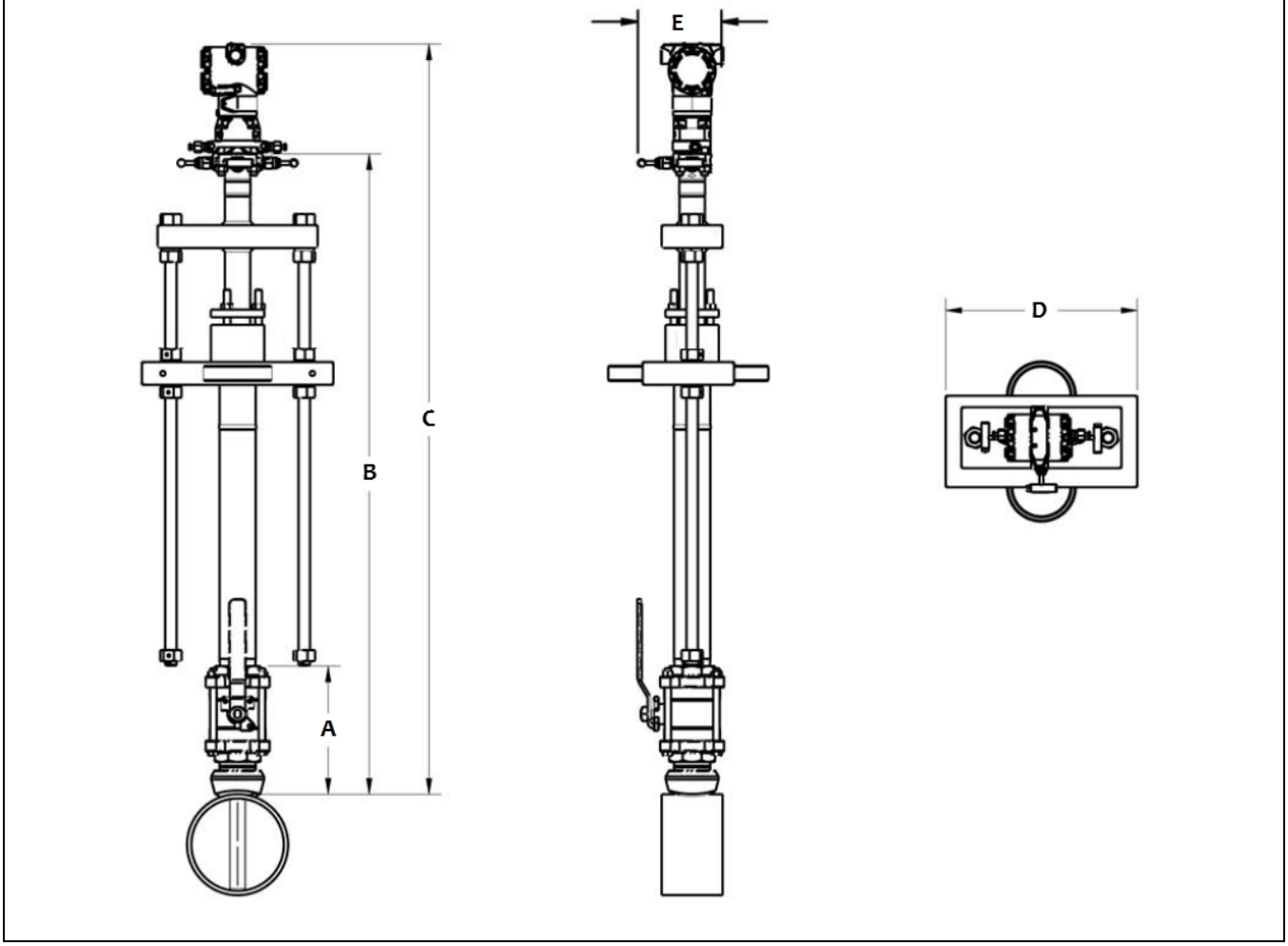
(1) Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I

(2) Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

(3) DIN Valves are not offered.

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 18. 3051CFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data[1][2]

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)	N/A	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)
3[3]	N/A	N/A	N/A	N/A	N/A	N/A

Dimensions are in inches (millimeters).

(1) Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + BI

(2) Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + BI

(3) Sensor Size 3 is not available in a Threaded Flo-Tap.

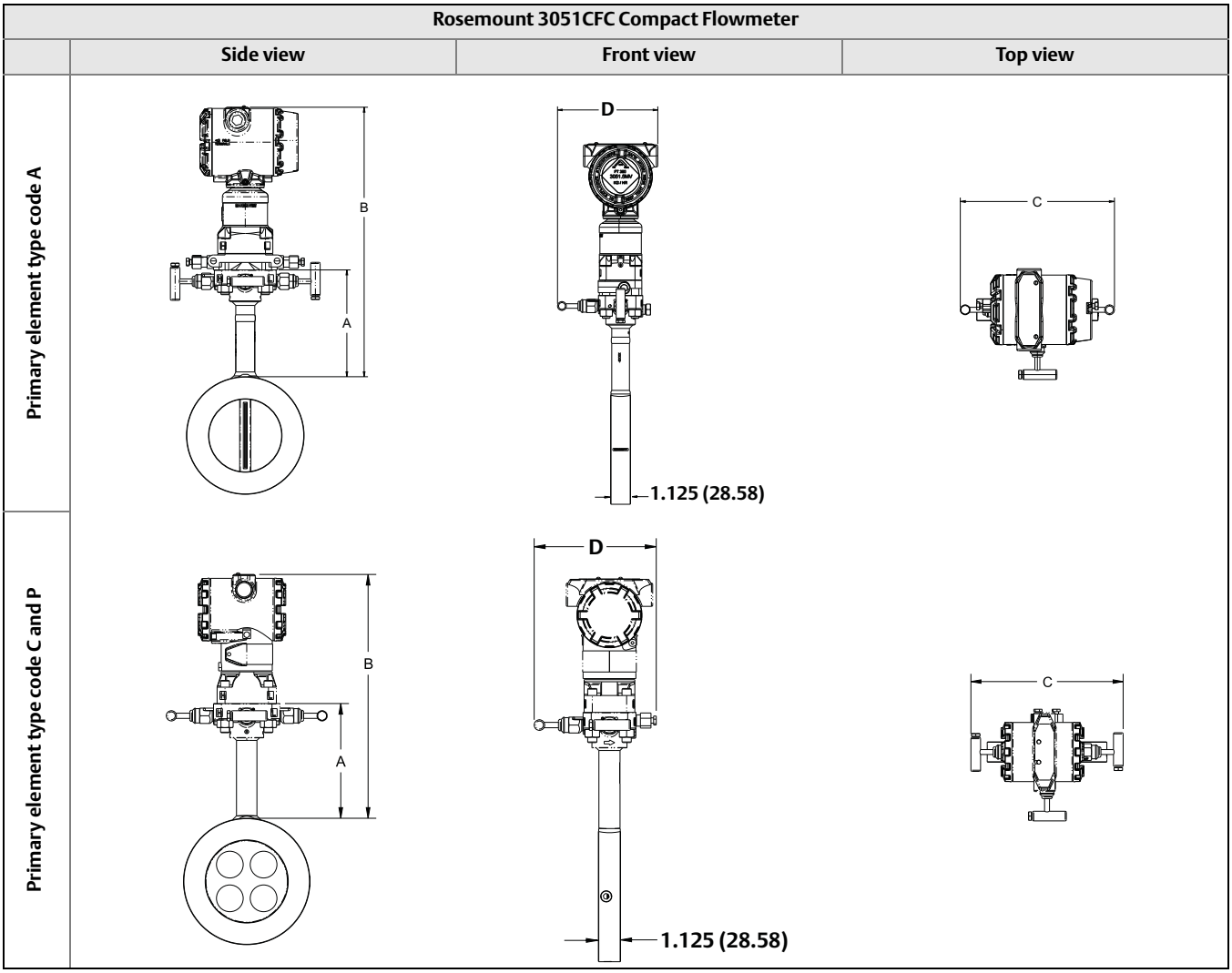


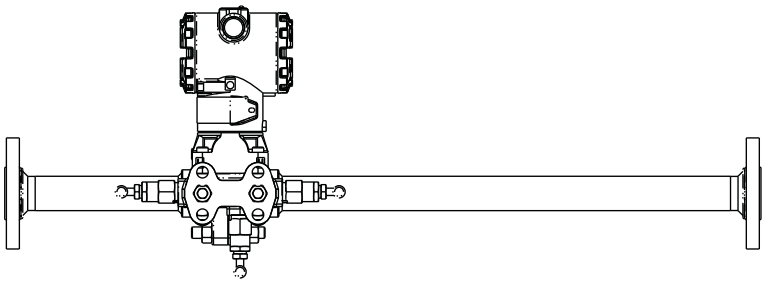
Table 19. 3051CFC Compact Dimensional Data

Primary element type	A	B	Transmitter height	C	D
A	5.62 (143)	Transmitter Height + A	7.38 (188)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open
P and C	5.62 (143)	Transmitter Height + A	6.55 (166)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

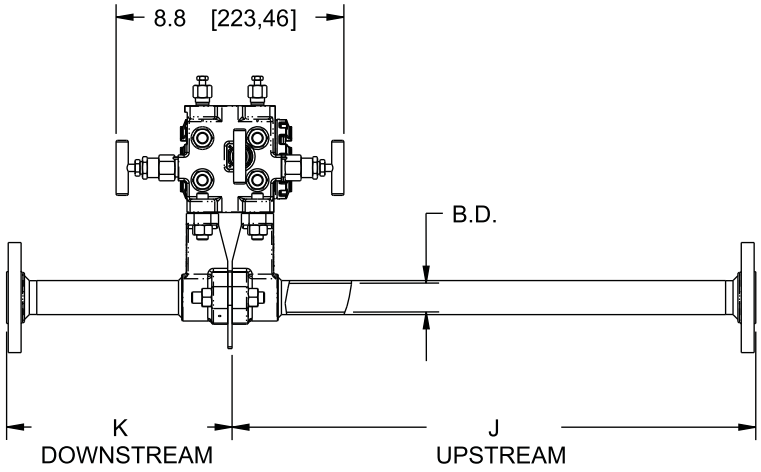
Dimensions are in inches (millimeters).

Rosemount 3051CFP Integral Orifice Flowmeter

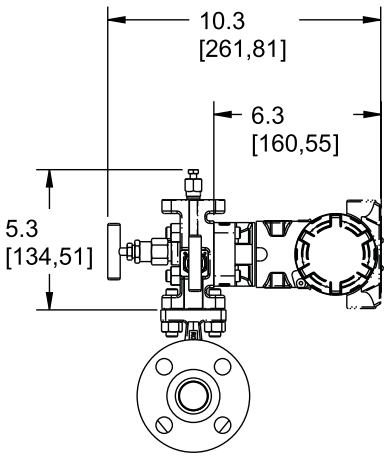
Side view



Bottom view



Front view



Dimensions are in inches (millimeters).

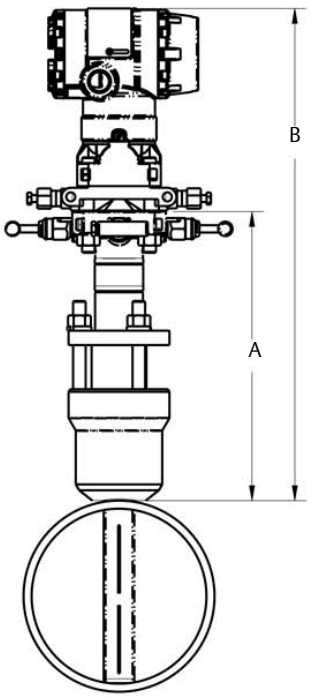
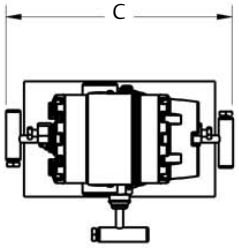
Table 20. 3051CFP Integral Orifice Dimensional Data

	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 21. 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

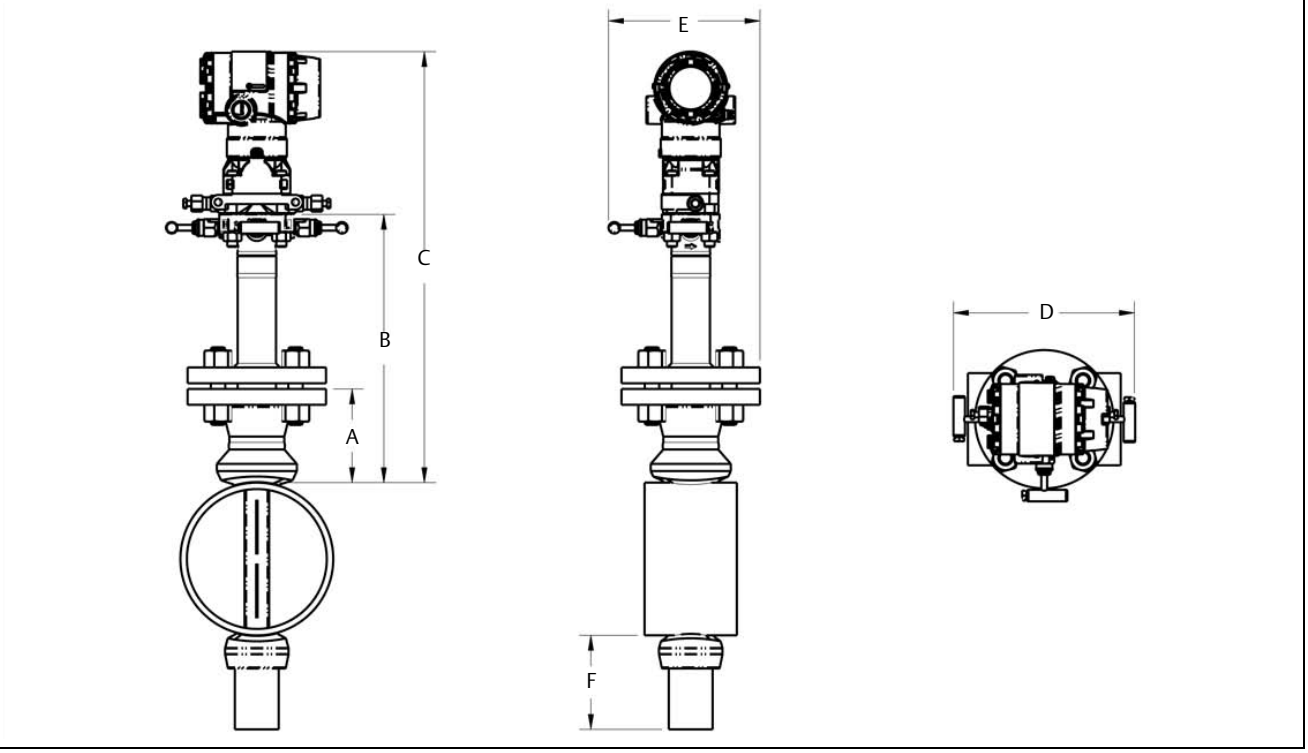


Table 22. 2051CFA Flanged Annubar Dimensional Data

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)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	N/A	N/A	N/A	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)	N/A	N/A	N/A	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	2 – 2500#	9.88 (251.0)	15.63 (397.0)	N/A	N/A	N/A	4.50 (114.3)
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)

Table 22. 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	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)	N/A	N/A	N/A	7.00 (177.8)
3	3 – 1500#	8.56 (217.4)	13.81 (350.8)	N/A	N/A	N/A	7.00 (177.8)
3	3 – 2500#	11.19 (284.2)	17.31 (439.7)	N/A	N/A	N/A	7.00 (177.8)

Dimensions are in inches (millimeters).

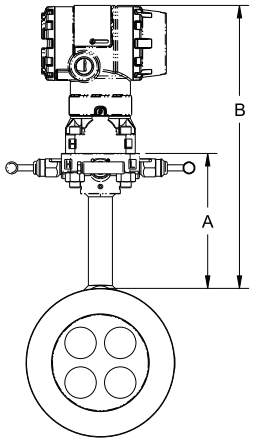
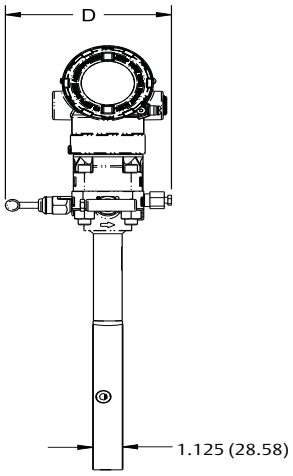
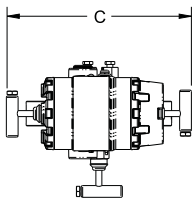
Rosemount 2051CFC Compact Flowmeter			
	Side view	Front view	Top view
Compact Flowmeter (Primary element type code C, P, and A)			

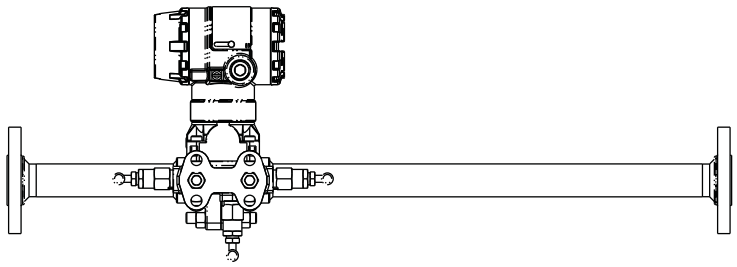
Table 23. 2051CFC Compact Dimensional Data[(1)]

Primary element type	A	B	Transmitter height	C	D
A	5.62 (143)	Transmitter Height + A	7.03 (179)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open
P and C	5.62 (143)	Transmitter Height + A	6.20 (157)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

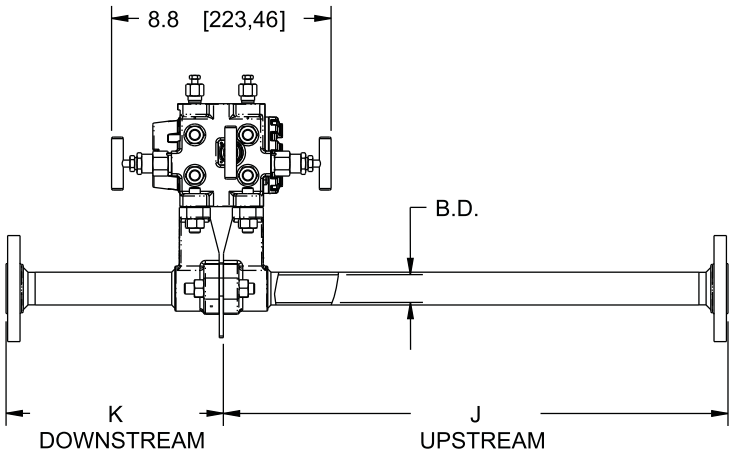
(1) Measurement in inches (millimeters).

Rosemount 2051CFP Integral Orifice Flowmeter

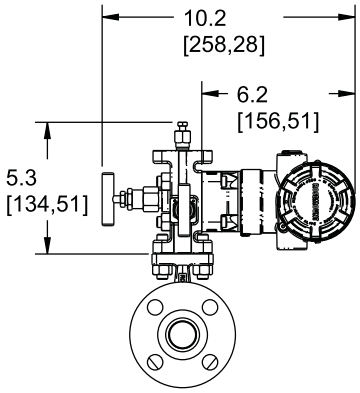
Side view



Bottom view



Front view



Dimensions are in inches (millimeters).

Table 24. 2051CFP Integral Orifice Dimensional Data

Dimension	Line size		
	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)

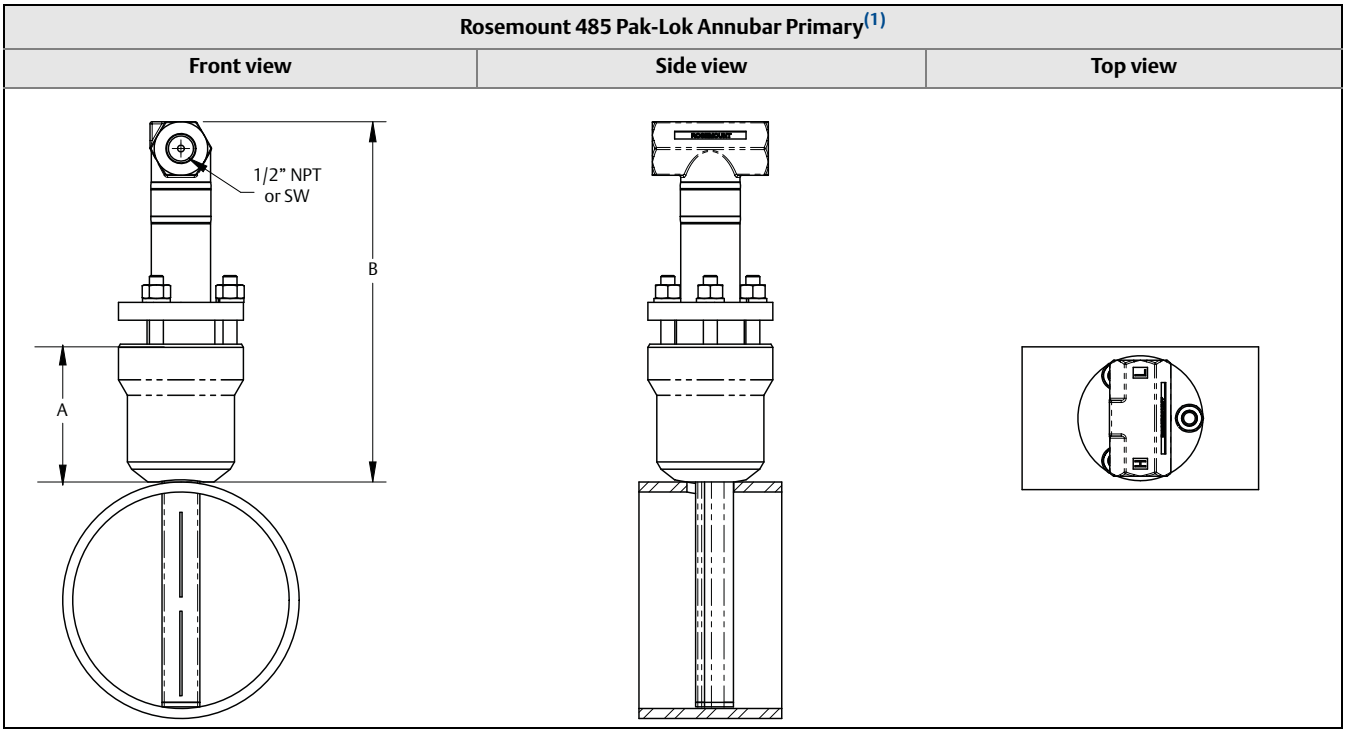
Dimensions are in inches (millimeters).

(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]

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]).

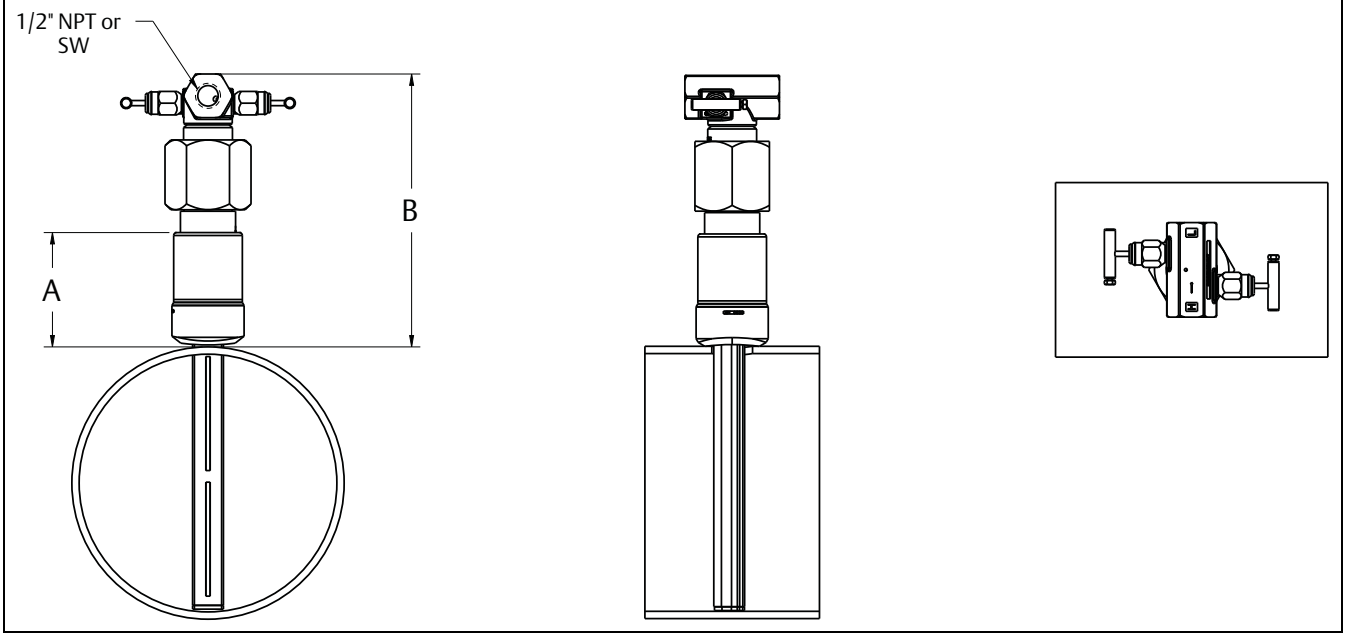
Table 25. 485 Pak-Lok Annubar Primary Dimensional Data

Sensor size	A (Max)	B (Max)
1	2.89 (73)	8.50 (215.9)
2	3.92 (100)	11.00 (279.4)
3	3.96 (101)	12.00 (304.8)

Dimensions are in inches (millimeters).

Rosemount 485 Threaded Annubar Primary(1)

Front view	Side view	Top view



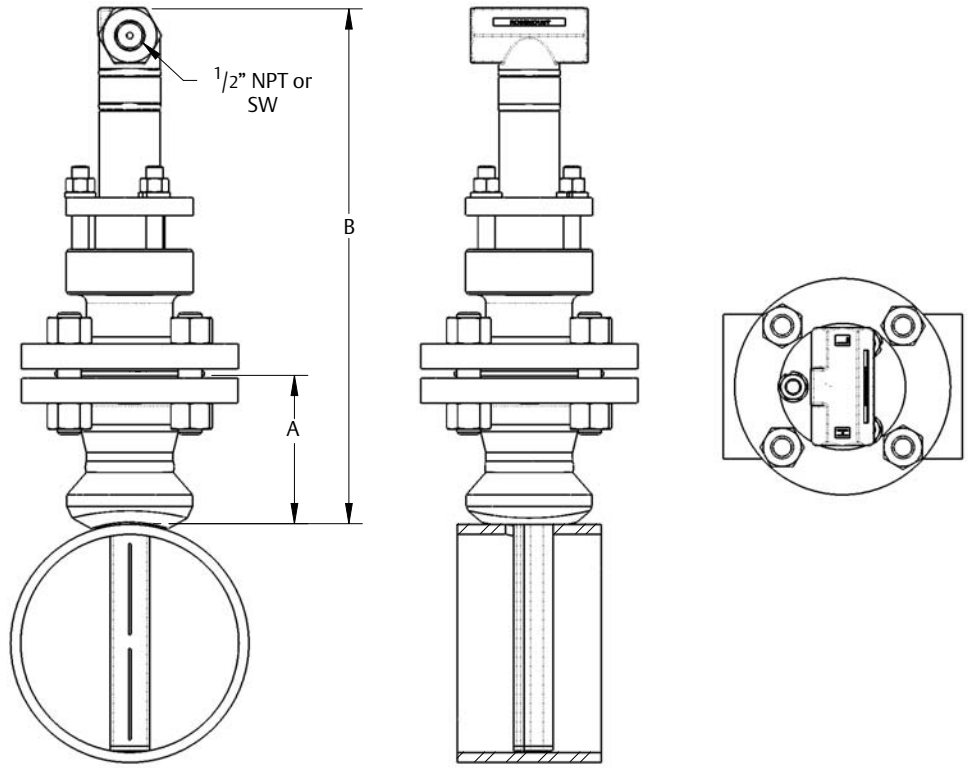
(1) The Threaded Annubar model is available up to 600# ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 26. 485 Threaded Annubar Primary Dimensional Data

Sensor size	A (Max)	B (Max)
1	2.89 (73)	8.50 (215.9)
2	3.92 (100)	11.00 (279.4)

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 27. 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

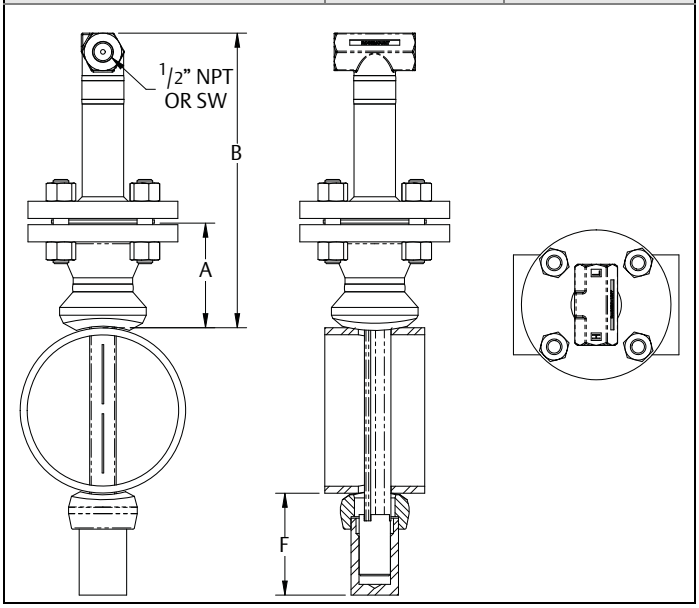


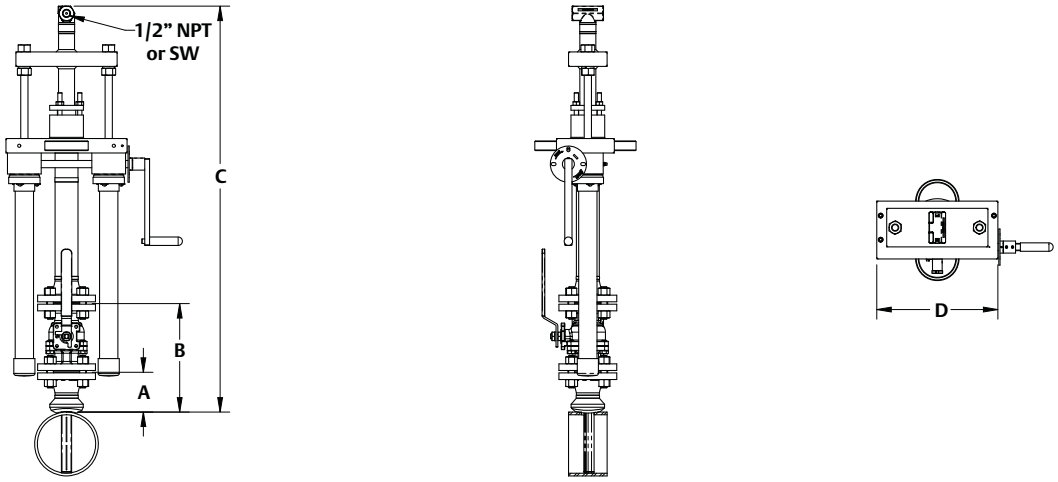
Table 28. 485 Flanged Annubar Primary Dimensional Data

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

Front view	Side view	Top view



Front view	Side view	Top view

MANUAL

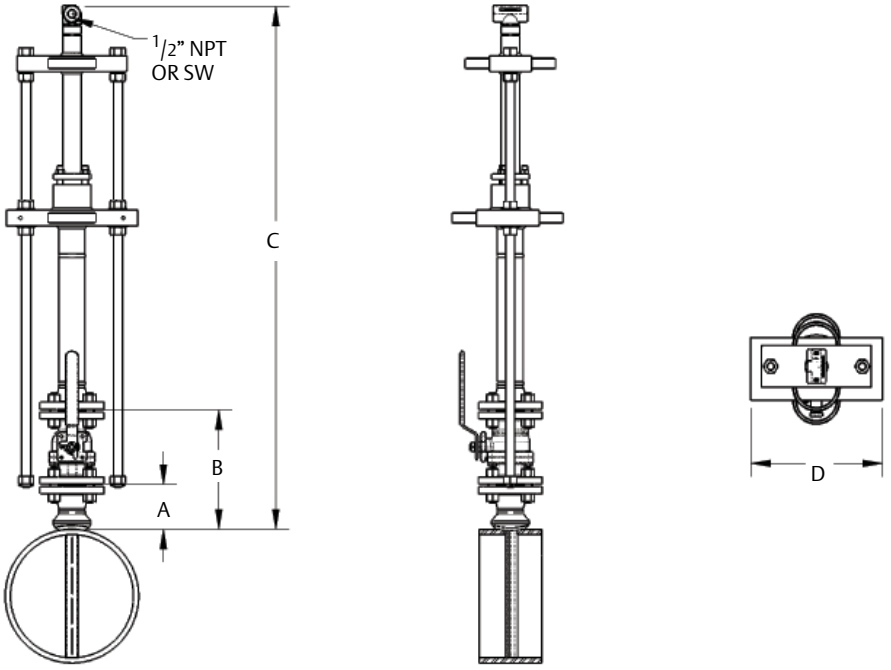


Table 29. 485 Flanged Flo-Tap Annubar Primary Dimensional Data

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)	N/A	17.77 (451.4)	10.50 (266.7)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	N/A	17.77 (451.4)	10.50 (266.7)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	N/A	17.77 (451.4)	10.50 (266.7)
1	DN40/PN16	3.09 (78.5)	(1)	N/A	17.77 (451.4)	10.50 (266.7)
1	DN40/PN40	3.21 (81.5)	(3)	N/A	17.77 (451.4)	10.50 (266.7)
1	DN40/PN100	3.88 (98.6)	(3)	N/A	17.77 (451.4)	10.50 (266.7)

Table 29. 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^1 (Max) (gear drive)	C^1 (Max) (manual)	D (Max)
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)	(3)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN40	3.52 (89.4)	(3)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN100	4.30 (109.2)	(3)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
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)	(3)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN40	4.16 (105.7)	(3)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN100	4.95 (125.7)	(3)	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.

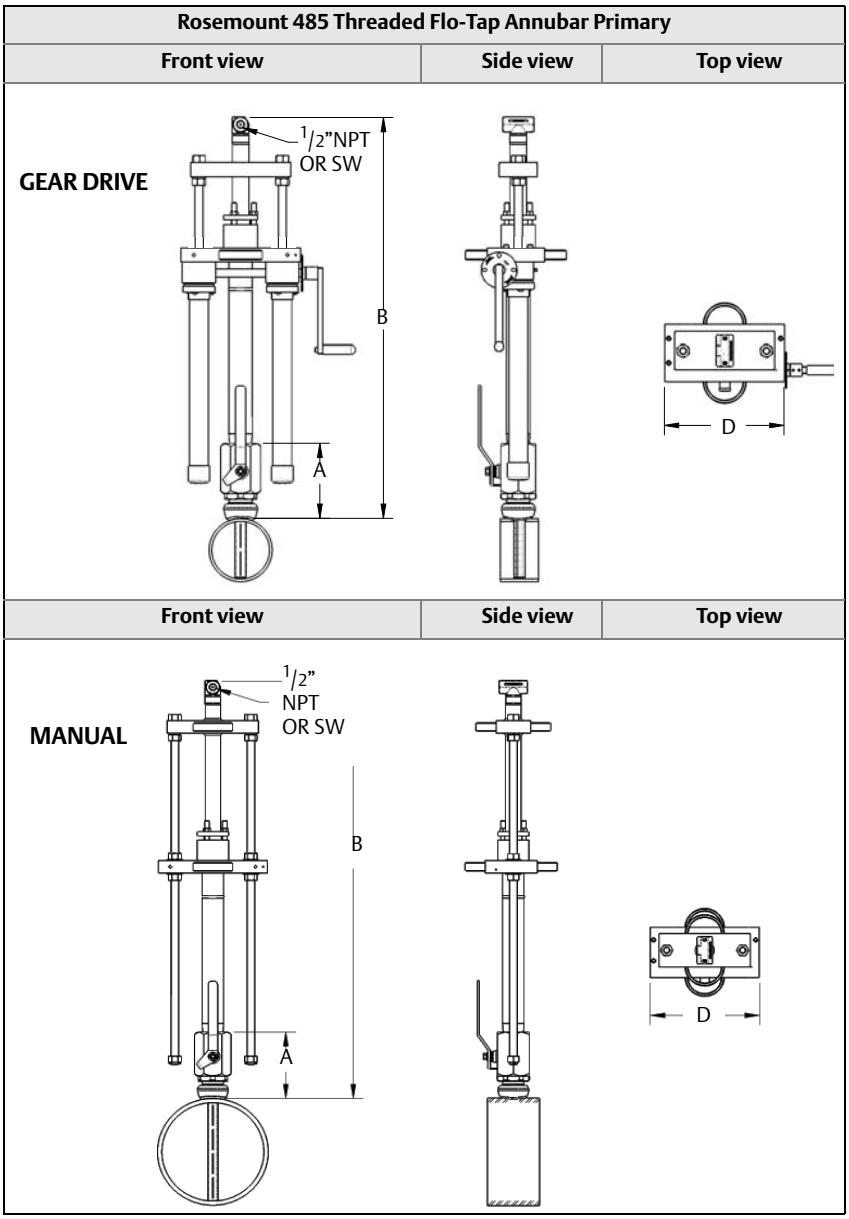


Table 30. 485 Threaded Flo-Tap Annubar Primary Dimensional Data(1)(2)

Sensor size	A ± 0.50 (12.7)	B^I (Max) (gear drive)	B^I (Max) (manual)	D (Max)
1	7.51 (190.9)	N/A	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)
3(3)	N/A	N/A	N/A	N/A

(1) Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I

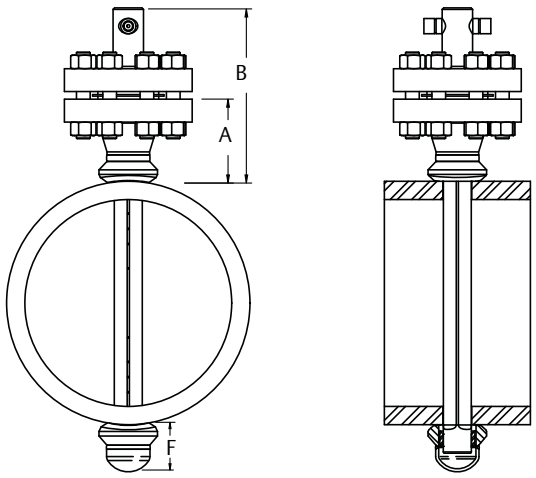
(2) Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

(3) Sensor Size 3 is not available in a Threaded Flo-Tap.

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 31. 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**

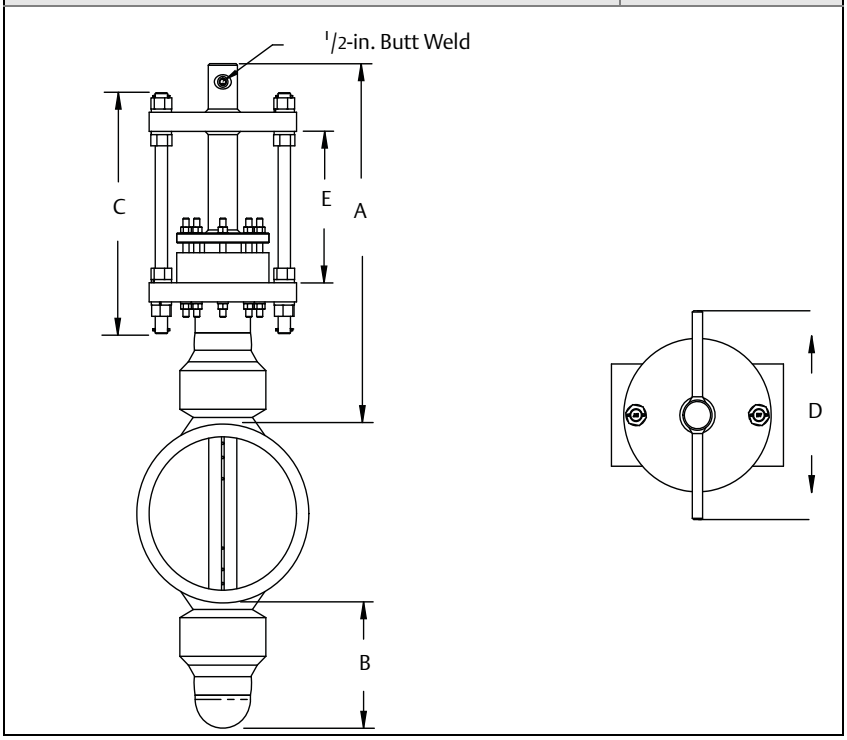


Table 32. 585 Main Steam Annubar w/ Opposite Side Support Annubar Dimensional Data

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

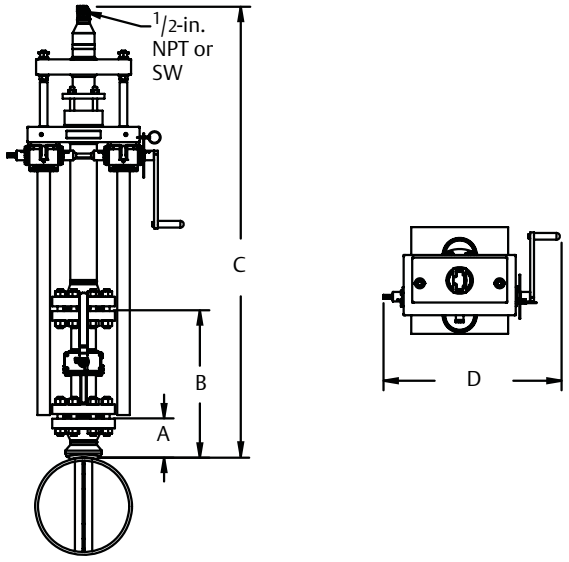
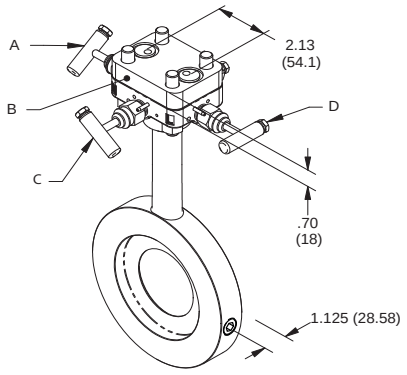
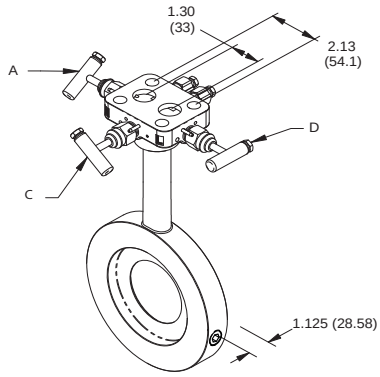
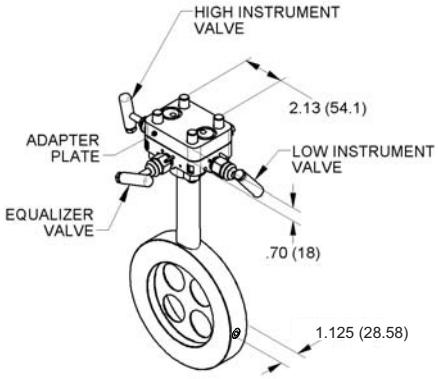
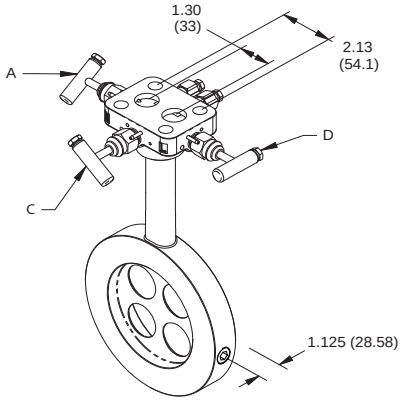
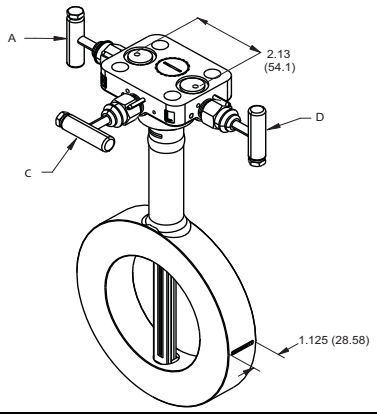


Table 33. 585 Flanged Flo-Tap Annubar Primary Dimensional Data

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)

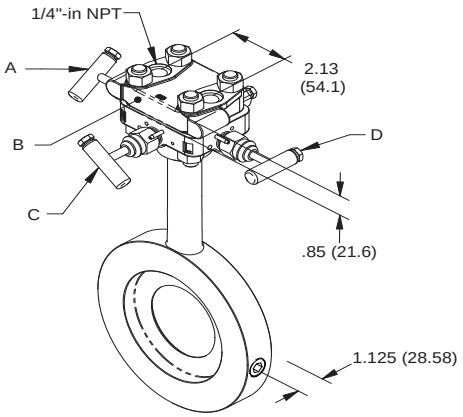
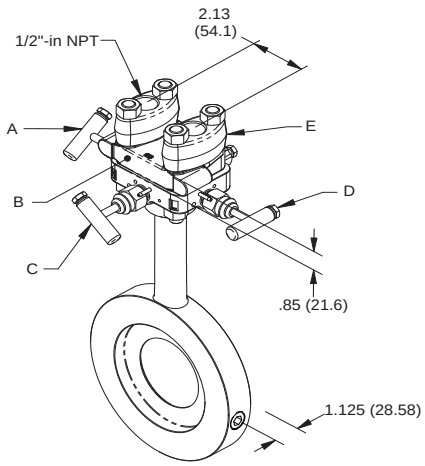
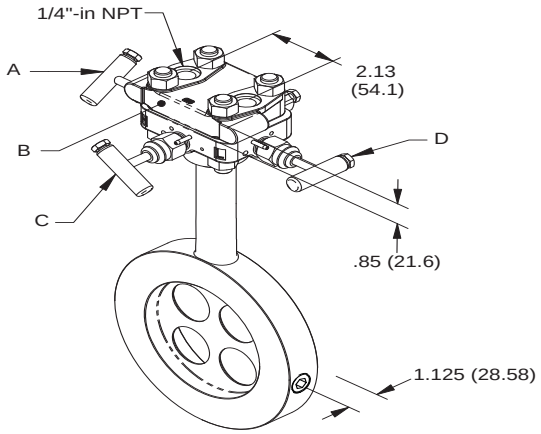
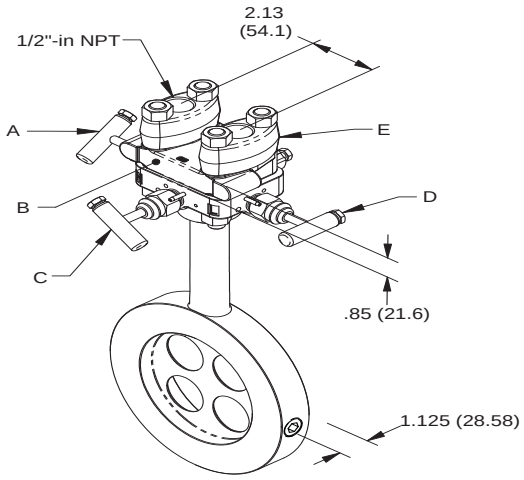
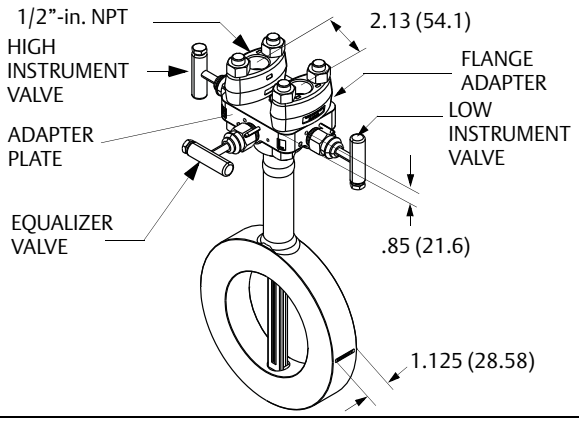
Use the appropriate formula to determine C value:
Inserted formula: Pipe I.D. + Wall Thickness + Value B + C^1 (use the Gear drive values for C^1)
Retracted formula: [2 x (Pipe I.D. + Wall Thickness + Value B)] + C^1 (use the Gear drive values for C^1)
Dimensions are in inches (millimeters).

405 dimensional drawings

	Rosemount 405 Compact Primary Element (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)		
Compact Annubar Primary Element (primary element type code A)	Transmitter Connection A3 not available with Primary Element Technology A	

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)		
Compact Annubar Primary Element (primary element type code A)	Transmitter Connection R3 not available with Primary Element Technology A	

1595 dimensional drawings

Rosemount 1595 Conditioning Orifice Plate

(ANSI flange, paddle, square edged)

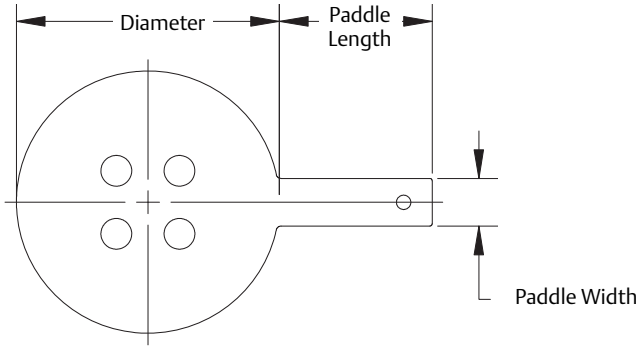


Table 34. Paddle Type Orifice Plate

Line size		Diameter for paddle type					Paddle length	Paddle width
	150#	300#	600#	900#	1500#	2500#		
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)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
16-in (400 mm)	20.250 (514.35)	21.250 (539.75)	22.250 (565.15)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
18-in. (450 mm)	21.500 (546.1)	23.375 (593.725)	24.000 (609.6)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
20-in. (500 mm)	23.750 (603.25)	25.625 (650.875)	26.750 (679.45)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
24-in. (600 mm)	28.125 (714.375)	30.375 (771.525)	31.000 (787.4)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)

Dimensions in inches (millimeters).

Note

Consult factory for availability of line sizes and flange ratings not shown in the above table.

1595U Orifice universal type (Universal, square edged)

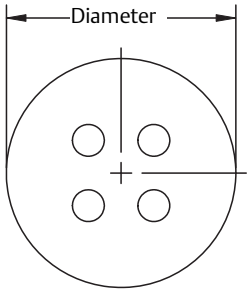


Table 35. A.P.I Ring No.'s and Rating

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 34 for line size and pressure rating availability.

Rosemount 1595 Conditioning Orifice Plate
(DIN flange, paddle, square edged)

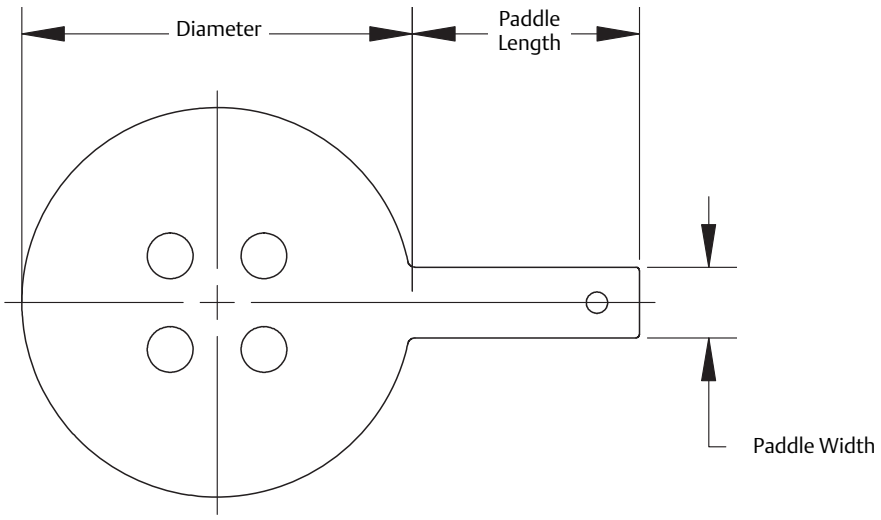


Table 36. 1595 Conditioning Orifice Plate

Line size	Diameter (max) – by flange rating						Paddle length	Paddle width
	PN 10	PN 16	PN 25	PN 40	PN 63/64	PN 100		
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)

Dimensions in millimeters (inches).

Note
Consult factory for availability of line sizes and flange ratings not shown in the above table.

Table 37. Available Beta Ratio (β)

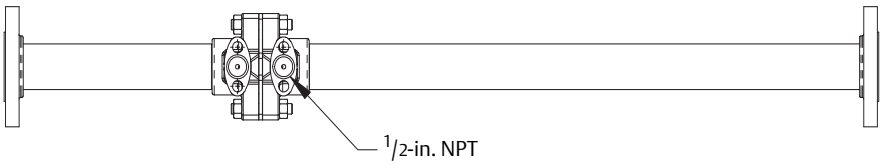
The table below shows the available Beta Ratio (β) for line size vs. pipe schedule.

Line size	Pipe schedule	Beta (β) available
2	≤ 80	0.20,0.40,0.50,0.60
2	160	0.20
2	XXS	0.20
3	≤ 80	0.20, 0.40, 0.50, 0.65
3	160	0.20, 0.40, 0.50
3	XXS	0.20
4	≤ 80	0.20, 0.40, 0.50, 0.65
4	120	0.20, 0.40, 0.50
4	160	0.20, 0.40, 0.50
4	XXS	0.20
6	≤ 80	0.20, 0.40, 0.50, 0.65
6	120	0.20, 0.40, 0.50
6	160	0.20, 0.40
6	XXS	0.20
8	≤ 80	0.20, 0.40, 0.50, 0.65
8	100	0.20, 0.40, 0.50, 0.65
8	120	0.20, 0.40, 0.50
14	≤ 80	0.20, 0.40,0.50, 0.65
14	100	0.20, 0.40, 0.50
14	120	0.20, 0.40, 0.50
14	140	0.20, 0.40, 0.50
14	160	0.20, 0.40
16	≤ 80	0.20, 0.40,0.50, 0.65
16	100	0.20, 0.40, 0.50
16	120	0.20, 0.40, 0.50
16	140	0.20, 0.40, 0.50
16	160	0.20, 0.40
18	≤ 80	0.20, 0.40,0.50, 0.65
18	100	0.20, 0.40,0.50, 0.65
18	120	0.20, 0.40, 0.50
18	140	0.20, 0.40, 0.50
18	160	0.20, 0.40, 0.50
8	140	0.20, 0.40, 0.50
8	160	0.20, 0.40
8	XXS	0.20, 0.40, 0.50
10	≤ 80	0.20, 0.40, 0.50, 0.65
10	100	0.20, 0.40, 0.50, 0.65
10	120	0.20, 0.40, 0.50
10	140	0.20, 0.40, 0.50
10	160	0.20, 0.40
10	XXS	0.20, 0.40, 0.50
12	≤ 80	0.20, 0.40, 0.50, 0.65
12	100	0.20, 0.40, 0.50
12	120	0.20, 0.40, 0.50
12	140	0.20, 0.40, 0.50
12	160	0.20, 0.40
12	XXS	0.20, 0.40, 0.50
20	≤ 80	0.20, 0.40,0.50, 0.65
20	100	0.20, 0.40,0.50, 0.65
20	120	0.20, 0.40, 0.50
20	140	0.20, 0.40, 0.50
20	160	0.20, 0.40, 0.50
24	≤ 80	0.20, 0.40,0.50, 0.65
24	100	0.20, 0.40
24	120	0.20, 0.40, 0.50
24	140	0.20, 0.40, 0.50
24	160	0.20, 0.40, 0.50

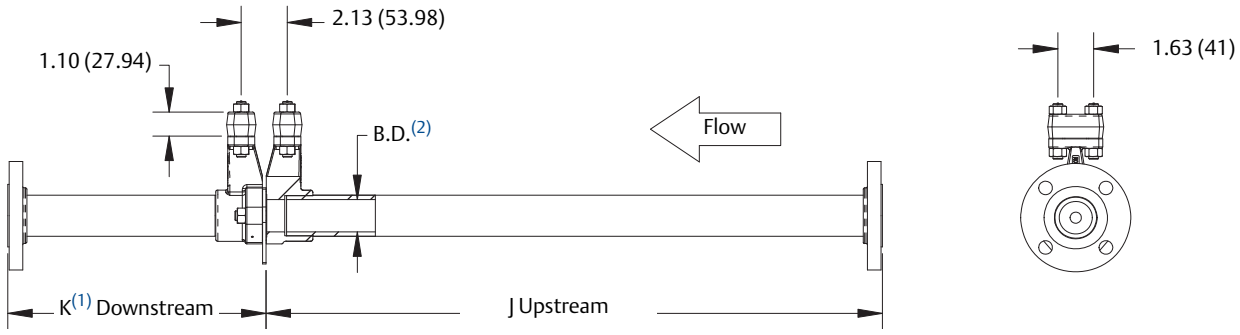
1195 dimensional drawings

Rosemount 1195 Integral Orifice Plate

Top view



Bottom view | **End view**



Dimensions are in inches (millimeters).

Table 38. 1195 Integral Orifice Plate Dimensional Data

Dimension	Line size		
	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)(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.

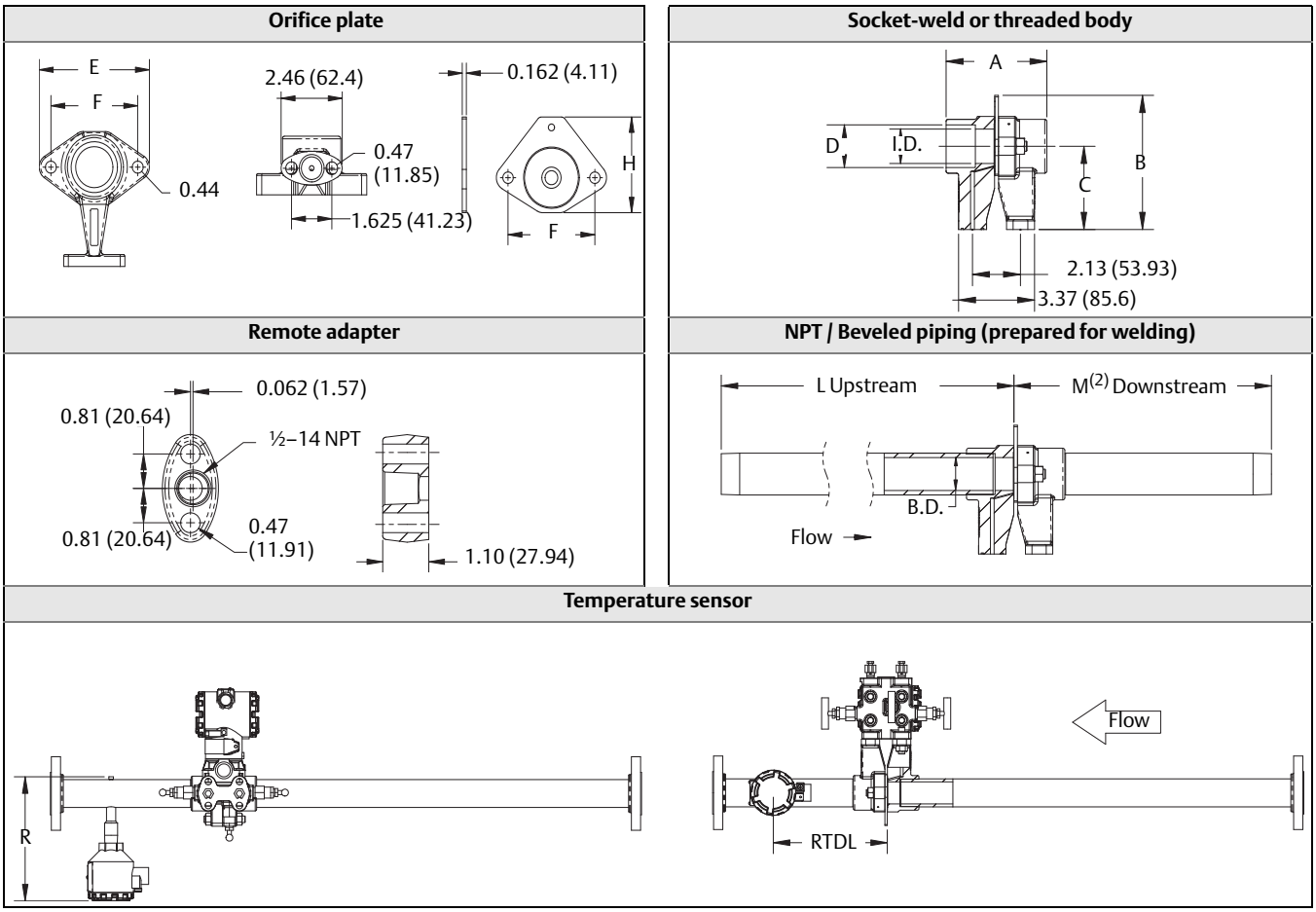


Table 39. 1195 Integral Orifice Dimensional Data

Dimension	Line size					
	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.

1495 dimensional drawings

1495PC Paddle Type Orifice Plate
(DIN, paddle, square edged, concentric)

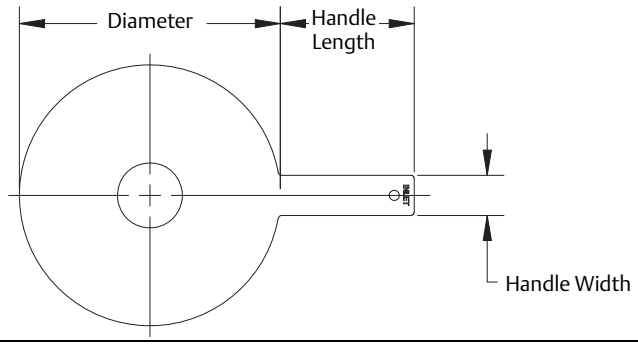
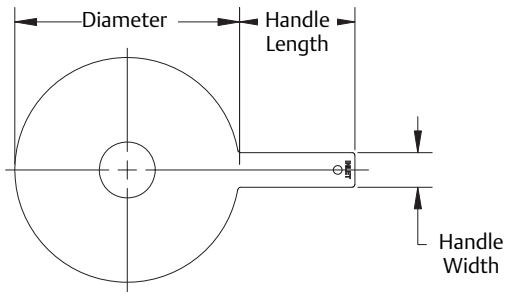


Table 40. 1495 Orifice Plate Dimensions

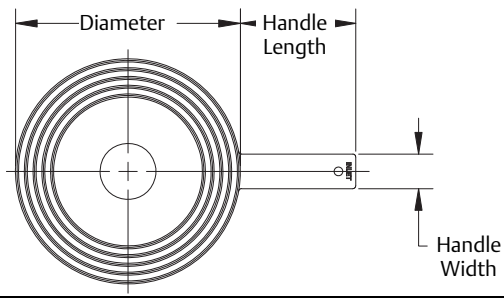
DN	Diameter (max) – by flange rating						Handle width	Handle length
	PN 10	PN 16	PN 25	PN 40	PN 63/64	PN 100		
DN 50	4.21 (107)	4.21 (107)	4.21 (107)	4.21 (107)	4.45 (113)	4.69 (119)	1.5 (40)	6.3 (160)
DN 65	5 (127)	5 (127)	5 (127)	5 (127)	5.43 (138)	5.67 (144)	1.5 (40)	6.3 (160)
DN 80	5.6 (142)	5.6 (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)	N/A	N/A	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)

Measurement is in inches (millimeters).

1495PC Orifice Paddle Type
(paddle, square edged, concentric)



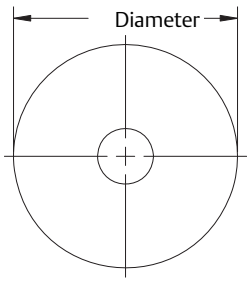
1495PG Orifice Paddle Type
(paddle, square edged, concentric, spiral finish)



Line size	Diameter for paddle type						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)	N/A	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)	N/A	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)	N/A	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)	N/A	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)	N/A	6.0 (152.4)	1.5 (38.1)

Measurement is in inches (millimeters).

1495UC Orifice Universal Type (universal, square edged, concentric)

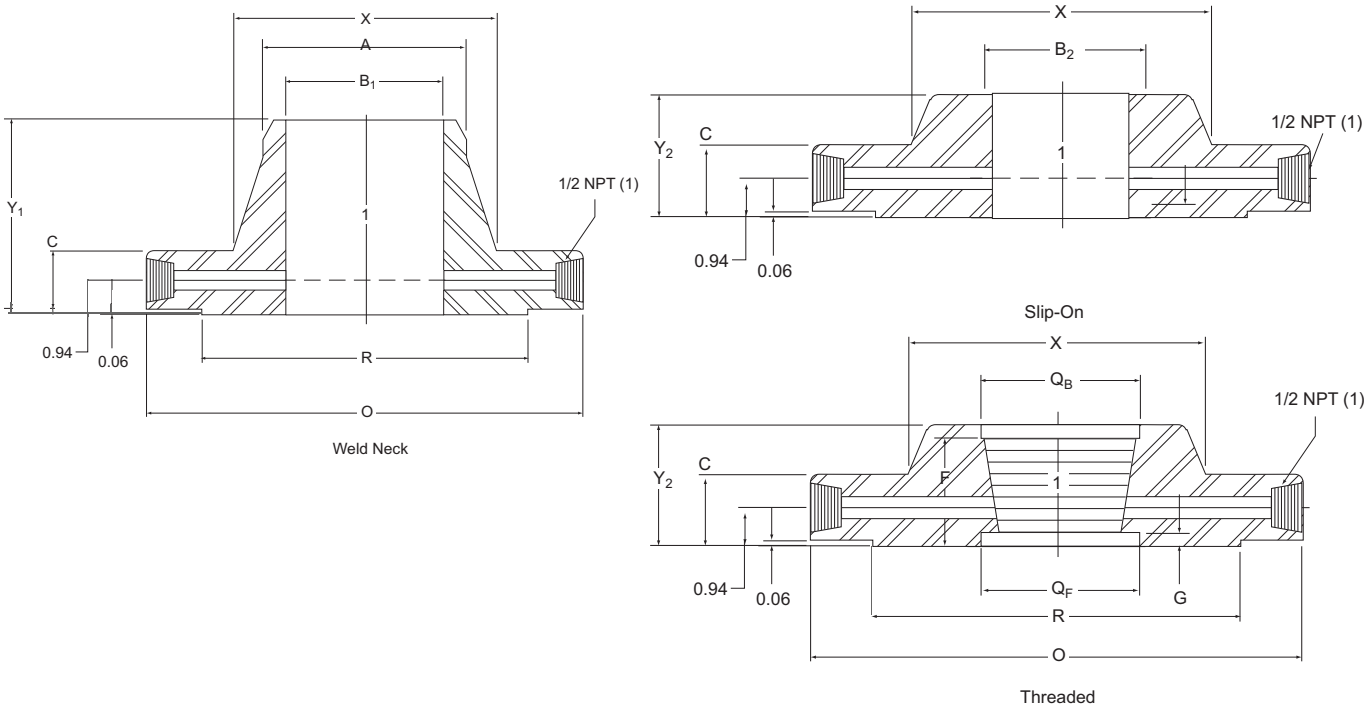


Line size	Diameter for universal type
2-in.	2.437 (61.8998)
2 1/2-in.	2.812 (71.4248)
3-in.	3.437 (87.2998)
4-in.	4.406 (111.912)
6-in.	6.437 (163.5)
8-in.	8.437 (214.3)
10-in.	10.687 (271.45)
12-in.	12.593 (319.862)
14-in.	14.000 (355.6)
16-in.	16.000 (406.4)
18-in.	18.000 (457.2)
20-in.	20.000 (508)
24-in.	24.000 (609.6)

Measurement is in inches (millimeters).

1496 dimensional drawings

Figure 5. Class 300



ASME B16.36-1996

Table 41. 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 ø	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

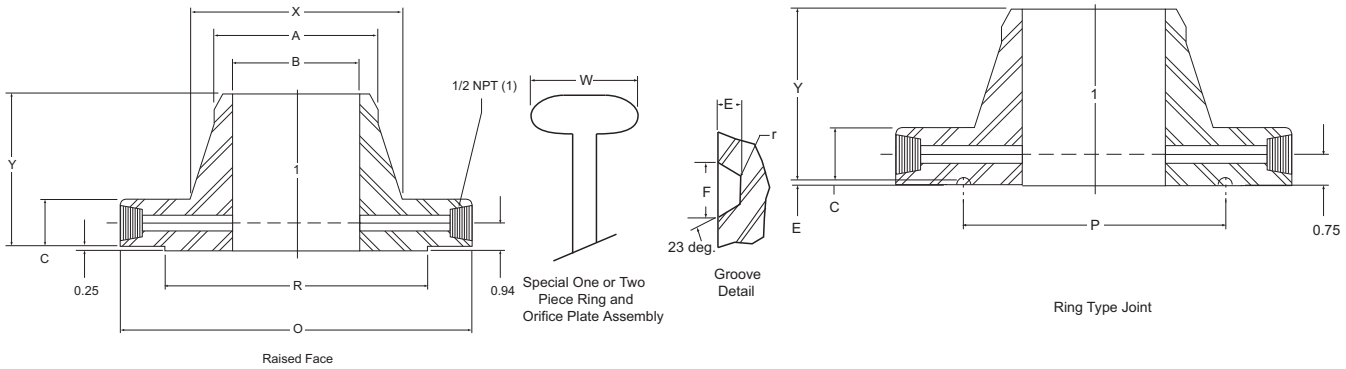


Table 42. Class 600 Orifice Flanges, Welding Neck[(1)(2)]

Nominal pipe size	Outside diameter of raised face R	Outside diameter of flange ø	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

Nominal pipe size[1][2]	Bore B	Diameter of pressure connection 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

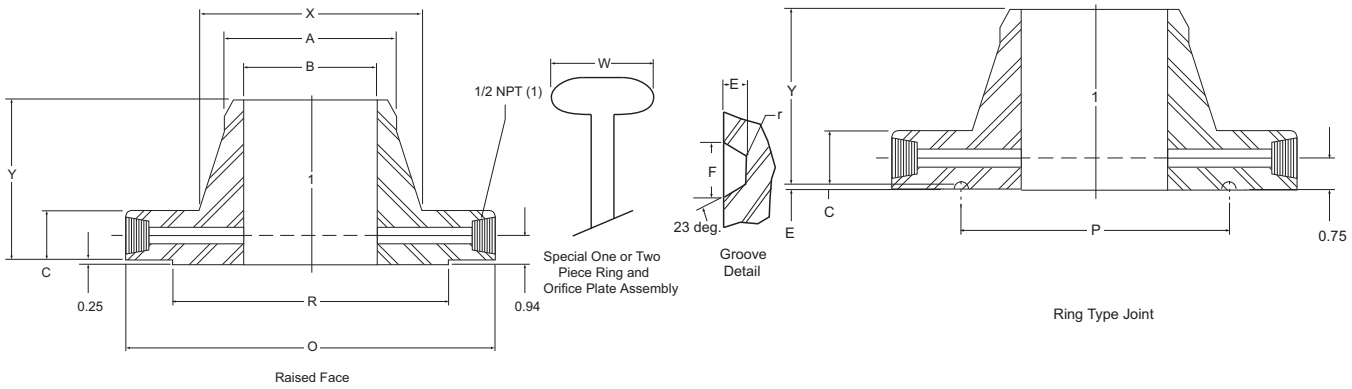


Table 43. Class 900 Orifice Flanges, Welding Neck(1)

Nominal pipe size	Outside diameter of raised face R	Outside diameter of flange ø	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

Nominal pipe size[1]	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	1	7/8	6.00	6.50
4		1/2	9.25	8	1 1/4	1 1/8	7.00	7.50
6		1/2	12.50	12	1 1/4	1 1/8	7.75	8.25
8		1/2	15.50	12	1 1/2	1 3/8	9.00	9.50
10		1/2	18.50	16	1 1/2	1 3/8	9.50	10.00
12		1/2	21.00	20	1 1/2	1 3/8	10.25	10.75
14		1/2	22.00	20	1 5/8	1 1/2	11.00	11.50
16		1/2	24.25	20	1 3/4	1 5/8	11.50	12.00
18		1/2	27.00	20	2	1 7/8	13.00	13.75
20		1/2	29.50	20	2 1/8	2	14.00	14.75
24		1/2	35.50	20	2 5/8	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

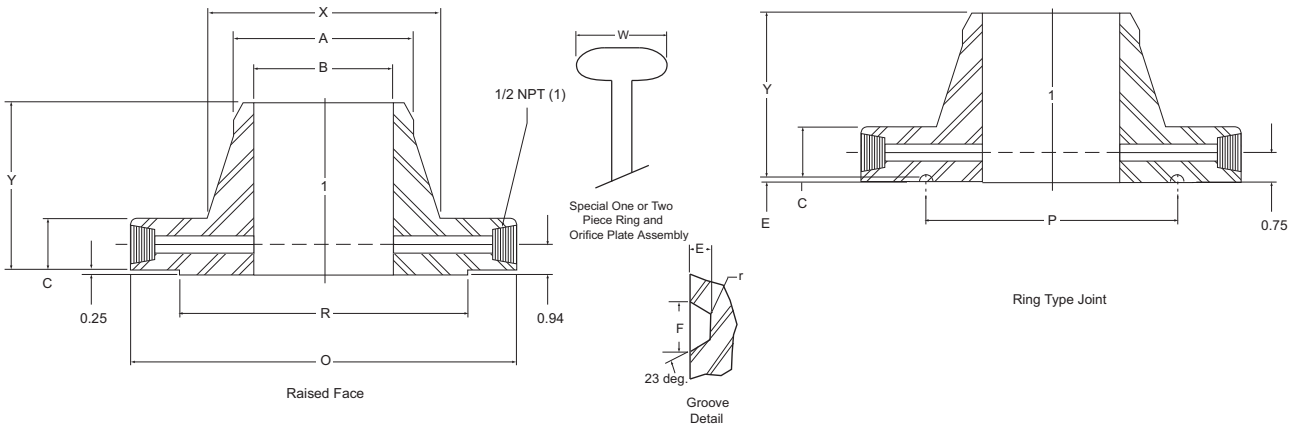


Table 44. Class 1500 Orifice Flanges, Welding Neck[1]

Nominal pipe size	Outside diameter of raised face R	Outside diameter of flange ø	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

Nominal pipe size[1]	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

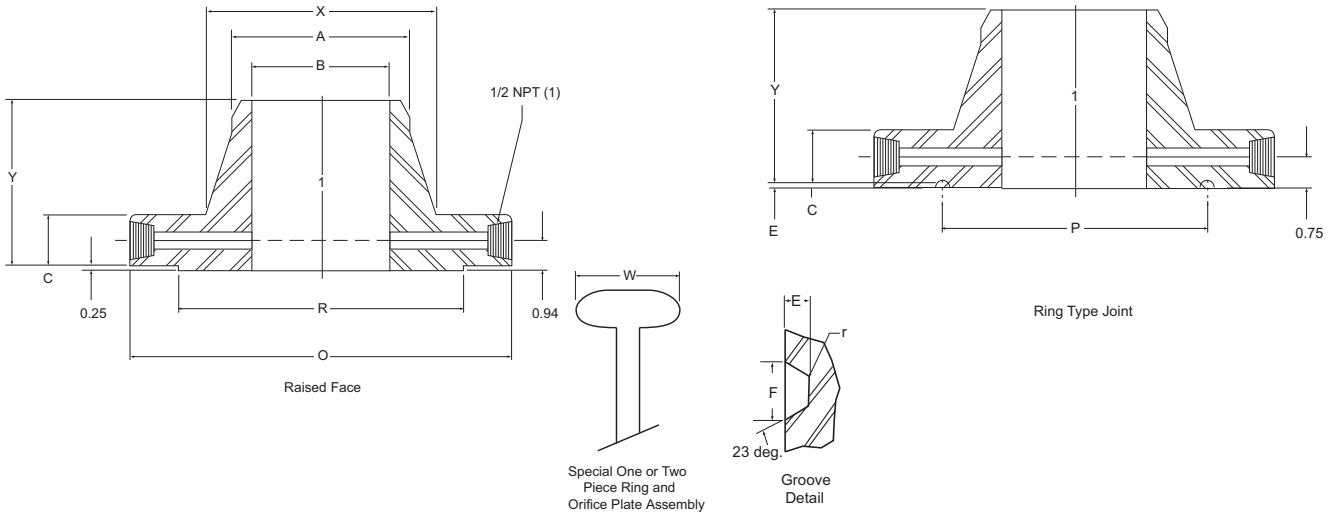


Table 45. Class 2500 Orifice Flanges, Welding Neck[(1)]

Nominal pipe size	Outside diameter of raised face R	Outside diameter of flange ø	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	G.roove 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

Nominal pipe size[1]	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	4.25	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.

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