Product Data Sheet
February 2017
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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 Rosemount Annubar™ Averaging Pitot Tube Technology
- Reduce straight pipe requirements to two diameters upstream and downstream from most flow disturbances with Conditioning Orifice Technology
- Improve accuracy and repeatability in small line sizes with Integral Orifice Plate Technology

EMERSON

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 percent mass flow rate accuracy
- Multivariable capabilities allow for real time fully compensated mass and energy flow
- Advanced diagnostics predict and prevent abnormal process conditions
- Installation ready wireless flow solution
- Ultra for Flow measures percent-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)
- Available with 4–20 mA HART®, *Wireless*HART, and FOUDATION™ Fieldbus Protocols

Rosemount 3051CF Flowmeters combine the proven 3051C Pressure Transmitter and the latest primary element technology

- Up to 1.65 percent 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

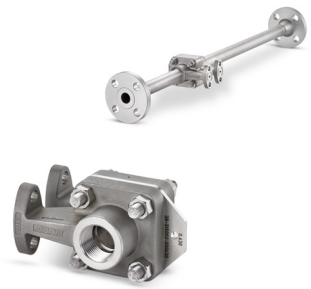
Rosemount Annubar Primary Element Technology

- Energy savings gained through minimal permanent pressure loss
- Innovative T-shape design providing accuracies up to ±0.75 percent of flow rate (Rosemount 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 (Rosemount 585 Annubar Primary Element)
- Rosemount 405A Compact Annubar primary element easily installs like an orifice plate
- Integral thermowell allows temperature measurement without additional pipe penetrations for Rosemount 485, 585, 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 percent
- 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 percent of flow rate
- Installation flexibility with numerous process connections
- Integral thermowell allows temperature measurement without an additional pipe penetration

Rosemount 3051SF DP Flowmeters

Rosemount 3051SFA

Rosemount 3051SFC

Rosemount 3051SFP

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)
- 4–20 mA HART, *Wireless*HART, 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 195

Rosemount 3051SFA Annubar Flowmeter ordering information

- Rosemount 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 42 for more information on material selection.

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	Measurement type		• = Available — = Unavailable
		D	1-7	
3051SFA	Rosemount Annubar Flowmeter	•	•	
Measurement type				
1	Fully compensated mass and energy flow calculations – Differential and static pressures with temperature	—	•	★
2	Compensated flow calculations – Differential and static pressures	—	•	★
3	Compensated flow calculations – Differential pressure and temperature	—	•	★
4	Compensated flow calculations – Differential pressure	—	•	★
D	Differential pressure	•	—	★
5	Process variables only (no flow calculations) – Differential and static pressures with temperature	—	•	★
6	Process variables only (no flow calculations) – Differential and static pressures	—	•	★
7	Process variables only (no flow calculations) – Differential pressure and temperature	—	•	★
Fluid type				
L	Liquid	•	•	★
G	Gas	•	•	★
S	Steam	•	•	★

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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 (see "Pipe I.D. range code for Rosemount Annubar Flowmeters and Primary Elements" on page 143)				
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. (300 mm)	•	•	
Pipe material/mounting assembly material				
C	Carbon steel (A105)	•	•	★
S	316 Stainless steel	•	•	★

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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	•	•	★
Rosemount 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- to 8-in. (50 to 200 mm)	•	•	★
2	Sensor size 2 — Line sizes 6- to 96-in. (150 to 2400 mm)	•	•	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	•	•	★
Mounting type				
T1	Compression/threaded connection	•	•	★
A1	Class 150 RF ANSI	•	•	★
A3	Class 300 RF ANSI	•	•	★
A6	Class 600 RF ANSI	•	•	★
D1	DN PN16 flange	•	•	★
D3	DN PN40 flange	•	•	★
D6	DN PN100 flange	•	•	★
A9[2]	Class 900 RF ANSI	•	•	
AF[2]	Class 1500 RF ANSI	•	•	
AT[2]	Class 2500 RF ANSI	•	•	
R1	Class 150 RTJ ANSI flange	•	•	
R3	Class 300 RTJ ANSI flange	•	•	
R6	Class 600 RTJ ANSI flange	•	•	
R9[2]	Class 900 RTJ ANSI flange	•	•	
RF[2]	Class 1500 RTJ ANSI flange	•	•	
RT[2]	Class 2500 RTJ ANSI flange	•	•	

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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			•	•	★
	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	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 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 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)			•	•	★

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Static pressure range						
A[4]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55,15 bar)			—	•	★
E[5]	Absolute 0 to 3626 psia (0 to 250,00 bar)			—	•	★
J	Gage –14.2 to 800 psig (–0.98 to 55,15 bar)			—	•	★
K[5]	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[6]	FOUNDATION Fieldbus protocol (requires PlantWeb™ housing)			•	•	★
X[7][8]	Wireless (requires wireless options and Wireless PlantWeb housing)			•	•	★
Transmitter housing style		**Material**	**Conduit entry size**			
00	None (customer-supplied electrical connection)	N/A	N/A	•	—	★
1A	PlantWeb housing	Aluminum	1/2–14 NPT	•	•	★
1B	PlantWeb housing	Aluminum	M20 × 1.5	•	•	★
1J	PlantWeb housing	SST	1/2–14 NPT	•	•	★
1K	PlantWeb housing	SST	M20 × 1.5	•	•	★
2A	Junction box housing	Aluminum	1/2–14 NPT	•	—	★
2B	Junction box housing	Aluminum	M20 × 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 × 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[9]	Wireless PlantWeb housing	Aluminum	1/2–14 NPT	•	•	★
5J[9]	Wireless PlantWeb housing	SST	1/2–14 NPT	•	•	★
7J[7][10]	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[11]						
Rosemount 3051S MultiVariable™ SuperModule™, Measurement Types 1, 2, 5, and 6						
3[12]	Ultra for flow: 0.8% flow rate accuracy, 14:1 flow turndown, 15-year stability, 15-year limited warranty			•	•	★
5	Classic MV: 1.15% flow rate accuracy, 8:1 flow turndown, 15-yr. stability			—	•	★

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Rosemount 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[12]	Ultra for flow: 0.8% flow rate accuracy, 14:1 flow turndown, 15-year stability, 15-year limited warranty	•	•	★

Wireless options[8] (requires option code X and wireless PlantWeb housing)

Update rate, operating frequency and protocol		**D**	**1-7**	
WA3	User configurable update rate, 2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	•	•	★
Omni-directional wireless antenna and SmartPower™				
WK1	External antenna, adapter for Black Power module (I.S. Power Module sold separately)	•	•	★
WM1	Extended range, external antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	★
WN1	High-gain, remote antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	

Other options (include with selected model number)

HART Revision configuration (requires HART Protocol output code A)[13]		**D**	**1-7**	
HR7	Configured for HART Revision 7	•	—	★
Extended product warranty				
WR3	3-year limited warranty	•	•	★
WR5	5-year limited warranty	•	•	★
Pressure testing[14]				
P1	Hydrostatic testing with certificate	•	•	
PX	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 and dimensional inspection with certificate	•	•	★
QC7	Inspection and performance certificate	•	•	★

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Surface finish				
RL	Surface finish for low pipe Reynolds number in gas and steam	•	•	★
RH	Surface finish for high pipe Reynolds number in liquid	•	•	★
Material traceability certification[15]				
Q8	Material traceability certificate per EN 10204:2004 3.1	•	•	★
Code conformance[16]				
J2	ANSI/ASME B31.1	•	•	
J3	ANSI/ASME B31.3	•	•	
J5[17]	NACE MR-0175/ISO 15156	•	•	
J6	European Pressure Directive (PED)	•	•	★
J1	Canadian Registration	•	•	
Installed in flanged pipe spool section				
H3	Class 150 flanged connection with Rosemount standard length and schedule	•	•	
H4	Class 300 flanged connection with Rosemount standard length and schedule	•	•	
H5	Class 600 flanged connection with Rosemount standard length and schedule	•	•	
Instrument connections for remote mount option				
G2	Needle valves, stainless steel	•	•	★
G6	OS and Y gate valve, stainless steel	•	•	★
G1	Needle valves, carbon steel	•	•	
G3	Needle valves, alloy C-276	•	•	
G5	OS and Y gate valve, carbon steel	•	•	
G7	OS and 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 and tamper evident seal	•	•	★
Quality certification for safety[20][25]				
QS	Prior-use certificate of FMEDA data	•	—	★
QT[19]	Safety certified to IEC 61508 with certificate of FMEDA data	•	—	★

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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	•	•	★
IE	FM FISCO Intrinsically Safe for FOUNDATION Fieldbus Protocol only.	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[(18)]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
IF	CSA FISCO Intrinsic Safety	•	•	★
K6[(18)]	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	•	•	★
IG	IECEx FISCO Intrinsic Safety	•	•	★
N7	IECEx Type n	•	•	★
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	•	•	★
EP	Republic of Korea Flameproof	•	•	★
IP	Republic of Korea Intrinsic Safety	•	•	★
KP	Republic of Korea Flameproof, Intrinsic Safety	•	•	★
KA	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Div 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[(18)]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
KG	ATEX, FM, CSA, and IECEx FISCO Intrinsic Safety (combination of IA, IE, IF, and I7)	•	•	★
E2	INMETRO Flameproof	•	•	★

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Shipboard approvals				
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[19]				
M5	PlantWeb LCD display (requires PlantWeb housing)	•	•	★
M7[20][21][22]	Remote mount LCD display and interface, PlantWeb housing, no cable; SST bracket	•	—	★
M8[20][21]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable; SST bracket	•	—	★
M9[20][21]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable; SST bracket	•	—	★
Transient protection[23]				
T1	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	•	•	
PlantWeb control functionality				
A01	FOUNDATION Fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb diagnostic functionality				
D01	FOUNDATION Fieldbus Diagnostics Suite	•	—	★
DA2[24][25]	Advanced HART Diagnostic Suite	•	—	★
PlantWeb enhanced measurement functionality[26]				
H01	FOUNDATION Fieldbus fully compensated mass flow block	•	—	★
Cold temperature[27]				
BRR	–60 °F (–51 °C) Cold temperature start-up	•	•	★
Alarm limit[20][25]				
C4	NAMUR alarm and saturation levels, high alarm	•	•	★
C5	NAMUR alarm and saturation levels, high alarm	•	•	★

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C6	Custom alarm and saturation levels, high alarm	•	•	★
C7	Custom alarm and saturation levels, high alarm	•	•	★
C8	Low alarm (standard Rosemount alarm and saturation levels)	•	•	★
Hardware adjustments and ground screw				
D1[20][25][28]	Hardware adjustments (zero, span, alarm, security)	•	—	★
D4[29]	External ground screw assembly	•	•	★
DA[20][25][28]	Hardware adjustments (zero, span, alarm, security) and external ground screw assembly	•	—	★
Conduit plug				
DO	316 SST Conduit plug	•	•	★
Conduit electrical connector[30]				
GE	M12, 4-pin, male connector (eurofast®)	•	•	★
GM	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. Required for measurement type codes 3, 4, 7, and D.
5. 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).
6. Transmitter output code F is only available with measurement type code 1, 2, 5, 6, and D.
7. Only intrinsically safe approval codes apply.
8. Only available with measurement types D and 6.
9. Only available with output code X.
10. Only available with output code A.
11. For detailed specifications see “Specifications” on page 35.
12. Only available with differential pressure ranges 2 and 3, and silicone fill fluid.
13. Option HR7 configures the HART output to HART Revision 7. This option requires the selection of the advanced diagnostic (DA2) option. The device with this option can be field configured to HART Revision 5 or 7 if desired.
14. Applies to assembled flowmeter only, mounting not tested.
15. Instrument connections for remote mount options and isolation valves for Flo-Tap models are not included in the Material Traceability Certification.
16. Not available with transmitter connection platform 6.
17. 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.
18. Not available with M20 or G^1/2 conduit entry size.
19. Not available with housing code 7J.
20. Not available with output code X. Only available with measurement type D.
21. Not available with output code F, option code DA2, or option code QT.
22. See the Rosemount 3051S Reference Manual for cable requirements. Contact an Emerson representative for additional information.
23. 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.
24. Includes hardware adjustments (option code D1) as standard. Not available with output code X. Only available with measurement type D.
25. Not available with output code F.
26. Requires Rosemount Engineering Assistant to configure (to ensure correct operation download the Engineering Assistant software at: Emerson.com/Rosemount/Engineering Assistant Software).
27. –58 °F (50 °C) for measurement type 1-7.

28. Not available with housing codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
29. 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.
30. 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 42 for more information on material selection.

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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 and energy flow calculations – Differential and Static Pressures with Temperature	—	•	★
2	Compensated flow calculations – Differential and Static Pressures	—	•	★
3	Compensated flow calculations – Differential Pressure and Temperature	—	•	★
4	Compensated flow calculations – Differential Pressure	—	•	★
D	Differential Pressure	•	—	★
5	Process variables only (no flow calculations) – Differential and Static Pressures with Temperature	—	•	
6	Process variables only (no flow calculations) – Differential and Static Pressures	—	•	
7	Process variables only (no flow calculations) – Differential Pressure and Temperature	—	•	
Primary element technology				
A	Rosemount 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 starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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						
N000	Rosemount 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[5]	Integral RTD			—	•	★
0	No temperature sensor			•	•	★
R[5]	Remote thermowell and RTD			•	•	
Transmitter connection platform						
3	Direct-mount, integral 3-valve manifold			•	•	★
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[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[8][9]	FOUNDATION Fieldbus protocol			•	•	★
X[10][11]	Wireless			•	•	★
Transmitter housing style		**Material**	**Conduit entry size**			
00	None (customer-supplied electrical connection)	N/A	N/A	•	—	★
1A	PlantWeb housing	Aluminum	1/2–14 NPT	•	•	★
1B	PlantWeb housing	Aluminum	M20 × 1.5	•	•	★
1J	PlantWeb housing	SST	1/2–14 NPT	•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

1K	PlantWeb housing	SST	M20 × 1.5	•	•	★
2A	Junction box housing	Aluminum	1/2–14 NPT	•	—	★
2B	Junction box housing	Aluminum	M20 × 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 × 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[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)	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[14]						
Rosemount 3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3[15]	Ultra for flow: 0.75% flow rate accuracy, 14:1 flow turndown, 15-yr stability, 15-yr limited warranty			•	•	★
5	Classic MV: 1.10% flow rate accuracy, 8:1 flow turndown, 15-yr stability			—	•	★
Rosemount 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**	
WA3	User configurable update rate, 2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	•	•	★
Omni-directional wireless antenna and SmartPower™			
WK1	External antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	★
WM1	Extended range, external antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	★
WN1	High-gain, remote antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Other options (include with selected model number)

HART Revision configuration (requires HART Protocol output code A)[16]		**D**	**1-7**	
HR7	Configured for HART Revision 7	•	—	★
Extended product warranty				
WR3	3-year limited warranty	•	•	★
WR5	5-year limited warranty	•	•	★
Installation accessories				
A	ANSI alignment ring (Class 150) (only required for 10- and 12-in. [250 and 300 mm] line sizes)	•	•	★
C	ANSI alignment ring (Class 300) (only required for 10- and 12-in. [250 and 300 mm] line sizes)	•	•	★
D	ANSI alignment ring (Class 600) (only required for 10- and 12-in. [250 and 300 mm] 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 ($^1/_2$ NPT)	•	•	★
High temperature applications				
T	Graphite valve packing (T_{max} = 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), Rosemount Annubar option A (schedule 40)	•	•	
Pressure testing				
P1	Hydrostatic testing with certificate	•	•	
Special cleaning[20]				
P2	Cleaning for special processes	•	•	
PA	Cleaning per ASTM G93 Level D (section 11.4)	•	•	
Special inspection				
QC1	Visual and dimensional Inspection with certificate	•	•	★
QC7	Inspection and performance certificate	•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Transmitter calibration certification				
Q4	Calibration data certificate for transmitter	•	•	★
QP	Calibration certificate and tamper evident seal	•	•	★
Quality certification for safety[21][22]				
QS	Prior-use certificate of FMEDA data	•	—	★
QT[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	•	•	
J5	NACE MR-0175/ISO 15156[23]	•	•	
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	•	•	★
IE	FM FISCO Intrinsic Safety	•	•	★
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	•	•	★
IF	CSA FISCO Intrinsic Safety	•	•	★
K6[24]	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	•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

IG	IECEx FISCO Intrinsic Safety: for FOUNDATION Fieldbus Protocol only	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
EP	Republic of Korea Flameproof	•	•	★
IP	Republic of Korea Intrinsic Safety	•	•	★
KP	Republic of Korea Flameproof, 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)	•	•	★
E2	INMETRO Flameproof	•	•	★
I2	INMETRO Intrinsic Safety	•	•	★
K2	INMETRO Flameproof, Intrinsic Safety	•	•	★
IB	INMETRO FISCO Intrinsic Safety	•	—	★
Shipboard approvals				
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. (15 m) cable, SST bracket	•	—	★
M9[22][26]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	•	—	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Transient protection[28]				
T1	Transient terminal block	•	•	★
Manifold for remote mount option				
F2	3-valve manifold, SST	•	•	★
F6	5-valve manifold, SST	•	•	★
PlantWeb control functionality				
A01	FOUNDATION Fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb diagnostic functionality				
D01	FOUNDATION Fieldbus Diagnostics Suite	•	—	★
DA2[29]	Advanced HART Diagnostic Suite	•	—	★
H01	FOUNDATION Fieldbus fully compensated mass flow block	•	—	★
Cold temperature [30]				
BRR	–60 °F (–51 °C) Cold temperature start-up	•	•	★
Alarm limit[21][22]				
C4	NAMUR alarm and saturation levels, high alarm	•	•	★
C5	NAMUR alarm and saturation levels, low alarm	•	•	★
C6	Custom alarm and saturation levels, high alarm	•	•	★
C7	Custom alarm and saturation levels, low alarm	•	•	★
C8	Low alarm (standard Rosemount alarm and saturation levels)	•	•	★
Hardware adjustments and ground screw				
D1[21][22][31]	Hardware adjustments (zero, span, alarm, security).	•	—	★
D4[32]	External ground screw assembly	•	•	★
DA[21][22][31]	Hardware adjustments (zero, span, alarm, security) and external ground screw assembly	•	—	★
Conduit plug				
DO	316 SST Conduit plug	•	•	★
Conduit electrical connector[33]				
ZE	M12, 4-pin, male connector (eurofast)	•	•	★
ZM	A size mini, 4-pin, male connector (minifast)	•	•	★
Typical model number: 3051SFC 1 C S 060 N 065 T 3 2 J A 1A 3				

1. Available with primary element technology P only.
2. For the 10- and 12-in. (250 and 300 mm) line sizes, the alignment ring must be ordered (installation accessories).
3. 10- and 12-in. (250 and 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. Only available with measurement type codes 1, 3, 5, 7.
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. Requires PlantWeb housing.
9. Transmitter output code F is only available with measurement type code 1, 2, 5, 6, and D.
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. Option HR7 configures the HART output to HART Revision 7. This option requires the selection of the advanced diagnostics (DA2) option. The device with this option can be field configured to HART Revision 5 or 7 if desired.
17. Available with primary element technology code C only.
18. Available with primary element technology codes C or A only.
19. For Rosemount 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 $G^1/2$ 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 Rosemount 3051S Reference Manual for cable requirements. Contact an Emerson 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. –58 °F (50 °C) for measurement type 1-7.
31. Not available with housing codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
32. This assembly is included with options EP, KP, E1, N1, K1, ND, E4, E7, K7, E3, KA, KC, KD, IA, T1, EM, and KM.
33. 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 42 for more information on material selection.

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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 and energy flow calculations – Differential and Static Pressures with Temperature	—	•	★
2	Compensated flow calculations – Differential and Static Pressures	—	•	★
3	Compensated flow calculations – Differential Pressure and Temperature	—	•	★
4	Compensated flow calculations – Differential Pressure	—	•	★
D	Differential Pressure	•	—	★
5	Process variables only (no flow calculations) – Differential and Static Pressures with Temperature	—	•	
6	Process variables only (no flow calculations) – Differential and Static Pressures	—	•	
7	Process variables only (no flow calculations) – Differential Pressure and Temperature	—	•	
Body material and type				
F	316 SST, enhanced support body	•	•	★
S	316 SST, traditional body	•	•	★
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	•	•	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

W3	Pipe ends: flanged, RF, ANSI Class 300, weld-neck	•	•	★
W6	Pipe ends: flanged, RF, ANSI Class 600, weld-neck	•	•	★
W9	Pipe ends: flanged, RF, ANSI Class 900, 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	•	•	
R9	Pipe ends: flanged, RTJ, ANSI Class 900, weld-neck	•	•	
P9	Special process connection	•	•	
Orifice plate material				
S	316/316L 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	•	•	

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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 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[4]	FOUNDATION Fieldbus (requires PlantWeb housing)			•	•	★
X[5][6]	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 × 1.5	•	•	★
1J	PlantWeb housing	SST	1/2-14 NPT	•	•	★
1K	PlantWeb housing	SST	M20 × 1.5	•	•	★
2A	Junction box housing	Aluminum	1/2-14 NPT	•	—	★
2B	Junction box housing	Aluminum	M20 × 1.5	•	—	★
2E	Junction box housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

2F	Junction box housing with output for remote display and interface	Aluminum	M20 × 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[7]	Wireless PlantWeb housing	Aluminum	1/2–14 NPT	•	•	★
5J[7]	Wireless PlantWeb housing	SST	1/2–14 NPT	•	•	★
7J[5][8]	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[9]						
	Rosemount 3051S MultiVariable SuperModule, measurement types 1, 2, 5, and 6					
3[10]	Ultra for flow: 0.95% flow rate accuracy, 14:1 flow turndown, 15-year stability, 15-year limited warranty			•	•	★
5	Classic MV: 1.25% flow rate accuracy, 8:1 flow turndown, 15-year stability			—	•	★
	Rosemount 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[10]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 15-year stability, 15-year limited warranty			•	•	★

Wireless options[6] (requires option code X and wireless PlantWeb housing)

Update rate, operating frequency and protocol		**D**	**1-7**	
WA3	User configurable update rate, 2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	•	•	★
Omni-directional wireless antenna and SmartPower™				
WK1	External antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	★
WM1	Extended range, external antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	★
WN1	High-gain, remote antenna, adapter for Black Power Module (I.S. Power Module sold separately)	•	•	

Other options (include with selected model number)

HART Revision configuration (requires HART Protocol output code A)[11]		**D**	**1-7**	
HR7	Configured for HART Revision 7	•	—	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Extended product warranty				
WR3	3-year limited warranty	•	•	★
WR5	5-year limited warranty	•	•	★
Transmitter/body bolt material[12]				
G	High temperature option (554 °F [290 °C])	•	•	
Temperature sensor[13]				
T	Thermowell and RTD	•	•	★
Optional connection				
G1	DIN 19213 Transmitter connection	•	•	★
Pressure testing[14]				
P1	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, W6, and W9)	•	•	
Flow calibration[15]				
WD	Discharge coefficient verification	•	•	
WZ	Special calibration	•	•	
Special inspection				
QC1	Visual and dimensional Inspection with certificate	•	•	★
QC7	Inspection and performance certificate	•	•	★
Material traceability certification				
Q8	Material certification per EN 10204:2004 3.1	•	•	★
Code conformance[16]				
J2	ANSI/ASME B31.1	•	•	
J3	ANSI/ASME B31.3	•	•	
J4	ANSI/ASME B31.8	•	•	
Materials conformance[17]				
J5	NACE MR-0175/ISO 15156	•	•	

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

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Country certification				
J6	European Pressure Directive (PED)	•	•	★
J1	Canadian registration	•	•	
Transmitter calibration certification				
Q4	Calibration data certificate for transmitter	•	•	★
Quality certification for safety[18][19]				
QS	Prior-use Certificate of FMEDA data	•	—	★
QT[22]	Safety-certified to IEC 61508 with Certificate of FMEDA data	•	—	★
Product certifications[20]				
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	•	•	★
IE	FM FISCO Intrinsic Safety	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[21]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[21]	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	•	•	★
IG	IECEx FISCO Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
KG	IECEx, FM, CSA, and IECEx FISCO Intrinsic Safety (combination of IA, IE, IF, and IG)	•	•	★
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	•	•	★
EP	Republic of Korea Flameproof	•	•	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

IP	Republic of Korea Intrinsic Safety	•	•	★
KP	Republic of Korea Flameproof, Intrinsic Safety	•	•	★
KA[21]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[21]	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[21]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
E2	INMETRO Flameproof	•	•	★
Shipboard approvals				
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[22]				
M5	PlantWeb LCD display (requires PlantWeb housing)	•	•	★
M7[18][23][24]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	—	★
M8[18][24]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	•	—	★
M9[18][24]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	•	—	★
Transient protection[25]				
T1	Transient terminal block	•	•	★
T2	Terminal block with WAGO spring clamp terminals	•	—	
T3	Transient terminal block with WAGO spring clamp terminals	•	—	
PlantWeb control functionality				
A01	FOUNDATION Fieldbus advanced control function block suite	•	•	★
PlantWeb diagnostic functionality				
D01	FOUNDATION Fieldbus Diagnostics Suite	•	—	★
DA2[26]	Advanced HART Diagnostics Suite	•	—	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

PlantWeb enhanced measurement functionality[27]				
H01	FOUNDATION Fieldbus fully compensated mass flow block	•	—	★
Cold temperature[28]				
BRR	-60 °F (-51 °C) Cold temperature start-up	•	•	★
Alarm limit[18][19]				
C4	NAMUR alarm and saturation levels, high alarm	•	•	★
C5	NAMUR alarm and saturation levels, low alarm	•	•	★
C6	Custom alarm and saturation levels, high alarm	•	•	★
C7	Custom alarm and saturation levels, low alarm	•	•	★
C8	Low alarm (standard Rosemount alarm and saturation levels)	•	•	★
Hardware adjustments and ground screw				
D1[18][19][29]	Hardware adjustments (zero, span, alarm, security)	•	—	★
D4[30]	External ground screw assembly	•	•	★
DA[18][19][29]	Hardware adjustments (zero, span, alarm, security) and external ground screw assembly	•	—	★
Conduit plug				
DO	316 SST conduit plug	•	•	★
Conduit electrical connector[31]				
GE	M12, 4-pin, male connector (eurofast)	•	•	
GM	A size mini, 4-pin, male connector (minifast)	•	•	
Typical model number: 3051SFP 1 F 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. Transmitter output code F is only available with measurement type code 1, 2, 5, 6, and D.
5. Only intrinsically safe approval codes apply.
6. Only available with measurement types D and 6.
7. Only available with output code X.
8. Only available with output code A.
9. For detailed specifications see "Specifications" on page 35.
10. Only available with differential pressure ranges 2 and 3, and silicone fill fluid.
11. Option HR7 configures the HART output to HART Revision 7. This option requires the selection of the advanced diagnostics (DA2) option. The device with this option can be field configured to HART Revision 5 or 7 if desired.
12. Only available for body material and type code F.
13. Thermowell material is the same as the body material.
14. Does not apply to process connection codes T1 and S1.
15. Not available for bore sizes 0010, 0014, 0020, 0034, 0066, or 0109.
16. Not available with DIN process connection codes D1, D2, or D3.

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. Not available with output code X. Only available with measurement type D.
19. Not available with output code F.
20. If select body material and type code F, consult the factory for product certifications availability.
21. Not available with M20 or $G^1/_2$ conduit entry size.
22. Not available with housing code 7J.
23. See the Rosemount 3051S Reference Manual for cable requirements. Contact an Emerson representative for additional information.
24. Not available with output code F, option code DA2, or option code QT.
25. Not available with Housing code 5A, 5J, or 7J. The T1 option is not needed with FISCO Product Certifications.
26. Includes hardware adjustments (option code D1) as standard. Not available with output code X. Only available with Measurement Type D.
27. Requires Rosemount Engineering Assistant to configure (to ensure correct operation download the Engineering Assistant software at: Emerson.com/Rosemount/Engineering Assistant Software).
28. –58 °F (50 °C) for measurement type 1-7.
29. Not available with housing codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
30. This assembly is included with options E1, E2, E3, E4,E7, EM, EP, K1, K2, K6, K7, KA, KC, KD, KP, KM, N1, N3, N7, ND, and T1.
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.

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]

Rosemount 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
Rosemount 3051SFC_A Compact Annubar Flowmeter - Rosemount 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
Rosemount 3051SFC Compact Orifice Flowmeter - Conditioning option C			
		Classic MV (8:1 flow turndown)	Ultra for flow (14:1 flow turndown)
Ranges 2–3		±1.45% of flow rate	±1.15% of flow rate
Rosemount 3051SFC Compact Orifice Flowmeter - Orifice option P[3]			
		Classic MV (8:1 flow turndown)	Ultra for Flow (14:1 flow turndown)
Ranges 2–3	$\beta = 0.4$	±1.45% of flow rate	±1.30% of flow rate
	$\beta = 0.50, 0.65$	±1.45% of flow rate	±1.30% of flow rate
Rosemount 3051SFP Integral Orifice Flowmeter			
		Classic MV (8:1 flow turndown)	Ultra for flow (14:1 flow turndown)
Ranges 2–3	$\beta < 0.1$	±2.65% of flow rate	±2.60% of flow rate
	$0.1 < \beta < 0.2$	±1.60% of flow rate	±1.40% of flow rate
	$0.2 < \beta < 0.6$	±1.25% of flow rate	±0.95% of flow rate
	$0.6 < \beta < 0.8$	±1.80% of flow rate	±1.60% 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 percent. Consult your Emerson Representative for exact specifications.
3. For line size less than 2-in. (50 mm) or greater than 8-in. (200 mm), add an additional 0.5 percent uncertainty.

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

Rosemount 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
Rosemount 3051SFC_A Compact Annubar Flowmeter - Rosemount 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
Rosemount 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		±1.40% of flow rate	±1.25% of flow rate	±1.15% of flow rate
Rosemount 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	$\beta = 0.4$	±1.80% of flow rate	±1.35% of flow rate	±1.30% of flow rate
	$\beta = 0.65$	±1.80% of flow rate	±1.35% of flow rate	±1.30% of flow rate

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

3051SFP Integral Orifice Flowmeter				
		Classic (8:1 flow turndown)	Ultra (8:1 flow turndown)	Ultra for flow (14:1 flow turndown)
Ranges 2–3	$\beta < 0.1$	±2.70% of flow rate	±2.65% of flow rate	±2.60% of flow rate
	$0.1 < \beta < 0.2$	±1.80% of flow rate	±1.45% of flow rate	±1.40% of flow rate
	$0.2 < \beta < 0.6$	±1.50% of flow rate	±1.05% of flow rate	±0.95% of flow rate
	$0.6 < \beta < 0.8$	±2.00% of flow rate	±1.70% of flow rate	±1.60% of flow rate

1. For measurement types 5–7, refer to the reference accuracy specification for the Rosemount 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 percent. Consult your Emerson 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 percent uncertainty.

Warranty[1]

Models	Ultra and Ultra for flow[2]	Classic and classic MV[3]	Optional extended warranty[4]
All Rosemount 3051S	Products 15-year limited warranty	1-year limited warranty	WR5: 5-year limited warranty WR3: 3-year limited warranty

1. Warranty details can be found in Emerson Terms and Conditions of Sale, Document 63445, Rev G (10/06).
2. Rosemount Ultra and Ultra for Flow transmitters have a limited warranty of 15 years from date of shipment. All other provisions of Emerson standard limited warranty remain the same.
3. Goods are warranted for 12 months from the date of initial installation or 18 months from the date of shipment by seller, whichever period expires first.
4. Rosemount extended warranties have a limited warranty of five or three years from date of shipment.

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 and 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 and 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 and 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 Rosemount 3051SFA, 3051SFC

Less than ±0.1 percent of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10 to 1000 Hz test frequency range, 0.15 mm displacement peak amplitude, 20m/s^2 acceleration amplitude).(1)

Vibration effect for Rosemount 3051SFC_A

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

1. *Stainless steel temperature housing is not recommended with Primary Element Technology A in application with mechanical vibration.*

Vibration effect for Rosemount 3051SFP

Less than ±0.1percent of URL when tested per the requirements of IEC60068-2-6 (10 to 1000 Hz test frequency range, 0.075 mm displacement peak amplitude, 10 m/s^2 acceleration amplitude).

Power supply effect

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

Electromagnetic compatibility (EMC)

Meets all industrial environment requirements of EN 61326 and NAMUR NE-21(1). Maximum deviation <1% span during EMC disturbance.(2)(3)(4)

1. *NAMUR NE-21 does not apply to wireless output code X configurations.*
2. *During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.*
3. *For devices with junction box housing or remote display (housing styles: 2A-2C, 2E-2G, 2J, 2M) testing performed with shielded cable.*
4. *Rosemount 3051SF measurement type 1, 3, 5, 7 require shielded cable for the process temperature connection.*

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

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 and ultra for flow	Classic
1	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)
2	1.25 inH_2O (3,11 mbar)	1.67 inH_2O (4,15 mbar)
3	5.0 inH_2O (12,43 mbar)	6.67 inH_2O (16,58 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 (Rosemount 3051SF_1, 3, 5 or 7)

Minimum span = 52 °F (11 °C)

Service

Rosemount 3051SF_5, 6, 7, or D (direct process variable output):

Liquid, gas, and steam applications

Rosemount 3051SF_1, 2, 3, or 4 (mass and energy flow output):

Some fluid types are only supported by certain measurement types 4–20 mA/HART

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	•	•	—	—

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.

HART 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.

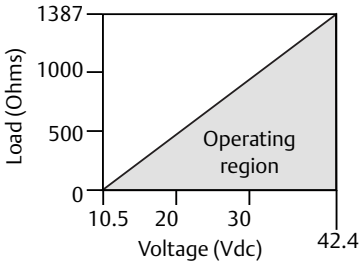
- 3051SF_D: 10.5 to 42.4 Vdc with no load
- 3051SF_D with Advanced HART Diagnostics Suite: 12 to 42.4 Vdc with no load
- 3051SF_1-7: 12 to 42.4 Vdc with no load

Load limitations

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

Rosemount 3051SF_D

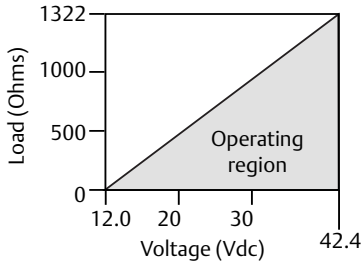
Maximum loop resistance
= 43.5 × (Power supply voltage – 10.5)



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

Rosemount 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 250 Ω for communication.

Selectable HART revisions (option code HR7)

The 2-wire 4–20 mA is user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal is available to any host that conforms to HART protocol. The Rosemount 3051S with Advanced HART Diagnostics (DA2) comes with Selectable HART revisions. Digital communications based on HART Revision 7 (with option code HR7 selected) or Revision 5 (default) protocol can be selected. The HART revision can be switched in the field using any HART-based configuration. See the Rosemount 3051S Reference Manual for instructions on how to switch HART revision.

Advanced HART diagnostics suite (option code DA2)

SPM provides statistical data (standard deviation, mean, coefficient of variation) that can be used to detect process and process equipment anomalies, including plugged impulse lines, air entrainment, pump cavitation, furnace flame instability, distillation column flooding and more. This diagnostic allows you to take preventative measures before abnormal process situations result in unscheduled downtime or rework.

Power advisory diagnostic pro-actively detects and notifies 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.

Suite includes: SPM, Power Advisory, Status Log, Variable Log, Advanced Process Alerts, Service Alerts, and Time Stamp capability.

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.

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 Rosemount 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 6 software. To ensure correct operation download the most current version of the Engineering Assistant software at: Emerson.com/Rosemount/Engineering Assistant Software.

ASP Diagnostics Suite for FOUNDATION Fieldbus (option code D01)

Statistical Process Monitoring (SPM) provides statistical data (standard deviation and mean) that can be used to detect process and process equipment anomalies, including plugged impulse lines, air entrainment, pump cavitation, furnace flame instability, distillation column flooding, and more. This diagnostic allows you to take preventative measures before abnormal process situations result in unscheduled downtime or rework.

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.

Suite includes: Statistical Process Monitoring (SPM) and Plugged Impulse Line Detection (PIL).

Wireless self-organizing networks

Output

*Wireless*HART, 2.4 GHz DSSS.

Local display

The optional 7-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 selectable1 second to 60 minutes

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)(2)

1. Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
2. 6.5-year life at one minute update rates when used with 3051SMV

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 (Rosemount 3051SF_1, 2, 5, or 6)

Static pressure	DP		
	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 (Rosemount 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	DP		
	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

Rosemount 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

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

Rosemount 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

Rosemount 3051SFP process temperature limits

Standard (direct/remote mount)

- –40 to 450 °F (–40 to 232 °C)

Extended (remote mount only with option code G)

- –112 to 554 °F (–80 to 290 °C)(1)

1. *Consult factory for all-welded design for temperatures up to 850 °F (454 °C) and down to –320 °F (–195 °C).*

Humidity limits

0–100 percent 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 Rosemount 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).

Table 6. 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][3]	20.2–23.0 µA	3.4–3.8 µA

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.
3. For Rosemount 3051SMV and option code DA2, low alarm custom values are 3.6–3.8 mA.

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 two percent 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 two percent.*

Physical specifications

Electrical connections

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

Process-wetted parts

Rosemount 3051SFA wetted parts - Annubar sensor material

- 316 stainless steel
- Alloy C-276

Rosemount 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 representative for use with other gaskets.
- Available as a spare part

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

Rosemount 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 Rosemount 3051SFP is disassembled for installation or maintenance.

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.

Product Certifications

Rosemount 3051SMV/3051SFx

Rev 1.18

European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

Ordinary Location Certification

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

Installing Equipment in 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.

USA

E5 US Explosionproof (XP) and Dust Ignition-proof (DIP)

Certificate: FM16US0089X

Standards: FM Class 3600 - 2011, FM Class 3615 - 2006, FM Class 3616 - 2011, FM Class 3810 - 2005, ANSI/NEMA® 250 - 2003

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

I5 US Intrinsically Safe (IS) and Nonincendive (NI)

Certificate: FM16US0233

Standards: FM Class 3600 -2011, FM Class 3610 - 2007, FM Class 3611 - 2004, FM Class 3616 - 2006, 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 ≤ T_a ≤ +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 Canada Explosionproof, Dust Ignition-proof, 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, CSA C22.2 No. 94.2-07 , CSA Std C22.2 No. 213-M1987, CAN/CSA C22.2 60079-11:14, CAN/CSA-C22.2 No. 61010-1-12, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05 (R2010)

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 Canada Intrinsically Safe

Certificate: 1143113

Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CSA C22.2 No. 94.2-07 , CSA Std C22.2 No. 213-M1987, CAN/CSA C22.2 60079-11:14, CAN/CSA-C22.2 No. 61010-1-12, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05 (R2010)

Markings: Intrinsically Safe Class I, Division 1; Groups A, B, C, D; suitable for Class 1, Zone 0, IIC, T3C, T_a=70 °C; when connected per Rosemount drawing 03151-1207; Type 4X

IF Canada FISCO Intrinsically Safe

Certificate: 1143113

Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CSA C22.2 No. 94.2-07, CSA Std C22.2 No. 213-M1987, CAN/CSA C22.2 60079-11:14, CAN/CSA-C22.2 No. 61010-1-12, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05 (R2010)

Markings: FISCO Intrinsically Safe Class I, Division 1; Groups A, B, C, D; suitable for Class I, Zone 0; T3C, T_a = 70 °C; when installed 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 (3051SFx models with RTD are certified to EN 60079-0:2006)

Markings: ⟨Ex⟩II 1/2 G Ex d IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T5/T4(–60 °C ≤ T_a ≤ +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 ≤ T_a ≤ +70 °C)

	HART	FOUNDATION Fieldbus	SuperModule only	RTD (for 3051SFx) (HART)	RTD (for 3051SFx) (Fieldbus)
Voltage U_i	30 V	30 V	7.14 V	30 V	30 V
Current I_i	300 mA	300 mA	300 mA	2.31 mA	18.24 mA
Power P_i	1 W	1.3 W	887 mW	17.32 mW	137 mW
Capacitance C_i	14.8 nF	0	0.11 µF	0	0.8 nF
Inductance L_i	0	0	0	0	1.33 mH

Special Conditions for Safe Use (X):

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

IA ATEX FISCO

Certificate: Baseefa08ATEX0064X

Standards: EN 60079-0: 2012, EN 60079-11: 2012

Markings: ⟨Ex⟩II 1 G Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Parameter	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

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 ≤ T_a ≤ +85 °C), V_{max} = 42.4 V

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 ≤ T_a ≤ 70 °C), V_{max} = 45 V

Special Condition for Safe Use (X):

1. If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.5.1 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 (3051SFx models with RTD are certified to IEC 60079-0:2004)

Markings: Ex d IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T5/T4(–60 °C ≤ T_a ≤ +80 °C)

Temperature class	Process temperature
T6	–60 to +70 °C
T5	–60 to +80 °C
T4	–60 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 ≤ T_a ≤ +85 °C), V_{max} = 42.4 V

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 Rosemount 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 ≤ T_a ≤ +70 °C)

	HART	FOUNDATION Fieldbus	SuperModule only	RTD (for 3051SFx) (HART)	RTD (for 3051SFx) (Fieldbus)
Voltage U_i	30 V	30 V	7.14 V	30 V	30 V
Current I_i	300 mA	300 mA	300 mA	2.31 mA	18.24 mA
Power P_i	1 W	1.3 W	887 mW	17.32 mW	137 mW
Capacitance C_i	14.8 nF	0	0.11 µF	0	0.8 nF
Inductance L_i	0	0	0	0	1.33 mH

Special Conditions for Safe Use (X):

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

IG IECEx FISCO

Certificate: IECEx BAS 08.0025X

Standards: IEC 60079-0: 2011, IEC 60079-11: 2011

Markings: Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Parameter	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

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 ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

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

Brazil

E2 INMETRO Flameproof

Certificate: UL-BR 15.0393X

Standards: ABNT NBR IEC 60079-0:2008 + Corrigendum 1:2011, ABNT NBR IEC 60079-1:2009 + Corrigendum 1:2011, ABNT NBR IEC 60079-26:2008 + Corrigendum 1: 2008

Markings: Ex d IIC T* Ga/Gb, T6(–40 °C ≤ T_a ≤ +70 °C), T5/T4(–40 °C ≤ T_a ≤ +70 °C), IP66

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.

I2 INMETRO Intrinsic Safety

Certificate: UL-BR 15.0357X

Standards: ABNT NBR IEC 60079-0:2008 + Addendum 1:2011, ABNT NBR IEC 60079-11:2009

Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +70 °C)

Special Conditions for Safe Use (X):

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

Parameter	HART		Fieldbus	
	Input	RTD	Input	RTD
Voltage U_i	30 V	30 V	30 V	30 V
Current I_i	300 mA	2.31 mA	300 mA	18.24 mA
Power P_i	1 W	17.32 W	1.3 mW	137 mW
Capacitance C_i	14.8 nF	0	0	0.8 µF
Inductance L_i	0	0	0	1.33 µF

China

E3 China Flameproof and Dust Ignition-proof

Certificate: 3051SMV: GYJ14.1039X [Mfg USA, China, Singapore]
3051SFx: GYJ11.1711X [Mfg USA, China, Singapore]

Standards: 3051SMV: GB3836.1-2010, GB3836.2-2010, GB3836.20-20103051SFx: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010, GB12476.1-2000

Markings: 3051SMV: Ex d IIC T6/T5 Ga/Gb
3051SFx: Ex d IIC T6/T5 Ga/Gb; DIP A20 T_A 105 °C; IP66

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use: For information on the dimensions of the flameproof joints the manufacturer shall be contacted.
2. The relationship between T code and ambient temperature range are as follows:

T code	Temperature range
T5	–50 ~ +65 °C
T6	–50 ~ +80 °C

3. The earth connection facility in the enclosure should be connected reliably.
4. During installation, use and maintenance of the product in explosive atmosphere, observe the warning "Do not open cover when circuit is alive". During installation, use, and maintenance in explosive dust atmosphere, observe the warning "Do not open when an explosive dust atmosphere is present".
5. During installation there should be no mixture harmful to the housing.
6. During installation, use and maintenance in explosive dust atmosphere, product enclosure should be cleaned to avoid dust accumulation, but compressed air should not be used.
7. During installation in a hazardous location, cable glands and blanking plugs certified by state appointed inspection bodies with Ex d C Gb or Ex d IIC Gb DIP A20 [Flowmeters] IP66 type of protection should be used. Redundant cable entries should be blocked with blanking plugs.
8. End users are not permitted to change any components but to contact the manufacturer to avoid damage to the product.
9. Maintenance should be done when no explosive gas and dust atmosphere is present.
10. During 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 Norse for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"

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

Special Conditions for Safe Use (X):

1. The enclosure may contain light metal, attention should be taken to avoid ignition hazard due to impact or friction.
2. The apparatus is not capable of withstanding the 500 V electrical strength test defined in Clause 6.3.12 of GB3836.4–2010.
3. Ambient temperature range: –60 ~ +70 °C
4. Intrinsically safe electric parameters:

Maximum input voltage: U_i (V)	Maximum input current: I_i (mA)	Maximum input power: P_i (W)	Maximum internal parameter:	
			C_i (nF)	L_i (uH)
30	300	1.0	14.8	0

Model	Maximum output voltage: U_i (V)	Maximum output current: I_i (mA)	Maximum output power: P_i (W)	Maximum external parameters:	
				C_i (nF)	L_i (μH)
RTD	30	2.31	17.32	0	0
SuperModule	7.14	300	887	110	0

5. The cables between this product and associated apparatus should be shielded cables. The shield should be grounded reliably in non-hazardous area.

6. 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.
7. End users are not permitted to change any components, contact the manufacturer to avoid damage to the product.
8. During installation in hazardous location, cable glands, conduit, and blanking plugs certified by state-appointed inspection bodies with DIP A20 IP66 type of protection should be used. Redundant cable entries should be blocked with blanking plugs.
9. During installation, use, and maintenance in explosive dust atmosphere, observe the warning "Do not open when an explosive dust atmosphere is present".
10. Maintenance should be done when no explosive dust atmosphere is present.
11. During 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".

EAC - Belarus, Kazakhstan, Russia

EM Technical Regulation Customs Union (EAC) Flameproof
Certificate: RU C-US.AA87.B.00094
Markings: Ga/Gb Ex d IIC T6...T4 X

IM Technical Regulation Customs Union (EAC) Intrinsic Safety
Certificate: RU C-US.AA87.B.00094
Markings: 0Ex ia IIC T4 Ga X

Japan

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

Republic of Korea

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

IP Republic of Korea Intrinsic Safety [HART only]
Certificate: 10-KB4BO-0021X [Mfg USA, SMMC]
Markings: Ex ia IIC T4

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

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

SDN Det Norske Veritas (DNV) Type Approval
Certificate: A-14186
Intended Use: Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft, and Det Norske Veritas' Offshore Standards. [HART Only]
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
Application: Environmental categories ENV1, ENV2, ENV3, and ENV5. [HART Only]

Rosemount 3051S/3051SFx

Rev 1.9

European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

Ordinary Location Certification

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

Installing Equipment in 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.

USA

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 ≤ T_a ≤ +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 ≤ T_a ≤ +70 °C) [HART]; T4(–50 °C ≤ T_a ≤ +60 °C) [Fieldbus]; when connected per Rosemount drawing 03151-1006; Type 4X

Special Condition for Safe Use (X):

1. The Rosemount 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

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 ≤ T_a ≤ +60 °C); when connected per Rosemount drawing 03151-1006; Type 4X

Special Condition for Safe Use (X):

1. The Rosemount 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; Groups A, B, C, D; suitable for Class 1, Zone 0, IIC, T3C; when connected per Rosemount drawing 03151-1016 [3051S] 03151-1313 [ERS]; Type 4X

IF CSA FISCO

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; Groups A, B, C, D; suitable for Class 1, Zone 0, IIC, T3C; when connected per Rosemount drawing 03151-1016 [3051S] 03151-1313 [ERS]; 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: Ⓔx II 1/2 G Ex d IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T5/T4(–60 °C ≤ T_a ≤ +80 °C)

Temperature class	Process temperature
T6	–60 to +70 °C
T5	–60 to +80 °C
T4	–60 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: Ⓔx II 1 G Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Model	U_i	I_i	P_i	C_i	L_i
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 ...A...M7, M8, or M9; 3051SF...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	60 µH
3051SAL or 3051SAM	30 V	300 mA	1.0 W	12 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	N/A	N/A

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V 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 Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 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.

IA ATEX FISCO

Certificate: BAS01ATEX1303X

Standards: EN 60079-0:2012, EN 60079-11:2012

Markings: Ⓔx II 1 G Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Parameter	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 Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V 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 Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 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.

ND ATEX Dust

Certificate: BAS01ATEX1374X

Standards: EN 60079-0:2012, EN 60079-31:2009

Markings: Ⓔx II 1 D Ex ta IIIC T105 °C T_{500} 95 °C Da, (–20 °C ≤ T_a ≤ +85 °C), V_{max} = 42.4 V

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 7 J 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: Ⓔx II 3 G Ex nA IIC T5 Gc, (–40 °C ≤ T_a ≤ +85 °C), V_{max} = 45 V

Special Condition for Safe Use (X):

1. The equipment is not capable of withstanding the 500 V 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 Rosemount 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 ≤ T_a ≤ +70 °C), T5/T4(–60 °C ≤ T_a ≤ +80 °C)

Temperature class	Process temperature
T6	–60 to +70 °C
T5	–60 to +80 °C
T4	–60 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 ≤ T_a ≤ +85 °C), V_{max} = 42.4 V

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 7 J impact test.
4. The Rosemount 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 ≤ T_a ≤ +70 °C)

Model	U_i	I_i	P_i	C_i	L_i
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 ...A...M7, M8, or M9; 3051SF...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	60 µH

Model	U_i	I_i	P_i	C_i	L_i
3051SAL or 3051SAM	30 V	300 mA	1.0 W	12 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	N/A	N/A

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V 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 Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 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 ≤ T_a ≤ +70 °C)

Model	U_i	I_i	P_i	C_i	L_i
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 ...A...M7, M8, or M9; 3051SF...A...M7 , M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	60 µH
3051SAL or 3051SAM	30 V	300 mA	1.0 W	12 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	N/A	N/A

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with an optional 90 V transient suppressor, it is not capable of withstanding the 500 V 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.
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 ≤ T_a ≤ +70 °C)

Parameter	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 Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V 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 Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 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.

IG IECEx Intrinsic Safety – Group I – Mining
(IG with Special A0259)

Certificate: IECEx TSA 04.0019X

Standards: IEC 60079-0:2011, IEC 60079-11:2011

Markings: FISCO FIELD DEVICE Ex ia I Ma,
(–60 °C ≤ T_a ≤ +70 °C)

Parameter	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. If the apparatus is fitted with optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test required by Clause 6.3.13 of 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 04.0018X

Standards: IEC 60079-0:2011, IEC 60079-15:2010

Markings: Ex nA IIC T5 Gc, (–40 °C ≤ T_a ≤ +85 °C)

Special Condition for Safe Use (X):

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

Brazil

E2 INMETRO Flameproof

Certificate: UL-BR15.0393X

Standards: ABNT NBR IEC 60079-0:2008 + Corrigendum 1:2011, ABNT NBR IEC 60079-1:2009 + Corrigendum 1:2011, ABNT NBR IEC 60079-26:2008 + Corrigendum 1:2008

Markings: Ex d IIC T* Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T5/T4(–60 °C ≤ T_a ≤ +80 °C), IP66

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.

I2/IB INMETRO Intrinsic Safety/FISCO

Certificate: UL-BR 15.0392X

Standards: ABNT NBR IEC 60079-0:2008 + Corrigendum 1:2011, ABNT NBR IEC 60079-11:2009

Markings: Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C), IP66

Special Condition for Safe Use (X):

1. The Rosemount 3051S enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in areas that requires EPL Ga.

Model	U_i	I_i	P_i	C_i	L_i
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	11.4 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.3 W	0	0
3051S...F...IB; 3051SF...F...IB	17.5V	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 µH
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	N/A	N/A

China

E3 China Flameproof and Dust Ignition-proof

Certificate: 3051S: GYJ16.1249X
3051SFx: GYJ11.1711X
3051S-ERS: GJY15.1406X

Standards: 3051S: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010, GB12476.1-2013, GB12476.5-2013
3051SFx: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010, GB12476.1-2000
3051S-ERS: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010

Markings: 3051S: Ex d IIC T6...T4; Ex tD A20 T 105 °C T_{500} 95 °C; IP66
3051SFx: Ex d IIC T5/T6 Ga/Gb; DIP A20 T_A 105 °C; IP66
3051S-ERS: Ex d IIC T4~ T6 Ga/Gb

Special Conditions for Safe Use (X):

1. Only the pressure transmitters, consisting of Rosemount 3051SC Series, 3051ST Series, 3051SL Series and 300S Series, are certified.
2. The ambient temperature range is (–20 ~ +60) °C.
3. The ambient temperature range for the Rosemount 3051S in a dust environment is –20 °C ≤ T_a ≤ 95 °C.
4. The relation between temperature class and maximum temperature of process medium is as follows:

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

Temperature class	Ambient temperature (°C)	Process temperature (°C)
T6	–60 °C ≤ T_a ≤ +70 °C	–60 °C ≤ T_a ≤ +70 °C
T5	–60 °C ≤ T_a ≤ + 80 °C	–60 °C ≤ T_a ≤ + 80 °C
T4	–60 °C ≤ T_a ≤ +80 °C	–60 °C ≤ T_a ≤ +120 °C

5. The earth connection facility in the enclosure should be connected reliably.
6. During installation, use and maintenance of transmitter, observe the warning "Don't open the cover when the circuit is alive."
7. During installation, there should be no mixture harm to flameproof housing.
8. 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. Five 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.
9. 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.
10. Maintenance should be done in non-hazardous location.
11. End users are not permitted to change any components inside.
12. 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: GYJ16.1250X [Mfg USA, China, Singapore]
3051SFx: GYJ11.1707X [Mfg USA, China, Singapore]
3051S-ERS: GYJ16.1248X [Mfg USA, China, Singapore]

Standards: 3051S: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
3051SFx: GB3836.1/4-2010, GB3836.20-2010, GB12476.1-2000
3051S-ERS: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010

Markings: 3051S, 3051SFx: Ex ia IIC T4 Ga
3051S-ERS: Ex ia IIC T4

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 500 V 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 ≤ T_a ≤+70 °C
F	–50 °C ≤ T_a ≤+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)	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: GYJ15.1106X [Mfg China]
3051SF: GYJ15.1107X [Mfg China]

Markings: Ex nA IIC T5 Gc

Special Conditions for Safe Use (X):

1. The ambient temperature range is: –40 °C ≤ T_a ≤ 85 °C.
2. Maximum input voltage: 45 V
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. Maintenance should be done in non-hazardous location.
5. 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.

   When installation, use and maintenance of this product, observe following standards:

   GB3836.13-2013 "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"

EAC – Belarus, Kazakhstan, Russia

EM Technical Regulation Customs Union (EAC) Flameproof

Certificate: RU C-US.AA87.B.00094

Markings: Ga/Gb Ex d IIC T6...T4 X

IM Technical Regulation Customs Union (EAC) Intrinsic Safety

Certificate: RU C-US.AA87.B.00094

Markings: 0Ex ia IIC T4 Ga X

Japan

E4 Japan Flameproof

Certificate: TC15682, TC15683, TC15684, TC15685, TC15686, TC15687, TC15688, TC15689, TC15690, TC17099, TC17100, TC17101, TC17102, TC18876

3051ERS: TC20215, TC20216, TC20217, TC20218, TC20219, TC20220, TC20221

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

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 AB classed vessels, marine, and offshore installations.

SBV Bureau Veritas (BV) Type Approval

Certificate: 31910 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-14186

Intended Use: Det Norske Veritas' Rules for Classification of Ships, High Speed and 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

Application: Environmental categories ENV1, ENV2, ENV3, and ENV5

D3 Custody Transfer – Measurement Canada Accuracy Approval [3051S only]

Certificate: AG-0501, AV-2380C

Rosemount 3051S and 3051SMV Wireless

Rev 2.2

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 Emerson.com/Rosemount.

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

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

Installing Equipment in 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.

USA

I5 USA Intrinsically Safe (IS), Nonincendive (NI), and Dust-Ignitionproof (DIP)

Certificate: FM 3027705

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; CL III T4; CL 1, Zone 0 AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D T4; DIP CL II, DIV 1, GP E, F, G; CL III, T5; T4(–50 °C ≤ T_a ≤ +70 °C)/ T5(–50 °C ≤ T_a ≤ +85 °C); when connected per Rosemount drawing 03151-1000; Type 4X

Special Conditions for Safe Use (X):

1. The Rosemount 3051S and SMV Wireless Transmitters shall only be used with the 701PBKKF Rosemount SmartPower Battery Pack or alternatively the perpetuum intelligent power module vibration harvester.
2. The transmitter may contain more than 10% aluminum and is considered a potential risk of ignition by impact or friction.
3. The surface resistivity of the antenna is greater than 1 GΩ. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Canada

I6 Canada Intrinsically Safe

Certificate: CSA 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 03151-1010; Type 4X

Europe

I1 ATEX Intrinsic Safety

Certificate: Baseefa13ATEX0127X

Standards: EN 60079-0:2012, EN 60079-11:2012

Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Wireless and 3051SMV Wireless 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.
2. The surface resistivity of the antenna is greater than 1 GΩ. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or dry cloth.

International

I7 IECEx Intrinsic Safety

Certificate: IECEx BAS 13.0068X

Standards: IEC 60079-0:2011, IEC 60079-11:2011

Markings: Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Wireless and 3051SMV Wireless 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.
2. The surface resistivity of the antenna is greater than 1GΩ. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or dry cloth.

Brazil

I2 INMETRO Intrinsic Safety

Certificate: UL-BR 14.0760X

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

Markings: Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. See certificate.

China

I3 China Intrinsic Safety

Certificate: 3051S Wireless: GYJ161250X
3051SFX: GYJ11.1707X [Flowmeters]

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

Markings: Ex ia IIC T4 Ga, T4(–60 ~ 70 °C)

Special Condition for Safe Use (X):

1. See appropriate certificate.

Note
Not currently available on the Rosemount 3051S MultiVariable Wireless Transmitter.

Japan

I4 TIIS Intrinsically Safe
Certificate: TC18649, TC18650, TC18657
Markings: Ex ia IIC T4, T4(–20 ~ 60 °C)

Note
Not currently available on the Rosemount 3051S MultiVariable Wireless Transmitter.

EAC – Belarus, Kazakhstan, Russia

IM EAC Intrinsic Safety

Certificate: RU C-US.AA87.B.00094

Markings: 0Ex ia IIC T4 Ga X (–60 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

Republic of Korea

IP Korea Intrinsic Safety

Certificates: 12-KB4BO-0202X, 12-KB4BO-0203X

Markings: Ex ia IIC T4, (–60 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

Note
Not currently available on the Rosemount 3051S MultiVariable Wireless Transmitter.

Combinations

KQ Combination of I1, I5, and I6

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 percent of flow rate accuracy
- Available in 2- to 96-in. (50 to 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 (LOI) with straightforward menus and built-in configuration buttons (option code M4)

Additional information:

Specifications: page 83
Certifications: page 91
Dimensional drawings: page 203

See “Specifications” on page -83 and options for more details on each configuration.

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
3051CFA	Rosemount 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)	★
070	7-in. (175 mm)	★

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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 (see "Pipe I.D. range code for Rosemount Annubar Flowmeters and Primary Elements" on page 143)		
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 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	
Piping orientation		
H	Horizontal piping	★
D	Vertical piping with downwards flow	★
U	Vertical piping with upwards flow	★

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Rosemount 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- to 8-in. (50 to 200 mm)	★
2	Sensor size 2 — line sizes 6- to 96-in. (150 to 2400 mm)	★
3	Sensor size 3 — line sizes greater than 12-in. (300 mm)	
Mounting type		
T1	Compression or threaded connection	★
A1	Class 150 RF ANSI	★
A3	Class 300 RF ANSI	★
A6	Class 600 RF ANSI	★
D1	DN PN16 flange	★
D3	DN PN40 flange	★
D6	DN PN100 flange	★
A9[(1)]	Class 900 RF ANSI	
AF[(1)]	Class 1500 RF ANSI	
AT[(1)]	Class 2500 RF ANSI	
R1	Class 150 RTJ ANSI flange	
R3	Class 300 RTJ ANSI flange	
R6	Class 600 RTJ ANSI flange	
R9[(1)]	Class 900 RTJ ANSI flange	
RF[(1)]	Class 1500 RTJ ANSI flange	
RT[(1)]	Class 2500 RTJ ANSI 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	★

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

	Packing gland – required for Flo-Tap models			
	Packing Gland Material	**Rod material**	**Packing material**	
J[2]	Stainless steel packing gland/cage nipple	Carbon steel	PTFE	
K[2]	Stainless steel packing gland/cage nipple	Stainless steel	PTFE	
L[2]	Stainless steel packing gland/cage nipple	Carbon steel	Graphite	
N[2]	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 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[3]	4–20 mA with digital signal based on HART Protocol			★
F	FOUNDATION Fieldbus Protocol			★
W[4]	PROFIBUS PA Protocol			★
X[5]	Wireless (requires wireless options and engineered polymer housing)			★
M[6]	Low-power 1–5 Vdc with digital signal based on HART Protocol			

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Transmitter housing material		**Conduit entry size**	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K	SST	M20 × 1.5	★
P[7]	Engineered polymer	No conduit entries	★
D[8]	Aluminum	G1/2	
M[8]	SST	G1/2	
Transmitter performance class			
1	1.8% flow rate accuracy, 8:1 flow turndown, 10-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)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Pressure testing[9]		
P1	Hydrostatic testing with certificate	
PX	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)	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Surface finish		
RL	Surface finish for low pipe Reynolds number in gas and steam	★
RH	Surface finish for high pipe Reynolds number in liquid	★
Material traceability certification[10]		
Q8	Material Traceability Certification per EN 10474:2004 3.1	★
Code conformance[11]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance[12]		
J5	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Installed in flanged pipe spool section		
H3	Class 150 flanged connection with Rosemount standard length and schedule	
H4	Class 300 flanged connection with Rosemount standard length and schedule	
H5	Class 600 flanged connection with Rosemount standard length and schedule	
Instrument connections for remote mount options		
G2	Needle valves, stainless steel	★
G6	OS and Y gate valve, stainless steel	★
G1	Needle valves, carbon steel	
G3	Needle valves, alloy C-276	
G5	OS and Y gate valve, carbon steel	
G7	OS and 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	
PlantWeb control functionality[13]		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
PlantWeb diagnostic functionality		
DA0[14]	Power Advisory HART Diagnostic	★
D01[13]	FOUNDATION Fieldbus Diagnostics Suite	★

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Product certifications		
E8	ATEX Flameproof, Dust	★
I1[15]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety	★
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[16]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe	★
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	★
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)	★
EM	Technical Regulations Custom Union (EAC) Flameproof	★
IM	Technical Regulations Custom Union (EAC) Intrinsic Safety	★
KM	Technical Regulations Custom Union (EAC) Flameproof, Intrinsic Safety (combination of EM and IM)	★
Sensor fill fluid and O-ring options		
L1[17]	Inert sensor fill fluid (silicone fill fluid is standard)	★
L2	Graphite-filled (PTFE) O-ring	★
LA[17]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Shipboard approvals[17]		
SBS	American Bureau of Shipping	★
SLL[18]	Lloyds Register (LR)	

Table 7. Rosemount 3051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Display and interface options		
M4[19]	LCD display with LOI	★
M5	LCD display	★
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★
Quality certification for safety[14]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Transient protection[17][20]		
T1	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[14]		
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Rosemount Standard low alarm	★
Configuration buttons		
D4[14]	Analog zero and span	★
DZ[21]	Digital zero trim	★
Ground screw[17][22]		
V5	External ground screw assembly	★
HART Revision configuration (requires HART Protocol Output Code A)[3]		
HR5	Configured for HART Revision 5	★
HR7	Configured for HART Revision 7	★
Typical model number: 3051CFA D L 060 D C H P S 2 T1 0 0 0 3 2 A A 1		

1. Available in remote mount applications only.
2. The cage nipple is constructed of 304 SST.
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 (LOI) 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 code X).
8. Transmitter conduit entry will be $^1/_2$ NPT and a $^1/_2$ NPT to G$^1/_2$ thread adapter will be provided. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, KD.
9. Applies to assembled flowmeter only, mounting not tested.
10. Instrument connections for remote mount options and isolation valves for Flo-tap Models are not included in the Material Traceability Certification.
11. Not available with transmitter connection platform 6.
12. 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.
13. Only valid with FOUNDATION Fieldbus (output code F).
14. Only available with 4–20 mA HART (output code A).
15. Dust approval not applicable to output code X. See "Rosemount 3051 Wireless" on page 97 for wireless approvals
16. Nonincendive certification not provided with Wireless output option code (X).
17. Not available with Wireless (output code X).
18. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7
19. Not available with FOUNDATION Fieldbus (output code F) or wireless (output code X) or low power (output code M).
20. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification codes IA, IB, and IE.
21. Only available with 4–20 mA HART Output (output code A) and Wireless (output code X).
22. 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 8. Rosemount 3051CFC Compact Flowmeter Ordering Information

★The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
3051CFC	Compact Flowmeter	
Measurement type		
D	Differential Pressure	★
Primary element technology		
A	Rosemount 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	Rosemount 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	★
R	Remote thermowell and RTD	
T[5]	Integral temperature	

Table 8. Rosemount 3051CFC Compact Flowmeter Ordering Information

★The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Transmitter connection platform		
3	Direct-mount, integral 3-valve manifold	★
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)	★
Transmitter output		
A[6]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION Fieldbus Protocol	★
W[7]	PROFIBUS PA Protocol	★
X[8]	Wireless (requires wireless options and engineered polymer housing)	★
M[9]	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 × 1.5 ★
J	SST	1/2–14 NPT ★
K	SST	M20 × 1.5 ★
P[10]	Engineered polymer	No conduit entries ★
D[11]	Aluminum	G1/2
M[11]	SST	G1/2
Transmitter performance class		
1	Up to ±1.65 percent flow rate accuracy, 8:1 flow turndown, 10-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 8. Rosemount 3051CFC Compact Flowmeter Ordering Information

★The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Installation accessories		
AB	ANSI alignment ring (Class 150) (only required for 10- and 12-in. [250 and 300 mm] line sizes)	★
AC	ANSI alignment ring (Class 300) (only required for 10- and 12-in. [250 and 300 mm] line sizes)	★
AD	ANSI alignment ring (Class 600) (only required for 10- and 12-in. [250 and 300 mm] 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 ($^1/_2$ NPT)	★
High temperature application		
HT	Graphite valve packing (T_{max} = 850 °F)	
Flow calibration[12]		
WC	Flow calibration, 3 pt, conditioning orifice option C (all pipe schedules)	
WD[13]	Flow calibration, 10 pt, conditioning option C (all schedules), Rosemount Annubar option A (schedule 40)	
Pressure testing		
P1	Hydrostatic testing with certificate	
Special cleaning[14]		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Transmitter calibration certification		
Q4	Calibration certificate for transmitter	★
Quality certification for safety[15]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Material traceability certification		
Q8	Material Traceability Certification per EN 10204:2004 3.1	★

Table 8. Rosemount 3051CFC Compact Flowmeter Ordering Information

★The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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[16]		
J5	NACE MR-0175/ISO 15156	
Country certification		
J1	Canadian registration	
Product certifications		
E8	ATEX Flameproof, Dust	★
I1[17]	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[18]	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[10]	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)	★
EM	Technical Regulations Custom Union (EAC) Flameproof	★
IM	Technical Regulations Custom Union (EAC) Intrinsic Safety	★
KM	Technical Regulations Custom Union (EAC) Flameproof, Intrinsic Safety (combination of EM and IM)	★

Table 8. Rosemount 3051CFC Compact Flowmeter Ordering Information

★The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Sensor fill fluid and O-ring options		
L1[19]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[19]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Shipboard approvals[19]		
SBS	American Bureau of Shipping	★
SLL[20]	Lloyds Register (LR)	
Display and interface options		
M4[21]	LCD display with LOI	★
M5	LCD display	★
Transient protection[19][22]		
T1	Transient terminal block	★
Manifold for remote mount option		
F2	3-valve manifold, stainless steel	★
F6	5-valve manifold, stainless steel	★
PlantWeb control functionality[23]		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
PlantWeb diagnostic functionality		
DA0[15]	Power Advisory HART Diagnostic	★
D01[23]	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[15]		
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Rosemount Standard low alarm	★
Ground screw[19][24]		
V5	External ground screw assembly	★
Configuration buttons		
D4[15]	Analog zero and span	★
DZ[25]	Digital zero trim	★

Table 8. Rosemount 3051CFC Compact Flowmeter Ordering Information

★The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

HART Revision Configuration (requires HART Protocol output code A)[6]		
HR5	Configured for HART revision 5	★
HR7	Configured for HART revision 7	★
Typical model number: 3051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

1. Available with Primary Element Technology P only.
2. 10- and 12-in. (250 and 300 mm) line sizes not available with Primary Element Technology A.
3. For the 10- and 12-in. (250 and 300 mm) line size, the alignment ring must be ordered (installation accessories).
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. 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.
7. For local addressing and configuration, M4 (LOI) is required.
8. 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).
9. 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.
10. Only available with wireless (output code X).
11. Transmitter conduit entry will be $^1/_2$ NPT and a $^1/_2$ NPT to G$^1/_2$ thread adapter will be provided. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, KD.
12. Available with Primary Element Technology C only.
13. For Rosemount Annubar option A, consult factory for pipe schedules other than schedule 40.
14. Available with Primary Element Technology C or P only.
15. Only available with HART 4–20 mA (output code A).
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. Dust approval not applicable to output code X. See "Rosemount 3051 Wireless" on page 97 for wireless approvals
18. Nonincendive certification not provided with Wireless output (option code X).
19. Not available with Wireless (output code X).
20. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7
21. Not available with output code F - FOUNDATION Fieldbus or wireless (output code X) or low power (output code M).
22. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA, IB, and IE.
23. Only valid with FOUNDATION Fieldbus (output code F).
24. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
25. Only available with 4–20 mA HART (output code A) and Wireless (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 9. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
3051CFP	Integral orifice flowmeter	
Measurement type		
D	Differential Pressure	★
Body material and type		
F	316 SST, enhanced support body	★
S	316 SST, traditional body	★
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	★
W9	Pipe ends: Flanged, RF, ANSI Class 900, 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	
R9	Pipe ends: Flanged, RTJ, ANSI Class 900, weld-neck	
P9	Special process connection	

Table 9. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Orifice plate material		
S	316/316L 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 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	

Table 9. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Differential pressure ranges		
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)	★
Transmitter output		
A[2]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION Fieldbus Protocol	★
W[3]	PROFIBUS PA Protocol	★
X[4]	Wireless	★
M[5]	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 × 1.5 ★
J	SST	$^1/_2$–14 NPT ★
K	SST	M20 × 1.5 ★
P[6]	Engineered polymer	No conduit entries ★
D[7]	Aluminum	G$^1/_2$
M[7]	SST	G$^1/_2$
Transmitter performance class		
1	up to ±1.8 percent flow rate accuracy, 8:1 flow turndown,10-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	★
Transmitter body/bolt material[8]		
GT	High temperature (554 °F/290 °C)	
Temperature sensor[9]		
RT	Thermowell and RTD	

Table 9. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Optional connection		
G1	DIN 19213 transmitter connection	★
Pressure testing[10][11]		
P1	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[12]		
WD	Discharge coefficient verification	
Special inspection		
QC1	Visual and Dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Material traceability certification		
Q8	Material traceability certification per EN 10204:2004 3.1	★
Code conformance[13]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance[14]		
J5	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[15]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★

Table 9. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Product certifications[16]		
E8	ATEX Flameproof, Dust	★
I1[17]	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[18]	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[6]	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)	★
EM	Technical Regulations Custom Union (EAC) Flameproof	★
IM	Technical Regulations Custom Union (EAC) Intrinsic Safety	★
KM	Technical Regulations Custom Union (EAC) Flameproof, Intrinsic Safety (combination of EM and IM)	★
Sensor fill fluid and O-ring options		
L1[19]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[19]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Shipboard approvals[19]		
SBS	American Bureau of Shipping	★
SLL[20]	Lloyds Register (LR)	

Table 9. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Display and interface options		
M4[21]	LCD display with LOI	★
M5	LCD display	★
Transient protection[19][22]		
T1	Transient terminal block	★
PlantWeb control functionality[23]		
A01	FOUNDATION Fieldbus control function block suite	★
PlantWeb diagnostic functionality		
DA0[15]	Power Advisory HART diagnostic	★
D01[23]	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[15]		
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Rosemount Standard low alarm	★
Ground screw[19][24]		
V5	External ground screw assembly	★
Configuration buttons		
D4[15]	Analog zero and span	★
DZ[25]	Digital zero trim	★
HART revision configuration (requires HART Protocol output code A)[2]		
HR5	Configured for HART Revision 5	★
HR7	Configured for HART Revision 7	★
Typical model number: 3051CFP D F010 W1 S 0500 D3 2 A A 1 E5 M5		

1. To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.
2. Option 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.
3. For local addressing and configuration, M4 (LOI) is required.
4. 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).
5. 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.
6. Only available with wireless (output code X).

7. Transmitter conduit entry will be 1/2 NPT and a 1/2 NPT to G1/2 thread adapter will be provided.Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, KD.
8. Only available for body material and type code F.
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. If select body material and type code F, consult the factory for product certifications availability.
17. Dust approval not applicable to output code X. See "Rosemount 3051 Wireless" on page 97 for wireless approvals
18. Nonincendive certification not provided with Wireless output option code (X).
19. Not available with wireless (output code X).
20. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7.
21. Not available with FOUNDATION Fieldbus (output code F) or wireless (output code X) or Low Power (output code M).
22. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA, IB, and IE.
23. Only valid with FOUNDATION Fieldbus (output code F).
24. The V5 option is not needed with E1, E2, E3, E4, E7, E8, EM, EP, K1, K2, K4, K6, K7, K8, KA, KC, KD, KP, KM, N1, N3, N7, ND, NK, or T1 as the external ground screw assembly is included with these options.
25. Only available with 4–20 mA (output code A) and wireless (output code X).

Specifications

Performance specifications

This product data sheet covers HART, *Wireless*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 digital trim values set to equal range points.

Conformance to specification

Flow performance - Flow reference accuracy [1]

Rosemount 3051CFA Annubar Flowmeter		
Ranges 2–3		±1.80% of flow rate at 8:1 flow turndown
Rosemount 3051CFC_A Compact Annubar Flowmeter - Rosemount 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
Rosemount 3051CFC Compact Orifice Flowmeter – conditioning option C		
Ranges 2–3		±1.95% of flow rate at 8:1 flow turndown
Rosemount 3051CFC Compact Orifice Flowmeter - orifice option P[2]		
Ranges 2–3	$\beta = 0.4$	±2.00% of flow rate at 8:1 flow turndown
	$\beta = 0.50, 0.65$	±2.00% of flow rate at 8:1 flow turndown
Rosemount 3051CFP Integral Orifice Flowmeter		
Ranges 2–3	$\beta < 0.1$	±3.00% of flow rate at 8:1 flow turndown
	$0.1 < \beta < 0.2$	±1.95% of flow rate at 8:1 flow turndown
	$0.2 < \beta < 0.6$	±1.75% of flow rate at 8:1 flow turndown
	$0.6 < \beta < 0.8$	±2.15% of flow rate at 8:1 flow turndown

1. Range 1 flowmeters may experience an additional uncertainty up to 0.9 percent. Consult your Emerson representative for exact specifications.
2. For line size less than 2-in. (50 mm) or greater than 8-in. (200 mm), add an additional 0.5 percent uncertainly.

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 percent of span

Long term stability

Models	Long term stability
Rosemount 3051CF Ranges 2–5	±0.2 percent of URL for 10 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6,9 MPa) line pressure
Rosemount 3051CF Low/Draft Range Ranges 0–1	±0.2 percent of URL for 1 year

Warranty[1]

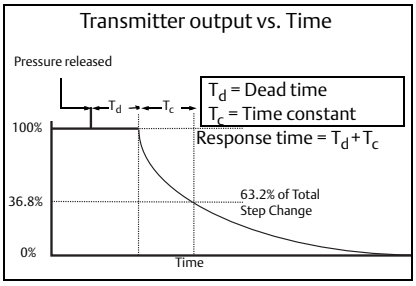
Models	Standard[2]	Optional extended warranty[3]
All Rosemount 3051	1-year limited warranty	WR5: 5-year limited warranty WR3: 3-year limited warranty

1. Warranty details can be found in Emerson Terms and Conditions of Sale, Document 63445, Rev G (10/06).
2. Goods are warranted for 12 months from the date of initial installation or 18 months from the date of shipment by seller, whichever period expires first.
3. Rosemount extended warranties have a limited warranty of five or three years from date of shipment.

Dynamic performance

	4–20 mA HART[1] 1–5 Vdc HART Low Power	FOUNDATION Fieldbus and PROFIBUS PA Protocols [3]	Typical HART transmitter response time
Total response time ($T_d + T_c$)[2]:			
3051CF, Ranges 2–5:	100 ms	152 ms	
Range 1:	255 ms	307 ms	
Range 0:	700 ms	N/A	
Dead Time (Td)	45 ms (nominal)	97 ms	
Update Rate[4]	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.
4. Does not apply to wireless (output code x). See "WirelessHart (output code X)" on page 87 for wireless update rate.



Vibration effect for Rosemount 3051CFA, 3051CFC

Less than ±0.1 percent 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, 0.15 mm displacement peak amplitude, 20 m/s^2 acceleration amplitude).[1]

Vibration effect for Rosemount 3051CFC_A

Less than ±0.1percent 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.*

Vibration effect for Rosemount 3051CFP

Less than ±0.1 percent of URL when tested per the requirements of IEC60068-2-6 (10–1000 Hz test frequency range, 0.075 mm displacement peak amplitude, 10 m/s^2 acceleration amplitude).

Power supply effect

Less than ±0.005 percent of calibrated span per volt.

Electromagnetic Compatibility (EMC)

Meets all industrial environment requirements of EN61326 and NAMUR NE-21[1]. Maximum deviation <1% span during EMC disturbance[2].

1. *NAMUR NE-21 does not apply to low-power (transmitter option code M) and wireless (transmitter output code X).*
2. *During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.*

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)

Functional specifications

Range and sensor limits

Table 10. 3051CF Range and Sensor Limits

Range[1]	Minimum span[2]	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)

1. inH_2O referenced at 68 °F.
2. For output options W and M. minimum span are:
   Range 1–0.50 inH_2O (1,24 mbar)
   Range 3–2.50 inH_2O (24,86 mbar)
   Range 4–3.00 psi (0,21 bar)
   Range 5–20.00 psi (1,38 bar)

4–20 mA HART (output code A)

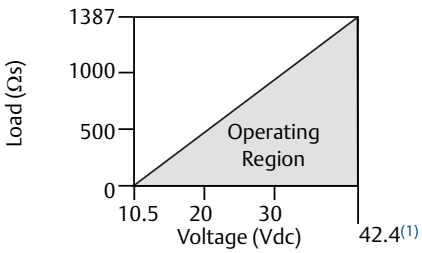
Power supply

External power supply required. Standard transmitter (4–20 mA) 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 LOI/LCD 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 Rosemount 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 LOI (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.

LOI

The LOI utilizes a two button menu with internal and external configuration buttons. Internal buttons are always configured for LOI. 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). For LOI configuration menu see Rosemount 3051 Product Manual.

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 Vdc.

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 LAS if the current link master device fails or is removed from the segment.

FOUNDATION Fieldbus diagnostics suite (option code D01)

The Rosemount 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

LOI

Optional external configuration buttons

*Wireless*Hart (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 percent of URL.

Update rate

User selectable 1 sec. to 60 min.

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 3051CFX

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

Burst pressure limits

Rosemount 3051CF

10081 psig (695,06 bar)

Failure mode alarm

HART 4–20 mA (output option code A)

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/switch 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, or custom levels (see Alarm Configuration). The values for each are as follows:

Table 11. 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 recommendations 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.

Output code M

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven either below 0.94 or above 5.4 V to alert the user (below 0.75 or above 4.4 V for option C2). High or low alarm signal is user-selectable by internal jumper.

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 Rosemount 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 Class 900 ANSI (2160 psig at 100 °F [149 bar at 38 °C])

Remote mount transmitter

- Up to Class 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 900

1.Static pressure selection may effect pressure limitations.

For Rosemount 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 Rosemount 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)

- –112 to 554 °F (–80 to 290 °C)(1)

1. *Consult factory for all-welded design for extended range from –320 to 850 °F.*

Table 12. Temperature Limits

Sensor	Limit
Silicone fill sensor(1)	N/A
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 percent relative humidity

Turn-on time

Performance within specifications less than 2.0 seconds (20.0 s for PROFIBUS PA and FOUNDATION Fieldbus protocols) after power is applied to the transmitter.(1)

1. *Does not apply to wireless option code X.*

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, G1/2, and M20 × 1.5 (CM20) conduit. The polymer housing (code P) has no conduit entries.
HART interface connections fixed to terminal block for output code A and to Rosemount 701P Power Module for option code X.

Process connections

For Rosemount 3051CFA- Rosemount Annubar sensor material

- 316 stainless steel
- Alloy C-276

For Rosemount 3051CFC-material of construction

- 316/316L SST

For Rosemount 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 or DIN EN 1092-1
- Flange face finish per ANSI B16.5 or DIN EN 1092-1, 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 GT

Transmitter connection studs

- ASTM A193 Gr B8M studs

Gaskets/O-rings

- Glass filled PTFE
- Alloy X-750 provided for high temperature option code GT
- Gaskets and O-rings must be replaced each time the Rosemount 3051CFP 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.

Transmitter process wetted parts

Drain/vent valves

316 SST, alloy C-276, or Alloy 400 material

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Non-wetted parts

Electronics housing

Low-copper aluminum or CF-8M (cast version of 316 SST).
Enclosures meet NEMA type 4X, IP66, and IP68 when properly installed.
Housing material code P: PBT/PC with NEMA 4X and IP66/67/68

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)

Product Certifications

Rosemount 3051

Rev 1.6

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 Emerson.com/Rosemount.

Ordinary Location Certification

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 - 2011, 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 ≤ T_a ≤ +85 °C); Factory Sealed; Type 4X

I5 FM Intrinsic Safety (IS) and Nonincendive (NI)
Certificate: FM16US0120X
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3611 - 2004, FM Class 3810 - 2005, ANSI/NEMA 250 - 2008
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 ≤ T_a ≤ +70 °C) [HART], T5(–50 °C ≤ T_a ≤ +40 °C) [HART]; T4(–50 °C ≤ T_a ≤ +60 °C) [Fieldbus/PROFIBUS]; Type 4x

Special Conditions for Safe Use (X):

1. The Rosemount 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 Rosemount 3051 transmitter with the transient terminal block (Option code T1) will not pass the 500 Vrms dielectric strength test and this must be taken into account during installation.

IE USA 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 Rosemount 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 Rosemount 3051 transmitter with the transient terminal block (option code T1) will not pass the 500 Vrms dielectric strength test and this must be taken into account during installation.

C6 Canada Explosionproof, Dust-Ignitionproof, Intrinsic Safety and Nonincendive
Certificate: 1053834
Standards: ANSI/ISA 12.27.01–2003, CSA Std. C22.2 No. 30 -M1986, C SA 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 Canada 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: EN60079-0:2012 + A11:2013, EN60079-1:2014, EN60079-26:2015, EN60079-31:2009
Markings: ⟨Ex⟩ II 1/2 G Ex db IIC T6...T4 Ga/Gb T6(–60 °C ≤ Ta ≤ +70 °C), T4/T5(–60 °C ≤ Ta ≤ +80 °C); ⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (–20 °C ≤ T_a ≤ +85 °C)

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

	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 clause 6.3.12 of EN60079-11:2012. 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)

	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 ≤ T_a ≤ +70 °C); ⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500}105 °C Da (–20 °C ≤ T_a ≤ +85 °C)

Special Conditions for Safe Use (X):

1. This apparatus is not capable of withstanding the 500 V insulation test that is required by clause 6.8.1 of 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, IEC60079-1:2014-06, IEC60079-26:2014-10,IEC60079-31:2008
Markings: Ex db IIC T6...T4 Ga/Gb T6(–60 °C ≤ T_a ≤ +70 °C), T4/T5(–60 °C ≤ T_a ≤ +80 °C); Ex ta IIIC T95 °C T_{500}105 °C Da (–20 °C ≤ T_a ≤ +85 °C)

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 ≤ T_a ≤ +40 °C), T4(–60 °C ≤ T_a ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC Ga T4(–60 °C ≤ T_a ≤ +60 °C)

	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 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.
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 ≤ T_a ≤ +70 °C)

	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 90 V transient suppressor, it is not capable of withstanding the 500 V 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 ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V 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 db IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T4/T5(–60 °C ≤ T_a ≤ +80 °C)

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between zone 0 (process connection) and zone 1 (all other parts of the equipment). The model code and datasheet are to be consulted for details of the diaphragm material. 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. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

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 ≤ T_a ≤ +40 °C), T4(–60 °C ≤ T_a ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +60 °C)

	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 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test required by ABNT NBR IRC 60079-11. 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 ≤ T_a ≤ +60 °C)

	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 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test required by ABNT NBR IEC 60079-11. 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 ≤ T_a ≤ +65 °C), T5(–50 °C ≤ T_a ≤ +80 °C)

Special Conditions for Safe Use (X):

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

T_a	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, GB3836.15–2000, GB3836.16–2006, GB50257-1996, GB12476.2–2006, GB15577–2007

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 500 V 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	$-60\ °C \le T_a \le +40\ °C$
HART	T4	$-60\ °C \le T_a \le +70\ °C$
Fieldbus/PROFIBUS/ FISCO	T4	$-40\ °C \le T_a \le +60\ °C$

3. Intrinsically Safe 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
FISCO parameters apply to both Group IIC and IIB.

[For Flowmeters] When Rosemount 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 Rosemount 644 and associated apparatus. The cables between Rosemount 644 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, GB3836.15–2000, GB3836.16–2006, GB50257-1996, GB12476.2–2006, GB15577–2007

N3 China Type n
Certificate: GYJ15.1105X
Standards: GB3836.1–2010, GB3836.8–2003
Markings: Ex nA nL IIC T5 Gc ($-40\ °C \le T_a \le +70\ °C$)

Special Condition 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.

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 EAC Flameproof
Certificate: RU C-US.GB05.B.01197
Markings: Ga/Gb Ex d IIC T5/T6 X, T5($-60\ °C \le T_a \le +80\ °C$), T6($-60\ °C \le T_a \le +65\ °C$)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

IM EAC Intrinsically Safe
Certificate: RU C-US.GB05.B.01197
Markings: HART: 0Ex ia IIC T4/T5 Ga X,
T4($-60\ °C \le T_a \le +70\ °C$),
T5($-60\ °C \le T_a \le +40\ °C$)
Fieldbus/PROFIBUS: 0Ex ia IIC T4 Ga X
($-60\ °C \le T_a \le +60\ °C$)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

Combinations of certifications

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
KM Combination of EM and IM

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

Table 13. Conduit Plug Thread Sizes

Thread	Identification mark
M20 × 1.5	M20
1/2–14 NPT	1/2 NPT

Table 14. Thread Adapter Thread Sizes

Male thread	Identification mark
M20 ×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 × 1.5–6H	M20
1/2–14 NPT	1/2–14 NPT
PG 1/2	PG 1/2

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. G1/2 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: Marine & Offshore Applications - Measurement of either gauge or absolute pressure for liquid, gas and vapor.

SBV Bureau Veritas (BV) Type Approval
Certificate: 23155
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: Det Norske Veritas' Rules for Classification of Ships, High Speed and Light Craft and Det Norske Veritas' Offshore Standards

Application:

Location classes	
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

Rosemount 3051 Wireless

Rev 1.3

European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

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 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).

USA

I5 U.S.A. Intrinsically Safe (IS)
Certificate: FM 3046325
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3810 - 2005, ANSI/ISA 60079-0 - 2009, ANSI/ISA 60079-11 - 2009, NEMA 250 - 2003, ANSI/IEC 60529
Markings: IS CL I, DIV 1, GP A, B, C, D T4; CL 1, Zone 0 AEx ia IIC T4; T4(–40 °C ≤ T_a ≤ +70 °C) when installed per Rosemount drawing 03031-1062; Type 4X/IP66/IP68

Special Conditions for Safe Use (X):

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

Canada

I6 Canada Intrinsically Safe
Certificate: CSA 2526009
Standards: CAN/CSA C22.2 No. 0-M91, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 157-92, CSA Std C22.2 No. 60529:05
Markings: Intrinsically Safe for Class I, Division 1, Groups A, B, C, D, T4 when installed per Rosemount drawing 03031-1063; Type 4X/IP66/IP68

European

I1 ATEX Intrinsic Safety
Certificate: Baseefa12ATEX0228X
Standards: EN 60079-0: 2012, EN 60079-11: 2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga, T4(–40 °C ≤ T_a ≤ 70 °C) IP66/IP68

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.

International

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 12.0124X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T4 Ga, T4(–40 °C ≤ T_a ≤ 70 °C) IP66/IP68

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.

Brazil

I2 INMETRO Intrinsic Safety
Certificate: UL-BR 13.0534X
Standards: ABNT NBR IEC 60079-0:2008 + Errata 1:2011, ABNT NBR IEC 60079-11:2009
Markings: Ex ia IIC T4 IP66 Ga, T4(–40 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

China

I3 China Intrinsic Safety
Certificate: GYJ13.1362X
GYJ15.1367X [Flowmeters]
Standards: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
Markings: Ex ia IIC T4 Ga, T4(–40 ~ 70 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

Japan

I4 TIIS Intrinsic Safety
Certificate: TC22022X (3051C/L)
TC22023X (3051T)
TC22024X (3051CFx)
Markings: Ex ia IIC T4 Ga, T4(–20 ~ +60 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

EAC - Belarus, Kazakhstan, Russia

IM Technical Regulation Customs Union (EAC) Intrinsic Safety
Certificate: RU C-US.ГБ05.B.00400
Markings: Ex ia IIC T4 Ga, T4(–20 ~ +60 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

Korea

IP Korea Intrinsic Safety
Certificate: 13-KB4BO-0295X
Markings: Ex ia IIC T4 (–40 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

Rosemount 2051CF Flowmeter Series

Rosemount 2051CFA Annubar Flowmeter

Rosemount 2051CF Flow meters integrate industry leading transmitters with industry leading primary elements. Capabilities include:

- Flow meters are fully assembled and leak tested for out-of-the-box installation
- 4–20 mA HART, *Wireless*HART, and FOUNDATION Fieldbus Protocols
- Integral temperature measurement (option code T)
- Advanced diagnostic (option code DA2)
- Direct or remote mount configuration available
- Rosemount 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 flow meter are concerns

Additional information

Specifications: page 119
Certifications: page 126
Dimensional drawings: page 211

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 124 for more information on material selection.

Table 15. Rosemount 2051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
2051CFA	Rosemount 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 15. Rosemount 2051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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 (see "Pipe I.D. range code for Rosemount Annubar Flowmeters and Primary Elements" on page 143)		
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	★

Table 15. Rosemount 2051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Rosemount 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- to 8-in. (50 to 200 mm)	★
2	Sensor size 2 — Line sizes 6- to 96-in. (150 to 2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	
Mounting type		
T1	Compression or threaded connection	★
A1	Class 150 RF ANSI	★
A3	Class 300 RF ANSI	★
A6	Class 600 RF ANSI	★
D1	DN PN16 flange	★
D3	DN PN40 flange	★
D6	DN PN100 flange	★
R1	Class 150 RTJ ANSI flange	
R3	Class 300 RTJ ANSI flange	
R6	Class 600 RTJ ANSI 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.)	

Table 15. Rosemount 2051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Differential pressure range			
1	0 to 25 inH_2O (0 to 62,3 mbar)		★
2	0 to 250 inH_2O (0 to 623 mbar)		★
3	0 to 1000 inH_2O (0 to 2,5 bar)		★
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 × 1.5	★
J	SST	1/2–14 NPT	★
K[(3)]	SST	M20× 1.5	★
P[(4)]	Engineered polymer	No conduit entries	★
D	Aluminum	G1/2	
M[(3)]	SST	G1/2	
Transmitter performance class			
1	2.3 percent 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	★
Pressure testing		
P1	Hydrostatic testing with Certificate	
PX	Extended hydrostatic testing	
Special cleaning		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 level D (section 11.4)	

Table 15. Rosemount 2051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Material testing		
V1	Dye penetrant exam	
Material examination		
V2	Radiographic examination	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Surface finish		
RL	Surface finish for low pipe Reynolds number in gas and steam	★
RH	Surface finish for high pipe Reynolds number in liquid	★
Material traceability certification[(5)]		
Q8	Material Traceability Certification per EN 10474:2004 3.1	★
Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance[(6)]		
J5	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	★
E4	TIIS Flameproof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★

Table 15. Rosemount 2051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

E7[3]	IECEx Flameproof	★
EM	Technical Regulations Custom Union (EAC) 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	★
I7[3]	IECEx Intrinsic Safety	★
IA[3][7]	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus protocol only	★
IB	INMETRO FISCO Intrinsic Safety	★
IE[3][7]	FM FISCO Intrinsically Safe	★
IF[3][7]	CSA FISCO Intrinsically Safe	★
IG[3][7]	IECEx FISCO Intrinsically Safe	★
IM	Technical Regulations Custom Union (EAC) Intrinsic Safety	★
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)	★
KM	Technical Regulations Custom Union (EAC) Flameproof, Intrinsic Safety	★
N1[3]	ATEX Type n	★
N7[3]	IECEx Type n	★
ND[3]	ATEX Dust	★
Shipboard approvals		
SBS	American Bureau of Shipping	★
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 LOI	★
M5	LCD display	★
Transmitter calibration certification		
Q4	Calibration Certificate for Transmitter	★

Table 15. Rosemount 2051CFA Annubar Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Quality certification for safety[10]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Transient protection[8][11]		
T1	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	
F5	5-valve manifold, carbon steel	
PlantWeb control functionality[7]		
A01	FOUNDATION Fieldbus advanced control function block suite	★
Hardware adjustments		
D4[12]	Zero and span hardware adjustments	★
DZ[13]	Digital zero trim	★
Alarm limit[12]		
C4[14]	NAMUR alarm and saturation levels, high alarm	★
CN[14]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
Ground screw[8][15]		
V5	External ground screw assembly	★
HART revision configuration[12]		
HR5[16]	Configured for HART revision 5	★
HR7[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 212) and Pak-Lok (page 211).
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 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 124 for more information on material selection.

Table 16. Rosemount 2051CFC Compact Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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	Rosemount 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	
R	Remote thermowell and RTD	

Table 16. Rosemount 2051CFC Compact Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Transmitter connection platform		
3	Direct-mount, integral 3-valve manifold	★
7	Remote-mount, NPT connections	★
Differential pressure range		
1	0 to 25 inH_2O (0 to 62,3 mbar)	★
2	0 to 250 inH_2O (0 to 623 mbar)	★
3	0 to 1000 inH_2O (0 to 2,5 bar)	★
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 × 1.5	★
J	SST	1/2–14 NPT	★
K[7]	SST	M20 × 1.5	★
P[8]	Engineered polymer	No conduit entries	★
D	Aluminum	G1/2	
M[7]	SST	G1/2	

Transmitter performance class		
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 3-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 16. Rosemount 2051CFC Compact Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Installation accessories		
AB	ANSI alignment ring (Class 150) (only required for 10- and 12-in. [250 and 300 mm] line sizes)	★
AC	ANSI alignment ring (Class 300) (only required for 10- and 12-in. [250 and 300 mm] line sizes)	★
AD	ANSI alignment ring (Class 600) (only required for 10- and 12-in. [250 and 300 mm] 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 (T_{max} = 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 orifice option C (all schedules), Rosemount Annubar option A (schedule 40)	
Pressure testing		
P1	Hydrostatic testing with certificate	
Special cleaning[12]		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 level D (section 11.4)	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Transmitter calibration certification		
Q4	Calibration certificate for transmitter	★
Quality certification for safety[13]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
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	

Table 16. Rosemount 2051CFC Compact Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Materials conformance[14]		
J5	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	★
EM	Technical Regulations Customs Union (EAC) 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	★
IB	INMETRO FISCO Intrinsic Safety	★
IE[7][15]	FM FISCO Intrinsically Safe	★
IF[7][15]	CSA FISCO Intrinsically Safe	★
IG[7][15]	IECEx FISCO Intrinsically Safe	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	★
K1[7]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K2	INMETRO Flameproof, Intrinsic Safety, Type n	★
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)	★
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety (combination of EM and IM)	★
N1[7]	ATEX Type n	★
N7[7]	IECEx Type n	★
ND[7]	ATEX Dust	★

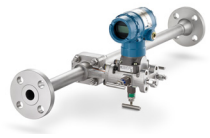
Table 16. Rosemount 2051CFC Compact Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Shipboard approvals		
SBS	American Bureau of Shipping	★
Sensor fill fluid and O-ring options		
L1[16]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[16]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Display and interface options		
M4[17]	LCD display with LOI	★
M5	LCD display	★
Transient protection[16][18]		
T1	Transient terminal block	★
Manifold for remote mount option		
F2	3-valve manifold, stainless steel	★
F6	5-valve manifold, stainless steel	★
Alarm limit[19]		
C4[20]	NAMUR alarm and saturation levels, high alarm	★
CN[20]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
PlantWeb control functionality[15]		
A01	FOUNDATION Fieldbus Advanced Control Function Block Suite	★
Hardware adjustments		
D4[19]	Zero and span hardware adjustments	★
DZ[21]	Digital zero trim	★
Ground screw[22]		
V5	External ground screw assembly	★
HART revision configuration[19]		
HR5[23]	Configured for HART Revision 5	★
HR7[24]	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. Only available with primary element technology P.
2. For the 10- and 12-in. (250 and 300 mm) line size, the alignment ring must be ordered (installation accessories).
3. 10- and 12-in. (250 and 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 Rosemount Annubar option A, consult factory for pipe schedules other than Sch. 40.
12. Available with primary element technology C or P only.
13. Only available with 4–20 mA HART (output code A).
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 valid with FOUNDATION Fieldbus output code F.
16. Not available with output code X.
17. Not available with FOUNDATION Fieldbus (output code F) or Wireless (output code X).
18. 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.
19. Only available with 4–20 mA HART (output codes A and M).
20. NAMUR-compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
21. Only available with HART 4–20 mA (output codes A and M) and wireless (output code X).
22. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
23. Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.
24. Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if 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 124 for more information on material selection.

Table 17. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
2051CFP	Integral orifice flowmeter	
Measurement type and type		
D	Differential Pressure	★
Material type and body		
F	316 SST, enhanced support body	★
S	316 SST, traditional body	★
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	★
W9	Pipe ends: Flanged, RF, ANSI Class 900, 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	
R9	Pipe ends: Flanged, RTJ, ANSI Class 900, weld-neck	

Table 17. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Orifice plate material		
S	316/316L 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 inH_2O (0 to 62,3 mbar)	★
2	0 to 250 inH_2O (0 to 623 mbar)	★
3	0 to 1000 inH_2O (0 to 2,5 bar)	★
Transmitter output		
A[(2)]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION Fieldbus Protocol	★
W	PROFIBUS PA Protocol	★

Table 17. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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 × 1.5	★
J	SST	1/2–14 NPT	★
K[3]	SST	M20 × 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, 2.4 GHz *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[6]		
P1	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, W6, and W9)	

Table 17. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Flow calibration[7]		
WD	Discharge coefficient verification	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Material traceability certification		
Q8	Material traceability certification per EN 10204:2004 3.1	★
Code conformance[8]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance[9]		
J5	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[10]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Product certifications[11]		
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	★
EM	Technical Regulations Customs Union (EAC) Flameproof	★
EP	Republic of Korea 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	★
I7[3]	IECEx Intrinsic Safety	★

Table 17. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

IA[3][12]	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus protocol only	★
IB	INMETRO FISCO Intrinsic Safety	★
ID	TIIS FISCO Intrinsic Safety	★
IE[3][12]	FM FISCO Intrinsically Safe	★
IF[3][12]	CSA FISCO Intrinsically Safe	★
IG[3][12]	IECEx FISCO Intrinsically Safe	★
IP	Republic of Korea Intrinsic Safety	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	★
K1[3][12]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K2	INMETRO Flameproof, Intrinsic Safety, Type n	★
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)	★
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety	★
KP	Republic of Korea Flameproof, Intrinsic Safety	★
N1[3]	ATEX Type n	★
N7[3]	IECEx Type n	★
Shipboard approvals		
SBS	American Bureau of Shipping	★
Sensor fill fluid and O-ring options		
L1[13]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[13]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Display and interface options		
M4[17]	LCD display with LOI	★
M5	LCD display	★
Transient protection[13][14]		
T1	Transient terminal block	★
PlantWeb control functionality[12]		
A01	FOUNDATION Fieldbus advanced control function block suite	★
PlantWeb diagnostic functionality[12]		
D01	FOUNDATION Fieldbus diagnostic suite	★

Table 17. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Alarm levels[15]		
C4[16]	NAMUR alarm and saturation levels, high alarm	★
CN[16]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
Hardware adjustments		
D4[15]	Zero and span hardware adjustments	★
DZ[17]	Digital zero trim	★
Ground screw[13][18]		
V5	External ground screw assembly	★
HART revision configuration[15]		
HR5[19]	Configured for HART revision 5	★
HR7[20]	Configured for HART revision 7	★
Typical model number: 2051CFP D F 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. Only available with 4–20 mA HART (output code A).
11. If select body material and type code F, consult the factory for product certifications availability
12. Only valid with FOUNDATION Fieldbus output code F.
13. Not available with output code X.
14. 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.
15. Only available with 4–20 mA HART (output codes A and M).
16. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
17. Only available with HART 4–20 mA (output codes A and M) and Wireless (output code X).
18. The V5 option is not needed with E1, E2, E3, E4, E7, EM, EP, K1, K2, K4, K7, KA, KC, KD, KP, KM, N1, N2, N3, N7, ND, NK, or T1 as the external ground screw assembly is included with these options.
19. Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.
20. 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 18. Flow Performance - Flow Reference Accuracy(1)

Rosemount 2051CFA Annubar Flowmeter		
Ranges 2–3		±2.30% of flow rate at 5:1 flow turndown
Rosemount 2051CFC_A Compact Annubar Flowmeter - Rosemount 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
Rosemount 2051CFC Compact Orifice Flowmeter – Conditioning option C		
Ranges 2–3		±2.45% of flow rate at 5:1 flow turndown
Rosemount 2051CFC Compact Orifice Flowmeter - Orifice option P(2)		
Ranges 2–3	$\beta = 0.4$	±2.50% of flow rate at 5:1 flow turndown
	$\beta = 0.50, 0.65$	±2.50% of flow rate at 5:1 flow turndown
Rosemount 2051CFP Integral Orifice Flowmeter		
Ranges 2–3	$\beta < 0.1$	±3.10% of flow rate at 5:1 flow turndown
	$0.1 < \beta < 0.2$	±2.75% of flow Rate at 5:1 flow turndown
	$0.2 \leq \beta \leq 0.6$	±2.25% of flow rate at 5:1 flow turndown
	$0.6 < \beta < 0.8$	±3.00% of flow rate at 5:1 flow turndown

1. Range 1 flowmeters may experience an additional uncertainty up to 0.9 percent. Consult your Emerson Representative for exact specifications.
2. For smaller line sizes, see Rosemount Compact Orifice.

Table 19. Warranty(1)

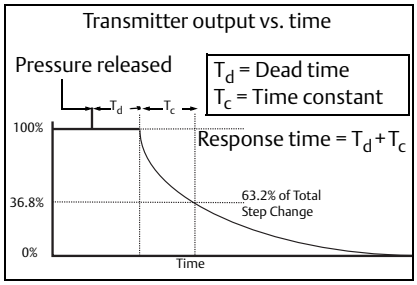
Models	Standard(2)	Optional extended warranty(3)
All Rosemount 3051	1-year limited warranty	WR5: 5-year limited warranty WR3: 3-year limited warranty

1. Warranty details can be found in Emerson Terms and Conditions of Sale, Document 63445, Rev G (10/06).
2. Goods are warranted for 12 months from the date of initial installation or 18 months from the date of shipment by seller, whichever period expires first.
3. Rosemount extended warranties have a limited warranty of five or three years from date of shipment.

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[4]	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.
4. Does not apply to wireless (output code X). See "WirelessHART (output code X)" on page 122.



Vibration effect for Rosemount 2051CFA, 2051CFC

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

Vibration effect for Rosemount 2051CFC_A

Less than ±0.1 percent of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10–60 Hz, 0.15 mm 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.*

Vibration effect for Rosemount 2051CFP

Less than ±0.1 percent of URL when tested per the requirements of IEC60068-2-6
(10–1000 Hz test frequency range, 0.075 mm displacement peak amplitude, 10 m/s^2 acceleration amplitude).

Functional specifications

Range and sensor limits

Range	Rosemount 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	10 inH_2O (24,88 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.

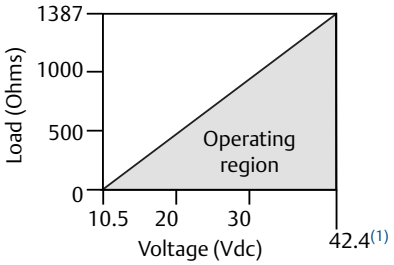
Turn-on time

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.

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

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*HART (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.

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.

Rosemount 2051
Digital communications based on HART Revision 5 protocol.

Rosemount 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 LOI.

LOI

The LOI utilizes a two button menu with internal and external configuration buttons. Internal buttons are always configured for LOI. 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). For LOI configuration menu, see Rosemount 2051 with Selectable HART Reference Manual.

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:

Rosemount 2051CF Flowmeters

- Ranges 2–3: 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

Rosemount 2051CF

- 10000 psig (689,5 bar)

Temperature limits

For Rosemount 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 Class 900ANSI (2160 psig at 100 °F [149 bar at 38 °C])
- Integral temperature measurement is not available with Flanged mounting type greater than Class 900

Remote Mount Transmitter

- Up to Class 2500 ANSI (6000 psig at 100 °F [416 bar at 38 °C]).

1. Static pressure selection may effect pressure limitations.

For Rosemount 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 Rosemount 2051CFP temperature limits-process temperature limits[(1)]

Standard (direct/remote mount)

- –40 to 450 °F (–40 to 232 °C)

Extended (remote mount only with option code GT)

- –112 to 554 °F (–80 to 290 °C)

1. *Consult factory for all-welded design for extended range from –320 °F to 850 °F (–195 to 454 °C).*

Transmitter temperature limits[1]

Ambient

- –40 to 185 °F (–40 to 85 °C)
  With LCD display[2]: –40 to 175 °F (–40 to 80 °C)

Storage

- –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.

Table 20. Temperature limits

Sensors	Limits
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

4–20 mA HART

Rosemount 2051 with selectable HART

Analog output response to a step input change is user-enterable from 0.0 to 60.0 seconds for one time constant. This software damping is in addition sensor module response time.

Rosemount 2051

Analog output response to a step input change is user-enterable from 0.4 to 60.0 seconds for one time constant. This software damping is in addition sensor module response time.

FOUNDATION Fieldbus

Transducer block: User configurable
AI bock: User configurable

PROFIBUS PA

AI block only: User configurable

Failure mode alarm

HART 4–20 mA (option code A)

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:

Table 21. Standard operation

Output code	Linear output	Fail high	Fail low
A	$3.9 \le I \le 20.8$	$I \ge 21.75$ mA	$I \le 3.75$ mA
M	$0.97 \le V \le 5.2$	$V \ge 5.4$ V	$V \le 0.95$ V

Table 22. NAMUR-compliant operation

Output code	Linear output	Fail high	Fail low
A	$3.8 \le I \le 20.5$	$I \ge 22.5$ mA	$I \le 3.6$ mA

Output code F and X

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
Rosemount 2051CF Range 1 (CF)	±0.2% of URL for 1 year, Reference Stability	±0.125% of URL for 5 years, Operating Stability
Ranges 2–3	±0.1% of URL for 3 years, Operating Stability	

Physical specifications

Electrical connections

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

Rosemount 2051CF process-wetted parts

For Rosemount 2051CFA wetted parts-Annubar sensor material

- 316 Stainless Steel
- Alloy C-276

For Rosemount 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 Rosemount 405 is disassembled.

For Rosemount 2051CFP wetted parts-material of construction

Orifice plate
- 316/316L SST

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

Transmitter connection studs
- ASTM A193 Gr B8M studs

Gaskets/O-rings
- Glass filled PTFE
- Gaskets and O-rings must be replaced each time the Rosemount 2051CFP is disassembled for installation or maintenance.

Process isolating diaphragms

316L SST, Alloy C-276

Non-wetted parts for Rosemount 2051CF

Electronics housing

Low-copper aluminum or CF-8M (Cast version of 316 SST). Enclosures meet NEMA Type 4X, IP66, and IP68 when properlyinstalled.

Coplanar sensor module housing

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

Bolts

ASTM F593G, Condition CW1 (austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)

Sensor module fill fluid

Silicone or inert halocarbon

Paint for aluminum housing

Polyurethane

Cover O-rings

Buna-N
Silicone (for wireless option X)

Product Certifications

Rosemount 2051

Rev 1.4

European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

Ordinary Location Certification

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

North America

E5 USA Explosionproof (XP) and Dust-Ignitionproof (DIP)
Certificate: 3032938
Standards: FM Class 3600 – 2011, FM Class 3615 – 2006, FM Class 3616 – 2011, FM Class 3810 – 2005, ANSI/NEMA 250 – 2008, ANSI/IEC 60529 2004
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(–50 °C ≤ T_a ≤ +85 °C); Factory Sealed; Type 4X

I5 USA Intrinsic Safety (IS) and Nonincendive (NI)
Certificate: 3033457
Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005, ANSI/NEMA 250 – 2008
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 02051-1009; Class I, Zone 0; AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D; T4(–50 °C ≤ T_a ≤ +70 °C); Type 4X

IE USA FISCO
Certificate: 3033457
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 02051-1009 (–50 °C ≤ T_a ≤ +60 °C); Type 4X

E6 Canada Explosion-Proof, Dust Ignition Proof
Certificate: 2041384
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, CAN/CSA-C22.2 No.157-92, CSA Std C22.2 No. 213-M1987, CAN/CSA-E60079-0:07, CAN/CSA-E60079-1:07, CAN/CSA-E60079-11-02, CAN/CSA-C22.2 No.60529:05, ANSI/ISA-12.27.01–2003
Markings: Explosion-Proof for Class I, Divisions 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 Canada Intrinsic Safety
Certificate: 2041384
Standards: 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 drawing 02051-1008. Ex ia IIC T3C. Single Seal. Enclosure Type 4X.

Europe

E1 ATEX Flameproof
Certificate: KEMA 08ATEX0090X
Standards: EN60079-0:2006, EN60079-1:2007, EN60079-26:2007
Markings: ⟨Ex⟩ II 1/2 G Ex d IIC T6 IP66 (–50 °C ≤ T_a ≤ 65 °C); ⟨Ex⟩ II 1/2 G Ex d IIC T5 IP66 (–50 °C ≤ T_a ≤ 80 °C)

Special Conditions for Safe Use (X):

1. The Ex d blanking elements, 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 the manufacturer for information on the dimensions of the flameproof joints.

I1 ATEX Intrinsic Safety
Certificate: Baseefa08ATEX0129X
Standards: EN60079-0:2012, EN60079-11:2012
Markings: Ⓔx II 1 G Ex ia IIC T4 Ga
(–60 °C ≤ T_a ≤ +70 °C)

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	1.0 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Condition for Safe Use (X):

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

IA ATEX FISCO
Certificate: Baseefa08ATEX0129X
Standards: EN60079-0:2012, EN60079-11:2012
Markings: Ⓔx II 1 G Ex ia IIC T4 Ga
(–60 °C ≤ T_a ≤ +60 °C)

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

Special Conditions for Safe Use (X):

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

N1 ATEX Type n
Certificate: Baseefa08ATEX0130X
Standards: EN60079-0:2012, EN60079-15:2010
Markings: Ⓔx II 3G Ex nA IIC T4 Gc
(–40 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V electrical strength test as defined in clause 6.5.1 of by EN 60079-15:2010. This must be taken into account during installation.

ND ATEX Dust
Certificate: Baseefa08ATEX0182X
Standards: EN60079-0:2012, EN60079-31:2009
Markings: Ⓔx II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da
(–20 °C ≤ T_a ≤ +85 °C)

Special Condition for Safe Use (X):

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

International

E7 IECEx Flameproof
Certificate: IECExKEM08.0024X
Standards: IEC60079-0:2004, IEC60079-1:2007-04, IEC60079-26:2006
Markings: Ex d IIC T6/T5 IP66,
T6(–50 °C ≤ T_a ≤ +65 °C),
T5(–50 °C ≤ T_a ≤ +80 °C)

Temperature class	Process temperature
T6	–50 °C to +65 °C
T5	–50 °C to +80 °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 maintenance shall be followed in detail to assure safety during its expected lifetime.

2. The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

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

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	1.0 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Condition for Safe Use (X):

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

IG IECEx FISCO
Certificate: IECExBAS08.0045X
Standards: IEC60079-0:2011, IEC60079-11:2011
Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +60 °C)

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

Special Condition for Safe Use (X):

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

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

Special Condition for Safe Use (X):

1. If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in clause 6.5.1 of IEC60079-15:2010. This must be taken into account during installation.

Brazil

E2 INMETRO Flameproof
Certificate: UL-BR 14.0375X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC 60079-1:2009 + Errata 1:2011,ABNT NBR IEC 60079-26:2008 + Errata 1:2009
Markings: Ex d IIC T6/T5 Gb IP66,
T6(–50 °C ≤ T_a ≤ +65 °C),
T5(–50 °C ≤ T_a ≤ +80 °C)

Special Condition 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. The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

I2 INMETRO Intrinsic Safety
Certificate: UL-BR 14.0759X
Standards: ABNT NBR IEC 60079-0:2008 + Errata 1:2011; ABNT NBR IEC 60079-11:2009
Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +70 °C)

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	1 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 90 V transient suppressor, it is incapable of withstanding the 500 V insulation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in atmospheres that require ELP Ga.

IB INMETRO FISCO
Certificate: UL-BR 14.0759X
Standards: ABNT NBR IEC 60079-0:2008 + Errata 1:2011; ABNT NBR IEC 60079-11:2009

Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +60 °C)

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

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V insulation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in atmospheres that require ELP Ga.

China

E3 China Flameproof
Certificate: GYJ13.1386X; GYJ5.1366X [Flowmeters]
Standards: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010-2010
Markings: Pressure Transmitter: Ex d IIC Gb, T6(–50 °C ≤ T_a ≤ +65 °C), T5(–50 °C ≤ T_a ≤ +80 °C)
Flowmeter: Ex d IIC Ga/Gb, T6(–50 °C ≤ T_a ≤ +65 °C), T5(–50 °C ≤ T_a ≤ +80 °C)

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:
   - The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C.
   - This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environment conditions to which the diaphragm will be subjected.
2. The relation between T code and ambient temperature range is:

T_a	Temperature class
–50 °C ≤ T_a ≤ +80 °C	T5
–50 °C ≤ T_a ≤ +65 °C	T6

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 mixture harmful to 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 a hazardous location. 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 a non-hazardous location.
9. During installation, use and maintenance of this product, observe the following standards: GB3836.13-2013, GB3836.15-2000, GB3836.16-2006, GB50257-2014.

I3 China Intrinsic Safety
Certificate: GYJ12.1295X; GYJ15.1365X [Flowmeters]
Standards: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +70 °C)

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:
   - 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.
   - 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, Fieldbus, PROFIBUS, and Low Power	T4	–60 °C ≤ T_a ≤ +70 °C

3. Intrinsically safe parameters:

Parameter	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	1 W	1.3 W	5.32 W
Capacitance C_i	0.012 µF	0 µF	0 nF
Inductance L_i	0 mH	0 mH	0 µF

Note
FISCO parameters comply with the requirements for FISCO field devices in GB3836.19-2010.

[For Flowmeters] When Rosemount 644 Temperature Transmitter is used, the transmitter 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 Rosemount 644 and associated apparatus. The cables between Rosemount 644 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. 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 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.
6. End users are not permitted to change any internal components, and needs to settle the problem in conjunction with the manufacturer to avoid damage to the product.
7. During installation, use and maintenance of this product, observe the following standards: GB3836.13-2013, GB3836.15-2000, GB3836.16-2006, GB3836.18-2010, GB50257-2014.

Japan

E4 Japan Flameproof
Certificate: TC20598, TC20599, TC20602, TC20603 [HART]; TC20600, TC20601, TC20604, TC20605 [Fieldbus]
Markings: Ex d IIC T5

Technical Regulations Customs Union (EAC)

EM EAC Flameproof
Certificate: RU C-US.GB05.B.01199
Markings: Ga/Gb Ex d IIC T5/T6 X, T5(–50 °C ≤ T_a ≤ +80 °C), T6(–50 °C ≤ T_a ≤ +65 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

IM EAC Intrinsically Safe
Certificate: RU C-US.GB05.B.01199
Markings: 0Ex ia IIC T4 Ga X (–60 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

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, N7 and IECEx Dust

IECEx Dust
Certificate: IECExBAS08.0058X
Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIIC T95 °C T_{500} 105 °C Da (–20 °C ≤ T_a ≤ +85 °C)

Special Condition for Safe Use (X):

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

KA Combination of E1, I1, and K6

KB Combination of K5 and K6

KC Combination of E1, I1, and K5

KD Combination of K1, K5, and K6

KM Combination of EM and IM

Additional certifications

SBS American Bureau of Shipping (ABS) Type Approval
Certificate: 09-HS446883B-3-PDA
Intended Use: Marine and Offshore Applications
Measurement of either Gauge or Absolute Pressure for Liquid, Gas, and Vapor
ABS Rules: 2013 Steel Vessels Rules 1-1-4/7.7, 1-1-Appendix 3, 4-8-3/1.7, 4-8-3/13.1

SBV Bureau Veritas (BV) Type Approval
Certificate: 23157/B0 BV
BV Rules: Bureau Veritas Rules for the Classification of Steel Ships
Application: Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS; Pressure transmitter type 2051 cannot be installed on diesel engines.

SDN Det Norske Veritas (DNV) Type Approval
Certificate: TAA00004F
Intended Use: DNV GL Rules for Classification — Ships and offshore units

Application:

Location classes	
Type	2051
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

Rosemount 2051 Wireless

Rev 1.2

European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

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

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

Installing in 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.

USA

I5 U.S.A. Intrinsically Safe (IS)
Certificate: FM 3046325
Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3810 – 2005, ANSI/ISA 60079-0 – 2009, ANSI/ISA 60079-11 – 2009, NEMA 250 – 2003, ANSI/IEC 60529
Markings: IS CL I, DIV 1, GP A, B, C, D T4; CL 1, Zone 0 AEx ia IIC T4; T4(–40 °C ≤ T_a ≤ +70 °C) when installed per Rosemount drawing 03031-1062; Type 4X/IP66/IP68

Special Conditions for Safe Use (X):

1. The Rosemount 2051 Wireless Pressure Transmitter shall only be used with the 701PGNKF Rosemount SmartPower Battery Pack.
2. 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 used to prevent impact and friction.
3. The surface resistivity of the transmitter housing is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Canada

I6 Canada Intrinsically Safe
Certificate: CSA 2526009
Standards: CAN/CSA C22.2 No. 0-M91, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 157-92, CSA Std C22.2 No. 60529:05
Markings: Intrinsically Safe for Class I, Division 1, Groups A, B, C, D, T4 when installed per Rosemount drawing 03031-1063; Type 4X/IP66/IP68

Europe

I1 ATEX Intrinsic Safety
Certificate: Baseefa12ATEX0228X
Standards: EN 60079-0: 2012, EN 60079-11: 2012
Markings: Ⓔx II 1 G Ex ia IIC T4 Ga, T4(–40 °C ≤ T_a ≤ +70 °C) IP66/IP68

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.

International

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 12.0124X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T4 Ga, T4(–40 °C ≤ T_a ≤ +70 °C) IP66/IP68

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.

Brazil

I2 INMETRO Intrinsic Safety
Certificate: UL-BR 13.0534X
Standards: ABNT NBR IEC 60079-0:2008 + Errata 1:2011, ABNT NBR IEC 60079-11:2009
Markings: Ex ia IIC T4 IP66 Ga, T4(–40 °C ≤ T_a ≤ +70 °C)

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

China

I3 China Intrinsic Safety
Certificate: GYJ12.1295X
GYJ15.1365X [Flowmeters]
Standards: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
Markings: Ex ia IIC Ga T4, –40 ~ +70 °C

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

Japan

I4 TIIS Intrinsic Safety
Certificate: TC22022X (2051C/L)
TC22023X (2051T)
TC22024X (2051CFx)
Markings: Ex ia IIC T4 Ga, T4(–20 ~ +60 °C)

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

EAC – Belarus, Kazakhstan, Russia

IM Technical Regulation Customs Union (EAC) Intrinsic Safety
Certificate: RU C-US.**ГБ**05.B.00390
Markings: 0Ex ia IIC T4 Ga X;

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

Korea

IP Korea Intrinsic Safety
Certificate: 13-KB4BO-0220X
Markings: Ex ia IIC T4 (–40 °C ≤ T_a ≤ +70°C);

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

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 percent flow rate accuracy
- Lowest permanent pressure loss of any DP Flowmeter
- Available in 2 to 96-in. (50 to 2400 mm) line sizes

Additional information

Specifications: page 140
Dimensional drawings: page 215
Installation and flowmeter orientation: page 187

Table 23. Rosemount 485 Annubar Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	DP Flow primary type	
485	Rosemount 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)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	

Table 23. Rosemount 485 Annubar Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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 for Rosemount Annubar Flowmeters and Primary Elements" on page 143)		
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	★
Rosemount 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	
Sensor material		
S	316 stainless steel	★
H	Alloy C-276	

Table 23. Rosemount 485 Annubar Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Sensor size				
1	Sensor size 1 — Line sizes 2- to 8-in. (50 to 200 mm)			★
2	Sensor size 2 — Line sizes 6- to 96-in. (150 to 2400 mm)			★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)			
Mounting type				
T1	Compression/threaded connection			★
A1	Class 150 RF ANSI			★
A3	Class 300 RF ANSI			★
A6	Class 600 RF ANSI			★
D1	DN PN16 flange			★
D3	DN PN40 flange			★
D6	DN PN100 flange			★
A9[3]	Class 900 RF ANSI			
AF[3]	Class 1500 RF ANSI			
AT[3]	Class 2500 RF ANSI			
R1	Class 150 RTJ ANSI flange			
R3	Class 300 RTJ ANSI flange			
R6	Class 600 RTJ ANSI flange			
R9[3]	Class 900 RTJ ANSI flange			
RF[3]	Class 1500 RTJ ANSI flange			
RT[3]	Class 2500 RTJ ANSI 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	
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	

Table 23. Rosemount 485 Annubar Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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[2]	Remote-mount NPT connections, integral needle valves	★
B[2]	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[5]		
P1	Hydrostatic testing with certificate	
PX	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	

Table 23. Rosemount 485 Annubar Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Surface finish		
RL	Surface finish for low pipe Reynolds number in gas and steam	★
RH	Surface finish for high pipe Reynolds number in liquid	★
Material traceability certification[(6)]		
Q8	Material traceability certificate per EN 10204:2004 3.1	★
Code conformance[(7)]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance[(8)]		
J5	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Installed in flanged pipe spool section		
H3	Class 150 flanged connection with Rosemount standard length and schedule	
H4	Class 300 flanged connection with Rosemount standard length and schedule	
H5	Class 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	★
Attach to		
H1	Attach to transmitter	

Table 23. Rosemount 485 Annubar Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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 218), Flange-Lok (page 217), Pak-Lok (page 215), Threaded (page 216) and Threaded Flo-Tap models (page 222). 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 percent of flow rate

Repeatability

±0.1 percent

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 24. 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 representative for assistance. A Configuration Data Sheet is required prior to order for application verification. To complete the Configuration Data Sheet go to:
Emerson.com/Rosemount/DP_Flow/Application/Pages/PCDefault

Flow turndown

10:1 or better

Rosemount Annubar sensor surface finish

The front surface of the Rosemount 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 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

- –50 to 1250 °F (–101 to 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.)
- –300 to 850 °F (–184 to 454 °C) – stainless steel sensor material
- 600 °F (315 °C) for Rosemount Annubar threaded type

Pressure and temperature limits

Direct mount transmitter

- Up to Class 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[1]

- Up to Class 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 NPT nipple and union

Remote RTD Thermowell

- 1/2 × 1/2 NPT, 316 SST or Alloy C-276 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

Rosemount Annubar type

See "Rosemount 485 Annubar Primary Element" on page 215.

Pak-Lok model (option P)

- Provided with a compression sealing mechanism rated up to Class 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 Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C])
- Temperature limits: –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.

  Temperature limits by sensor material:
  - 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.
- Temperature limits: –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).

Table 25. 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	Class 150 RF ANSI			X	X	X
A3	Class 300 RF ANSI			X	X	X
A6	Class 600 RF ANSI			X	X	X
A9[2]	Class 900 RF ANSI				X	
AF[2]	Class 1500 RF ANSI				X	
AT[2]	Class 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	Class 150 RTJ ANSI flange			X	X	X
R3	Class 300 RTJ ANSI flange			X	X	X
R6	Class 600 RTJ ANSI flange			X	X	X
R9[2]	Class 900 RTJ ANSI flange				X	
RF[2]	Class 1500 RTJ ANSI flange				X	
RT[2]	Class 2500 RTJ ANSI flange				X	

1. Available up to Class 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 26. 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 and Y gate valve, carbon steel	–20 to 775 °F (–29 to 413 °C)
G6	OS and Y gate valve, stainless steel	–40 to 850 °F (–40 to 454 °C)
G7	OS and 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 Class 600 and DIN flanges.
- Available in carbon steel (A105) and 316 stainless steel.

Table 27. Flanged Pipe Spool Section Schedule

ANSI	Schedule
Class 150 ANSI	40
Class 300 ANSI	40
Class 600 ANSI	80

Table 28. 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 Rosemount Annubar Flowmeters and Primary Elements

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. The Emerson 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	
N/A	2-in. (50 mm)	2.625-in. (66.68 mm)	020	1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
	2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025	2.207 to 2.322-in. (56.06 to 58.98 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.448-in. (2.1 to 11.4 mm)	B
				2.323 to 2.469-in. (59.00 to 62.71 mm)		0.083 to 0.417-in. (2.1 to 10.6 mm)	C
				2.470 to 2.598-in. (62.74 to 65.99 mm)		0.083 to 0.435-in. (2.1 to 11.0 mm)	D
				2.599 to 2.647-in. (66.01 to 67.23 mm)		0.083 to 0.515-in. (2.1 to 13.1 mm)	E
	3-in. (80 mm)	3.75-in. (95.25 mm)	030	2.648 to 2.751-in. (67.26 to 69.88 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.460-in. (2.1 to 11.7 mm)	A
				2.752 to 2.899-in. (69.90 to 73.63 mm)		0.083 to 0.416-in. (2.1 to 10.6 mm)	B
				2.900 to 3.068-in. (73.66 to 77.93 mm)		0.083 to 0.395-in. (2.1 to 10.0 mm)	C
				3.069 to 3.228-in. (77.95 to 81.99 mm)		0.083 to 0.404-in (2.1 to 10.3 mm)	D
	3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035	3.229 to 3.333-in. (82.02 to 84.66 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.496-in. (3.0 to 12.6 mm)	B
				3.334 to 3.548-in. (84.68 to 90.12 mm)		0.120 to 0.386-in. (3.0 to 9.8 mm)	C
				3.549 to 3.734-in. (90.14 to 94.84 mm)		0.120 to 0.415-in. (3.0 to 10.5 mm)	D
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	B
				3.826 to 4.026-in. (97.18 to 102.26 mm)		0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.027 to 4.237-in. (102.29 to 107.62 mm)		0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.238 to 4.437-in. (107.65 to 112.70 mm)		0.120 to 0.401-in. (3.0 to 10.2 mm)	E
	5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.438 to 4.571-in. (112.73 to 116.10 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	A
				4.572 to 4.812-in. (116.13 to 122.22 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				4.813 to 5.047-in. (122.25 to 128.19 mm)		0.134 to 0.380-in. (3.4 to 9.7 mm)	C
				5.048 to 5.249-in. (128.22 to 133.32 mm)		0.134 to 0.413-in. (3.4 to 10.5 mm)	D

Sensor size 1	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 138.99 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.3919-in. (3.4 to 9.9 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 0.327-in. (3.4 to 8.3 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 0.31-in. (3.4 to 7.9 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 0.297-in. (3.4 to 7.5 mm)	D
Sensor size 2	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 139.99 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 1.067-in. (3.4 to 27.1 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 1.05-in. (3.4 to 26.7 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 1.037-in. (3.4 to 26.3 mm)	D
Sensor size 1	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.216-in. (3.4 to 5.5 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.246-in. (3.4 to 6.2 mm)	D
Sensor size 2	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.114-in. (3.4 to 28.3 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.956-in. (3.4 to 24.3 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.986-in. (3.4 to 25.0 mm)	D
Sensor size 1	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
Sensor size 2	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 1.052-in. (6.4 to 26.7 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
N/A	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 to 2400 mm) line sizes

Additional information

Specifications: page 151
Dimensional drawings: page 223
Installation and flowmeter orientation: page 187

Table 29. Rosemount 585 Annubar Primary Element Ordering Information

he starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	DP Flow primary type	
585	Severe service Rosemount Annubar primary element	
Application type		
S[(1)(2)]	Severe service Rosemount Annubar	★
M[(3)]	Main steam line Rosemount Annubar	
Fluid type		
L	Liquid	★
G	Gas	★
S	Steam	★
Rosemount 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)	

Table 29. Rosemount 585 Annubar Primary Element Ordering Information

he starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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)	
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 29. Rosemount 585 Annubar Primary Element Ordering Information

he starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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	★
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	
Temperature measurement		
0	No temperature sensor required	★
R[4][6][9]	Remote RTD (1/2 NPT aluminum housing) with thermowell	
S[4][6][9]	Remote RTD (1/2 NPT stainless housing) with thermowell	

Table 29. Rosemount 585 Annubar Primary Element Ordering Information

he starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Transmitter connection platform		
3[6][10][11]	Direct-mount, 3-valve manifold	★
4[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[13]		
P1	Hydrostatic testing with certificate	
PX	Extended hydrostatic testing	
Special cleaning[6][14]		
PA	Cleaning per ASTM G93 level D (section 11.4)	
Material testing		
V1	Dye penetrant weld exam	
Material examination		
V2	Radiographic weld examination	
Flow calibration		
W1	Flow calibration (average K)	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★

Table 29. Rosemount 585 Annubar Primary Element Ordering Information

he starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Material traceability certification[15]		
Q8	Material traceability certification per EN 10204:2004 3.1	★
Positive material testing[15]		
V4	Positive material identification	
Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance[16]		
J5	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[17]		
DV	Double instrument valves (4 valves total)	★
Special shipment		
Y1	Mounting hardware shipped separately	★
Assemble mounting hardware[18]		
WP	Assemble socket-weld outlet to packing body	★
Special dimensions		
VM	Variable mounting	
585 packing gland plug[18]		
TP	Packing gland plug for steam blow down	
585 installation alignment bar[18]		
A1	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 Rosemount Annubar type F.

2. Required for Rosemount Annubar type G.
3. Required for Rosemount Annubar type L.
4. Not available with Rosemount Annubar type L.
5. Not available with Rosemount 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 Rosemount 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 Rosemount Annubar Type L.

Specifications

Performance specifications

Performance statement assumptions

Measured pipe I.D.

Discharge coefficient factor

±1.50 percent of flow rate

Repeatability

±0.10 percent

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 30. 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)

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

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 representative for assistance. A Configuration Data Sheet is required prior to order for application verification. To complete the Configuration Data Sheet go to: Emerson.com/Rosemount/DP_Flow/Application/Pages/PCDefault.aspx

Flow turndown

10:1 or better

Functional specifications

Service

- Liquid
- Gas
- Steam

Process temperature limits

Table 31. Direct Mount Transmitter Connection Platform

Transmitter connection platform	Temperature limit
3-valve manifold (option codes 3, 4)	500 °F (260 °C)
5-valve manifold (option code 6)(1)	750 °F (398 °C)

1. Specification is 600 °F (315 °C) in steam service.

Table 32. Remote Mount Transmitter Connection Platform (Option Codes 7, 8)

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 33. Main Steam Line Rosemount Annubar (Option Code L)

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 34. Severe Service Rosemount Annubar

Rosemount Annubar type	Sensor material	Max. flange rating
Flanged (option code F)	316 SST	Class 2500 ANSI
	Alloy C-276	Class 2500 ANSI
	Alloy 800H	Class 2500 ANSI
	PVDF	Class 150 ANSI
Flanged Flo-Tap (option code G)	316 SST	Class 600 ANSI

Physical specifications

Temperature measurement

Remote RTD

- Series 78 with Rosemount 644 housing 100 Ohm platinum RTD
- Spring loaded with 1/2 NPT nipple and union thermowell
- 1/2 × 3/4 NPT socket weld
- 316 stainless steel and Alloy C-276 Material
- 4-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

Rosemount Annubar type

See "Rosemount 585 Annubar Primary Element" on page 223.

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
- Optional flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)

Temperature limits by sensor material:

- SST: –325 to 850 °F (–198 to 454 °C)
- Alloy C-276: –25 to 1250 °F (–98 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

Temperature limits by sensor material

- 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.

Temperature limits by sensor material

- SST: –25 to 850 °F (–98 to 454 °C)
- Maximum allowable insertion pressure: 1440 psig (99 bar)
- Only available in sensor size 44

Table 35. Rosemount Annubar Type Specification Chart

Option code	Mounting type/pressure class	Flanged	Main team	Gear-drive Flo-Tap
A1	Class 150 RF ANSI	X		X
A3	Class 300 RF ANSI	X		X
A6	Class 600 RF ANSI	X		X
AN(1)	Class 900 RF ANSI	X		
AF(1)	Class 1500 RF ANSI	X		
AT(1)	Class 2500 RF ANSI	X		
D1	DIN PN 16	X		X
D3	DIN PN 40	X		X
D6	DIN PN 100	X		X
R1	Class 150 RTJ ANSI flange	X		X
R3	Class 30 RTJ ANSI flange	X		X
R6	Class 600 RTJ ANSI flange	X		X
RN(1)	Class 900 RTJ ANSI flange	X		
RF(1)	Class 1500 RTJ ANSI flange	X		
RT(1)	Class 2500 RTJ ANSI flange	X		
00(1)	Main steam packing gland		X	

1. Remote mount only.

Table 36. 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
- Rosemount 405P/C orifice primary elements are based on ASME/ISO corner tap design

Additional information

Specifications: page 157
Dimensional drawings: page 226
Installation and flowmeter orientation: page 187

Table 37. Rosemount 405 Compact Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
405	Compact Orifice Flowmeter	
Primary element technology		
A	Rosemount 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 37. Rosemount 405 Compact Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Primary element type		
000	Rosemount 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 integral 3-valve manifold	★
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[2]		
A	ANSI alignment ring (Class 150)	★
C	ANSI alignment ring (Class 300)	★
D	ANSI alignment ring (Class 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 NPT)	★
High temperature application		
T	Graphite valve packing (T_{max} = 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), Rosemount Annubar option A (schedule 40)	
Pressure testing		
P1	Hydrostatic testing	

Table 37. Rosemount 405 Compact Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Special cleaning[10]		
P2	Cleaning for special processes	
PA	Cleaning per ASTM G93 level D (section 11.4)	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and 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	
J5[11]	NACE MR-0175/ISO 15156	
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- and 12-in. (250 and 300 mm) line size, the alignment ring must be ordered (installation accessories).
3. 10- and 12-in. (250 and 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. A 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 Rosemount 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 38. Rosemount 405C Compact Conditioning Orifice Technology

Beta ratio	Discharge coefficient uncertainty
β = 0.40, 0.50, 0.65(1)	±1.00%(2)

1. For 0.65 beta and ReD < 10,000 add an additional 0.5 percent to the discharge coefficient uncertainty.
2. ±0.50% for 0.40 beta and WD calibration.

Table 39. Rosemount 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 40. Rosemount 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 Rosemount 405A
- 12-in. (300 mm) – not available for the Rosemount 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: Emerson.com/Rosemount/DP-Flow-Configuration-Assistant.

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

Line size (inches)	Temp (F)	DP limit (inH_2O)
≤ 8	850	1200
= 10	850	1000
	800	1050
	700	1050
	600	1100
	500	1150
	< 400	1200
= 12	850	700
	800	700
	700	750
	600	750
	500	800
	400	850
	< 300	900

Differential pressure limits for primary element technology A

Table 42. Maximum Allowable DP (Measurement in inH_2O [bar])

Line size	Max DP < 400 °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)

Maximum working pressure

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

Vibration effect for Rosemount 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 lb (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 2051C transmitters) to factory assemble the Rosemount 405 to a pressure transmitter. If the Rosemount 405 and transmitter are not factory assembled, they may be shipped separately. For a consolidated shipment, inform the Emerson 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 NPT connection to wafer side and 1/2 NPT connection to transmitter RTD sensor is separated from process fluid by 1/16-in. and is pressure retaining rated for ANSI Class 600. Complies with IEC-751 Class B accuracy. Meets Intrinsic Safety certification.

1. *Only available with Rosemount 3051SFC Compact Orifice Flowmeter.*

Remote RTD(1)

- 100 Ohm platinum with 1/2 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- × 1/2 NPT, 316 SST

1. *Only available with Rosemount 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
- Gaskets and O-rings should be replaced when the Rosemount 405 is disassembled.

Transmitter connections

Direct mount

- Available with Rosemount 3051SMV, 3051S, 3051, and 2051 Transmitters.

Remote mount

- Primary Element Technology C or P available with 1/4 NPT (standard) or 1/2 NPT (option code E) connections
- Remote Mount transmitter connections available with 1/2 NPT for Primary Element Technology A

Orifice plate design

Orifice type

- Square edged

Orifice pressure taps

- Corner

Alignment rings

Table 43. 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 - Class 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 Rosemount 405C, beta is calculated by: $\beta = d_C$ / Pipe ID[(1)], where the calculated bore is equal to 2× typical orifice hole size ($d_C = 2d$). The tables below show the diameter of the typical orifice holes.

1. Based on schedule 40.

Table 44. β = 0.4 (Measurement in Inches [mm])[(1)]

Line size	405C	405P
1/2-in. (15 mm)	Not Available	0.249 (6.33)
1-in. (25 mm)	Not Available	0.420 (10.67)
1 1/2-in. (40 mm)	Not Available	0.644 (16.36)
2-in. (50 mm)	0.413 (10.40)	0.827 (21.01)
3-in. (80 mm)	0.614 (15.60)	1.227 (31.17)
4-in. (100 mm)	0.805 (20.45)	1.610 (40.89)
6-in. (150 mm)	1.213 (30.81)	2.426 (61.62)
8-in. (200 mm)	1.596 (40.54)	3.192 (81.08)
10-in. (250 mm)	2.004 (50.90)	4.008 (101.80)
12-in. (300 mm)	2.400 (60.96)	4.800 (121.92)

1. Tolerance = ±0.002-in.

Table 45. β = 0.50 (Measurement in Inches [mm])[(1)]

Line size	405C	405P
1/2-in. (15 mm)	Not Available	0.311 (7.90)
1-in. (25 mm)	Not Available	0.525 (13.34)
1 1/2-in. (40 mm)	Not Available	0.805 (20.45)
2-in. (50 mm)	0.517 (13.13)	1.034 (26.26)
3-in. (80 mm)	0.767 (19.48)	1.534 (38.96)
4-in. (100 mm)	1.007 (25.58)	2.013 (51.13)
6-in. (150 mm)	1.516 (38.51)	3.033 (77.04)
8-in. (200 mm)	1.995 (50.67)	3.991 (101.37)
10-in. (250 mm)	2.505 (63.63)	5.010 (127.25)
12-in. (300 mm)	3.000 (76.20)	6.000 (152.40)

1. Tolerance = ±0.002-in.

Table 46. β = 0.65 (Measurement in Inches [mm])[1]

Line size	405C	405P
1/2-in. (15 mm)	Not Available	0.404 (10.26)
1-in. (25 mm)	Not Available	0.682 (17.32)
1 1/2-in. (40 mm)	Not Available	1.047 (26.59)
2-in. (50 mm)	0.620 (15.75)[2]	1.344 (34.14)
3-in. (80 mm)	0.997 (25.32)	1.994 (50.65)
4-in. (100 mm)	1.309 (33.25)	2.617 (66.47)
6-in. (150 mm)	1.971 (50.06)	3.942 (100.13)
8-in. (200 mm)	2.594 (65.89)	5.188 (131.78)
10-in. (250 mm)	3.257 (82.73)	6.513 (165.43)
12-in. (300 mm)	3.900 (99.06)	7.800 (198.12)

1. Tolerance = ±0.002-in.
2. For 2-in. (50 mm) line size, the Beta (β) = 0.60.

Table 47. Rosemount 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 48. Rosemount 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 two 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 to 600 mm) line sizes

Additional information
Specifications: page 164
Dimensional drawings: page 228
Installation and flowmeter orientation: page 187

Table 49. Rosemount 1595 Conditioning Orifice Plate Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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 49. Rosemount 1595 Conditioning Orifice Plate Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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)			
R6[1]	ANSI Class 600 ring joint (only available with orifice plate type code U)			
R9[1]	ANSI Class 900 ring joint (only available with orifice plate type code U)			
RF[1]	ANSI Class 1500 ring joint (only available with orifice plate type code U)			
RT[1]	ANSI Class 2500 ring joint (only available with orifice plate type code U)			
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[1]		
PH	Plate holder for universal type orifice plate for use with RTJ ANSI flange or section	

Table 49. Rosemount 1595 Conditioning Orifice Plate Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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(3)		
J5	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 50. 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 or 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 representative for assistance. A Configuration Data Sheet is required prior to order for application verification. To complete the Configuration Data Sheet go to:
Emerson.com/Rosemount/DP-Flow-Configuration-Assistant

Pressure tap orientation

Orient the Rosemount 1595 so pressure taps are centered between any two (of four) 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 six upstream pipe diameters
- with a 0.65 Beta

The Rosemount 1595 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 Rosemount 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.

Pipe sizes

2- to 24-in. (50 to 600 mm). Contact Emerson for other pipe sizes.

Operating limits

For line sizes 2- to 24-in. (50 to 600 mm)

Temperature Range: –320 to 1200 °F (–196 to 649 °C)

Up to 1200 inH2O differential pressure dependent on temperature, line size, and material.

Maximum working pressure

Flange rating per ANSI B16.5 and DIN EN 1092-1

Physical specifications

Material of construction

Table 51. 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 Rosemount 1595 can be used with the Rosemount 1496 Flange Union.

Orifice type

- Paddle, square-edge
- Universal, square-edge

Typical orifice hole sizes

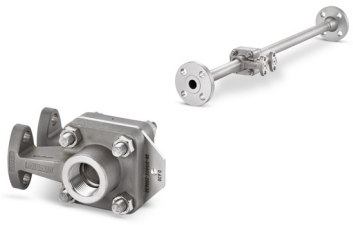
Beta is calculated by: $\beta = d_C$ /Pipe ID, where the calculated bore is equal to 2× typical orifice hole size ($d_C = 2d$). Table 52 shows the diameter of each of the four orifice holes.

Table 52. 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



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 to 40 mm) line sizes

Additional information

Specifications: page 170
Dimensional drawings: page 232
Installation and flowmeter orientation: page 187

Table 53. Rosemount 1195 Integral Orifice Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
1195	Integral orifice primary flow element	★
Body material and type		
F	316 SST, enhanced support body	★
S	316 SST, traditional body	★
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	★
W9	Pipe ends: flanged, RF, ANSI Class 900, 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 600, slip-on	

Table 53. Rosemount 1195 Integral Orifice Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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	
R9	Pipe ends: flanged, RTJ, ANSI Class 900, weld-neck	
P9	Special process connection	
Orifice plate material		
S	316/316L 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 (554 °F [290 °C])	

Table 53. Rosemount 1195 Integral Orifice Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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[3]		
S	Thermowell and RTD (SST temperature housing)	
T	Thermowell and RTD (Aluminum temperature housing)	★
Assemble to transmitter[4]		
S4	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	★
Pressure testings[5]		
P1	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, W6, and W9)	
Flow calibration[6]		
WD	Discharge coefficient verification	
WZ	Special calibration	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Material traceability certification		
Q8	Material traceability certification per EN 10204:2004 3.1	★

Table 53. Rosemount 1195 Integral Orifice Primary Element Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Code conformance[7]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance[8]		
J5	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 F 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 body material and type code S.
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 54. Discharge Coefficient Uncertainty(1)

Orifice plate bore	Discharge coefficient uncertainty
$\beta < 0.1$	±2.50%
$0.1 < \beta < 0.2$	±1.25%
$0.2 \leq \beta \leq 0.6$	±0.75%
$0.6 < \beta < 0.8$	±1.50%

1. Without associated straight run piping, discharge coefficient uncertainty can add up to 1.5–5 percent 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 sales representative for assistance. A "Configuration Data Sheet" is required prior to order for application verification. To complete the Configuration Data Sheet go to:
Emerson.com/Rosemount/DP-Flow-Configuration-Assistant

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):

- –112 °F to 554 °F (–80 °C to 290 °C)(1)

1. Contact DP Flow specialist about all welded design for temperature range –320 to 850 °F (–195 to 454 °C)

Maximum working pressure

Pressure retention per ANSI B16.5 Class 900 or DIN PN100

Table 55. Standard HydroTest Pressures for Integral Orifice Plates in PSIG

Rosemount 1195	Body type		316SS		
	Description	Code	Max working pressure	Hydro pressure	Max test pressure
1/2-in. line	Threaded fitting	T1/P1	1500	2250	2385
	Welded fitting	S1/P2	3000	4500	4650
	Class 150 flanged	A1/W1/R1	275	413	563
	Class 300 flanged	A3/W3/R3	720	1080	1230
	Class 600 flanged	A6/W6/R6	1440	2160	2310
	Class 90 flanged	W9/R9	2160	3240	3434
	DIN PN16 flanged	D1	232	348	498
	DIN PN40 flanged	D2	580	870	1020
	DIN PN100 flanged	D3	1450	2175	2325
1-in. line	Threaded fitting	T1/P1	1500	2250	2385
	Welded fitting	S1/P2	2000	3000	3150
	Class 150 flanged	A1/W1/R1	275	413	563
	Class 300 flanged	A3/W3/R3	720	1080	1230
	Class 600 flanged	A6/W6/R6	1440	2160	2310
	Class 900 flanged	W9/R9	2160	3240	3434
	DIN PN16 flanged	D1	232	348	498
	DIN PN40 flanged	D2	580	870	1020
	DIN PN100 flanged	D3	1450	2175	2325
1–1/2-in line	Threaded fitting	T1/P1	1440	2160	2290
	Welded fitting	S1/P2	1500	2250	2400
	Class 150 flanged	A1/W1/R1	275	413	563
	Class 300 flanged	A3/W3/R3	720	1080	1230
	Class 600 flanged	A6/W6/R6	1440	2160	2310
	Class 900 flanged	W9/R9	2160	3240	3434
	DIN PN16 flanged	D1	232	348	498
	DIN PN40 flanged	D2	580	870	1020
	DIN PN100 flanged	D3	1450	2175	2325

Physical specifications

Material of construction

Orifice Plate

- 316/316L SST
- Alloy C-276
- Alloy 400

Body

- 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 Rosemount 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.

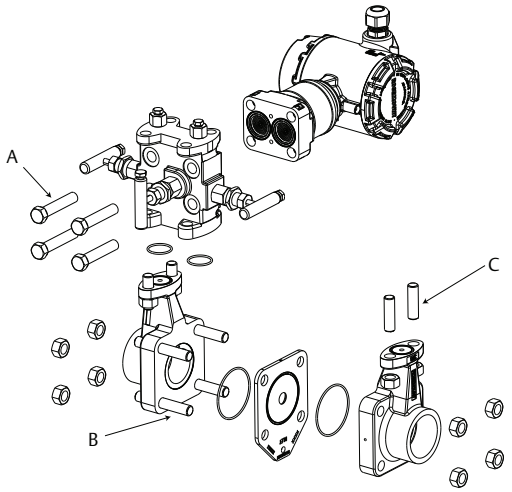
Pipe lengths

Upstream and downstream associated piping sections are available on the Rosemount 1195. See “Rosemount 1195 Integral orifice plate” on page 232.

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.

Figure 1. Bolt Types for Enhanced Support Body



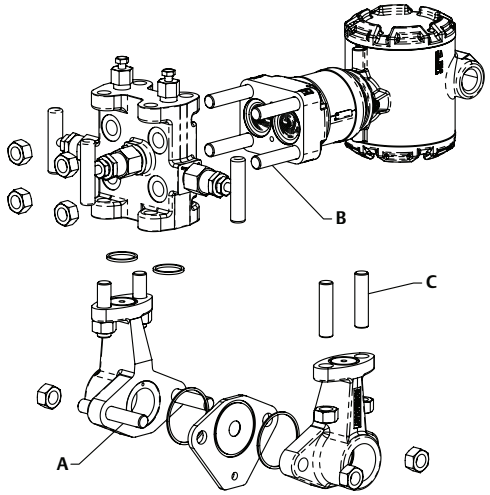
A. Transmitter bolts– (4×)
B. Orifice body studs – (4×)
C. Manifold studs – (4×)

Table 56. Weight (Weights are Approximate)

Line size	1195 only		with Flanged piping[1]	
	lb	kg	lb	kg
1/2-in.	5.0	2.3	9.0	4.1
1-in.	7.0	3.2	13.0	5.9
1 1/2-in.	9.0	4.1	26.0	11.8

1. As supplied with standard lengths, ANSI Class 150 flanges.

Figure 2. Bolt Types for Traditional Body



A. Orifice body bolts– (2×)
B. Transmitter bolts– (4×)
C. Manifold bolts – (4×)

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 57. Rosemount 1495 Orifice Plate Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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	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 57. Rosemount 1495 Orifice Plate Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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	★
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[1]	Flange ANSI Class 2500 ring joint	
Orifice plate material type		
S	316/316L SST	★
T	DIN 1.4571 (316Ti SST)	★
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[4]		
DV	Drain/vent hole	★

Table 57. Rosemount 1495 Orifice Plate Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Plate holder[5]		
PH	Plate holder for RTJ ANSI 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	★
Code conformance[8]		
J5	NACE MR-0175/ISO 15156	

Table 57. Rosemount 1495 Orifice Plate Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

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 62 lists standard pipe schedules.

- Meets ASME B16.36
- Meets EN-1092-1
- Threaded tap connection provided 180-degrees apart

The following options are available:

- Socket weld tap connections
- Stainless steel flange bolting per ASTM A193 Grade B8M/A194 Grade 8M

Table 58. Rosemount 1496 Orifice Flange Union 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	
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	21/2-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)	★

Table 58. Rosemount 1496 Orifice Flange Union 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.

Flange rating		
A3	ANSI Class 300	★
A6	ANSI Class 600	★
A9	ANSI Class 900	★
AF	ANSI Class 1500	★
AT[1]	ANSI Class 2500	★
D1	DIN PN10	★
D2	DIN PN16	★
D3	DIN PN25	★
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[1]	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	★
FE	Schedule 30	★

Table 58. Rosemount 1496 Orifice Flange Union 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.

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[5][6]		
G1	High temperature gaskets (spiral wound gaskets for use with 125–250 [3.2–6.3 μm] Ra flange surface finish)	★
Alternate bolting material[7]		
SS	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[8]		
J5	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 to12-in.
2. Previously PN64.
3. Default pipe schedules are listed in Table 62 on page 184 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 62 on page 184. 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 Rosemount 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 59. Temperature Limit (Based on Gasket Material)

ANSI flange rating	Applicability	Gasket description	Temperature rating
Class 300Class	Default	Compressed sheet gasket material, 1/16-in. thick, aramid and inorganic fibers in nitrile rubber binder.	–100 to 50°F
	If "P2" option	Compressed sheet gasket material, 1/16-in. thick, PTFE with inorganic filler.	–350 to 520 °F
	If "G1" option	Spiral wound gasket per ASME B16.20, 0.175-in. uncompressed thickness, high temperature filler, inner ring. wetted material to equal or exceed flange material.	–350 to 1250 °F[1]
Class 600, 900, 1500, 2500	Default	Spiral wound gasket per ASME B16.20, 0.175-in. uncompressed thickness, flexible graphite filler, inner ring. wetted material to equal or exceed flange material.	–350 to 900 °F
	If "P2" option	Spiral wound gasket per ASME B16.20, 0.175-in. uncompressed thickness, PTFE filler, inner ring. wetted material to equal or exceed flange material.	–350 to 500 °F
	If "G1" option	Spiral wound gasket per ASME B16.20, 0.175-in. uncompressed thickness, high temperature filler, inner ring. wetted material to equal or exceed flange material.	–350 to 1250 °F[1]

1. Dependent on flange material.

Maximum working pressure

Based on flange rating per ANSI B16.5

Pipe sizes

2- to 24-in. (50 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

Table 60. Rosemount Temperature Range per ANSI B31.3

1495 material	Temperature rating
316/316L stainless steel	–425 to 1000 °F (–254 to 538 °C)
DIN 1.4571 (316 Ti SS)	–425 to 1000 °F (–254 to 538 °C)
304/304L stainless steel	–425 to 1250 °F (–254 to 538 °C)
Alloy C-276	–325 to 1250 ° F (–198 to 677 °C)
Alloy 400	–325 to 900 ° F (–198 to 482 °C)

Table 61. Temperature Range (Based on Flange Material Rating per ANSI B16.5)

1496 material [1]	Temperature rating
Carbon steel (ASTM A105[2])	–20 to 800 °F (–29 to 427 °C)
316/316L stainless steel (ASTM A182 F316/316L)	–425 to 1000 °F (–254 to 538 °C)
304/304L stainless steel (ASTM A182 F304/304L)	–425 to 1000 °F (–254 to 538 °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)
DIN 1.4571 (316Ti stainless steel) (ASTM A182 F316Ti)	–325 to 1000 ° F (–198 to 538 °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 62 on page 184 lists standard pipe schedules.

- Meets ASME B16.36
- Meets EN-1092-1
- Threaded tap connection provided 180-degrees apart

The following options are available.

- Socket weld tap connections
- Stainless steel flange bolting per ASTM A193 Grade B8M/A194 Grade 8M

Standard pipe schedules

Table 62. Default Pipe Schedules for 1496 Orifice Flange Unions [(1)(2)]

Nominal pipe size [(3)]	ANSI Class 300 (WN, TH, SO)	ANSI Class 600 (WN, RJ)	ANSI Class 900 (WN, RJ)	ANSI Class 1500 (WN, RJ)	ANSI Class 2500 (WN, RJ)
2 (51)	Standard	Standard	XS	XS	160
2 1/2 (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 63. 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)
2 1/2 (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)
2 (51)	2.067 (52.501)	2.067 (52.50)	N/A	1.939 (49.25)	1.939 (49.25)	1.939 (49.25)
2 1/2 (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)
2 (51)	N/A	N/A	N/A	1.689 (42.9)	1.503 (38.18)	
21/2 (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

Rosemount 1495 Orifice Plate

Table 64. Rosemount1495 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 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 174 specifies the physical parameters of the orifice from a detailed sizing calculation.

Rosemount 1496 Flange Unions

Table 65. 1496 Materials of Construction

1496 material	Material specification reference
Carbon steel(1)	ASTM A105/A350
Stainless steel	ASTM A240 Grade 316/316L
DIN 1.4571 (316Ti SST)(2)	ATSTM A182
DIN 1.0460 (carbon steel)(1)	ASTM A105
Alloy C-276	ASTM B564/575
Alloy 400	ASTM B564/127

1. When the J6 Option is selected, this material will be supplied as ASTM A350 LF2.
2. May not be available in all world areas.

Standard flange mounting hardware

- Studs: Carbon steel ASTM A193 Grade B7M
- Nuts: Carbon steel ASTM A194 Gr 2H
- Gaskets: Refer to Table 59 on page 182
- Pipe plugs: Match flange material

Pressure taps

Pressure tap connections are 1/2 -in. (12,7 mm) NPT and 180° apart as standard. The tap hole diameter is 1/4-in. (6,35 mm) for 2-in. (51 mm) and 2 1/2 -in. (63,5 mm) size, 3/8-in. (9,6 mm) for 3-in. (76,2 mm) size, and 1/2-in. (12,7 mm) for 4-in. (101,6 mm) and larger sizes.

Important
Gasket failure can result in death, serious injury, or monetary loss. Emerson supplies a variety of gasket materials, and it is the purchaser's sole responsibility to specify a gasket compatible with their process. Emerson is not in a position to evaluate or guarantee compatibility with the material selected.

Installation and flowmeter orientation

Rosemount Annubar™ Flowmeter installation considerations

Table 66. Rosemount Annubar Flowmeter Straight Run Requirements[1]

		Rosemount Annubar products			
		Rosemount 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
Upstream (inlet) side of primary	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 to 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 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 Rosemount 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 3 on page 187.
4. Use straightening vane to reduce the required straight run length.

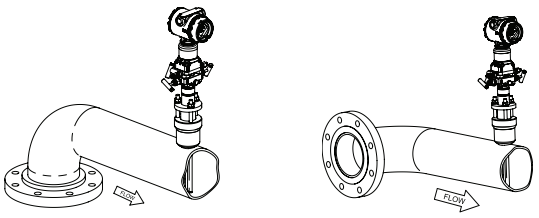
Table 67. Rosemount 3051SFA, 3051CFA, 2051CFA, 485 Drill Hole Size (Sensor Size)

Sensor size	Diameter
1	3/4-in. (19 mm)
2	15/16-in. (34 mm)
3	2 1/2-in. (64 mm)

Table 68. Rosemount 585 Drill Hole Size (Sensor Size)

Sensor size	Hole diameter	
11	7/8-in. (23 mm)	+ 1/32-in. (0,80 mm)
		– 0.00
22	15/16-in. (34 mm)	+ 1/16-in. (159 mm)
		– 0.00
44	2 1/2-in. (64 mm)	+ 1/16-in. (1,59 mm)
		– 0.00

Figure 3. Rosemount Annubar In Plane and Out of Plane



Orifice plate installation considerations

Table 69. Rosemount 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 percent open)	2	5	5
Downstream (outlet) side of primary		2	2	2

1. Consult an Emerson representative if a disturbance is not listed.

Table 70. Rosemount 405P Straight Pipe Requirements[1][2][3]

	Beta	0.40	0.50	0.65
Upstream (inlet) side of primary	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 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 71. Integral Orifice Plate Straight Run Requirements[1][2][3]

		Rosemount 3051SFP, 3051CFP, 2051CFP, 1195					
	Beta	<0.20	0.40	0.50	0.60	0.70	0.75
Upstream (inlet) side of primary	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 Rosemount 3051SFC, 3051CFC,2051CFC, 405C, 405P, 3051SFP, 3051CFP, 2051CFP and 1195.

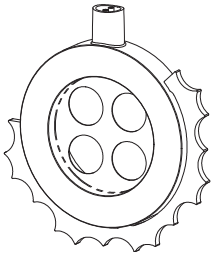
Orientation/flow direction	Process [1]		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	D/R	R
Vertical Down	D/R	NR	NR

1. D = Direct mount acceptable (recommended).
   R = Remote mount acceptable.
   NR = Not recommended.

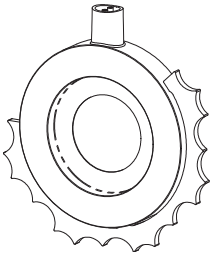
Compact flowmeter pipe centering

Improper centering of any orifice type device can cause an error of up to ±5 percent in small line sizes. A centering mechanism (centering ring) independent of flange rating comes standard with the Rosemount 405 Compact Flowmeter Series.

Rosemount 405C Conditioning Orifice



Rosemount 405P Compact Orifice



Rosemount 1595 Pressure Tap orientation

Orient the Rosemount 1595 Conditioning Orifice Plate so that the pressure taps are centered between any two (of four) orifice bore holes. In addition, the pressure taps should be located at 90° to the plane of the last upstream elbow under these conditions:

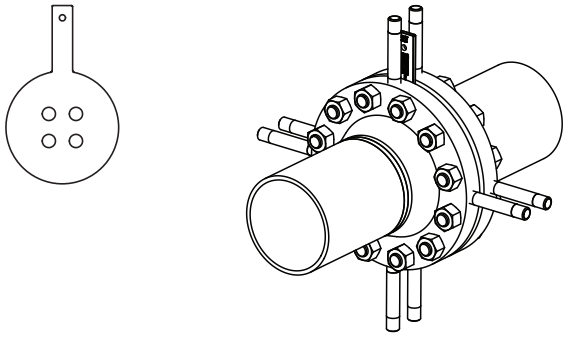
- with less than six upstream pipe diameters
- with a 0.65 beta

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 Rosemount 1595 Orifice Plate. See Figure 4.

Figure 4. Rosemount 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 Rosemount 1595 Orifice Plate 90° from the plane of the elbow. See Figure 5 and Figure 6.

Figure 5. Rosemount 1595 Pressure Tap Locations

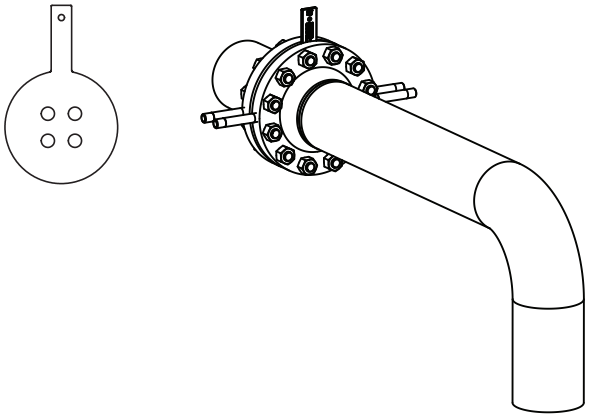
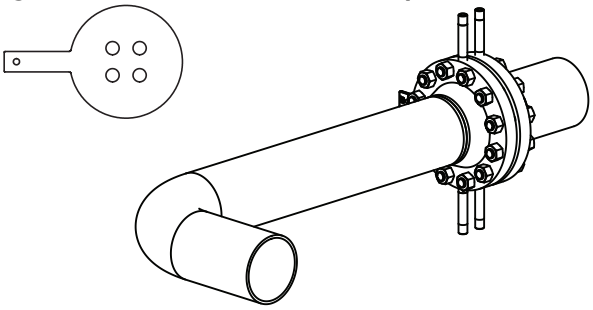


Figure 6. Rosemount 1595 Pressure Tap Locations

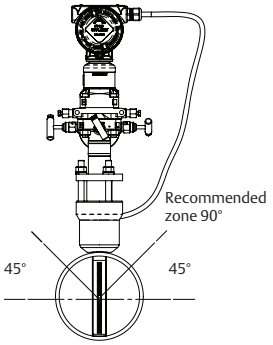


Rosemount Annubar Flowmeter orientation

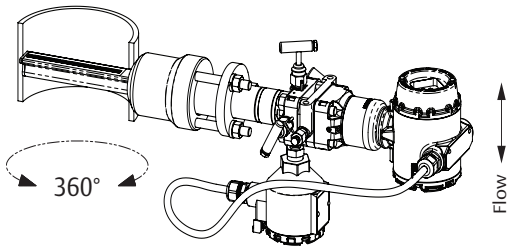
For Rosemount 3051SFA, 3051CFA, 2051CFA, 485, and 585

Figure 7. Rosemount Annubar Direct Mount Flowmeter Orientation (recommended)(1)

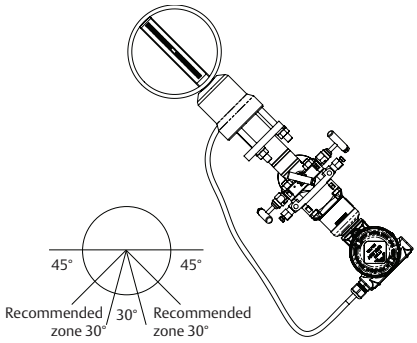
Gas (horizontal)



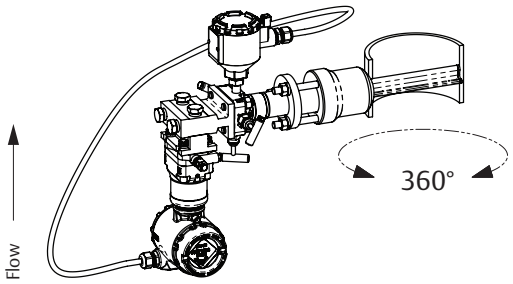
Gas (vertical)



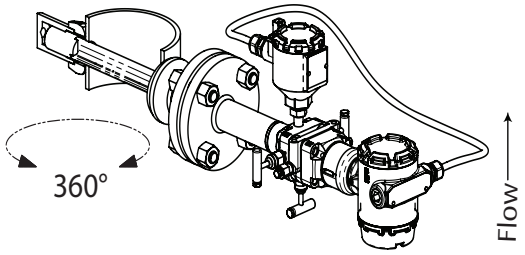
Liquid and steam (horizontal)



Steam (vertical)

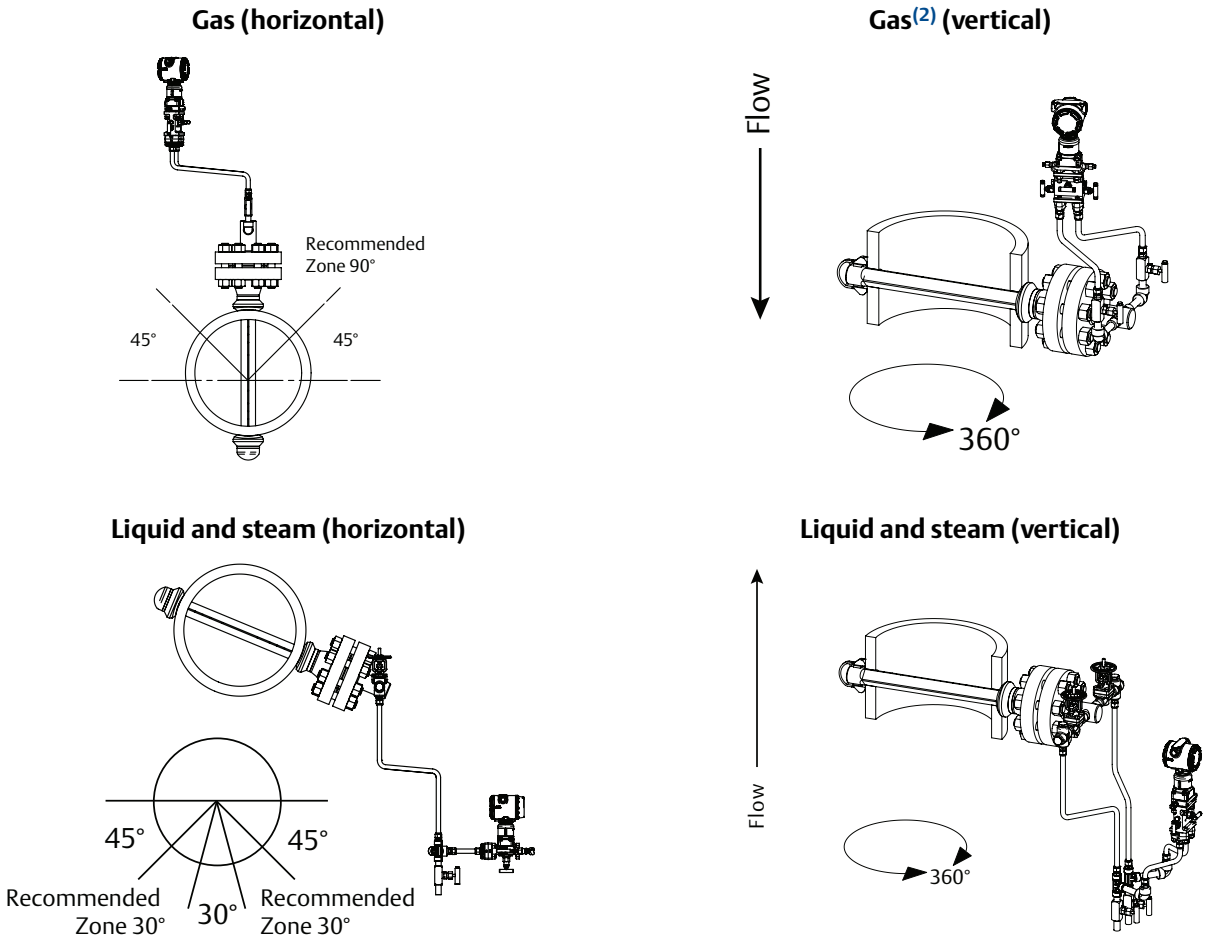


Liquid (vertical)



1. The flowmeter orientation recommendations may vary for the Manual and Gear-Drive Flo-Tap Rosemount Annubar Types.

Figure 8. Rosemount Annubar Remount Mount Flowmeter Orientation (Recommended)[1]



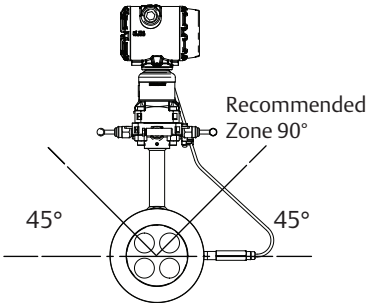
1. The flowmeter orientation recommendations may vary for the Gear-Drive Flo-Tap Annubar Type.
2. Can also be mounted for gas vertical up applications.

Rosemount 405 Flowmeter orientation

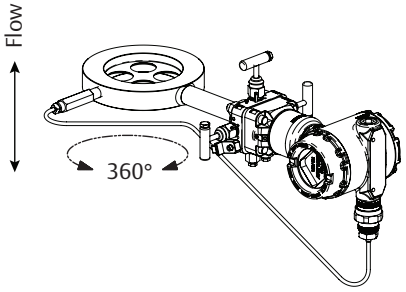
For Rosemount 3051SFC, 3051CFC, 2051CFC, 405C, and 405P

Figure 9. Rosemount 405 Direct Mount Flowmeter Orientation (Recommended)

Gas (horizontal)



Gas (vertical)



Liquid and steam (horizontal)

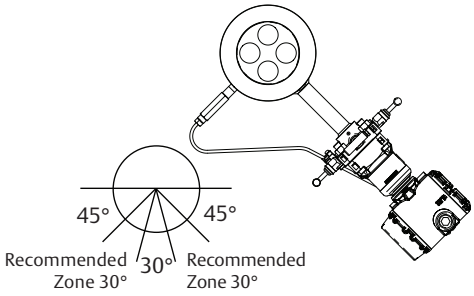
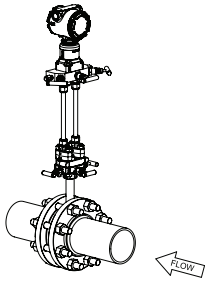
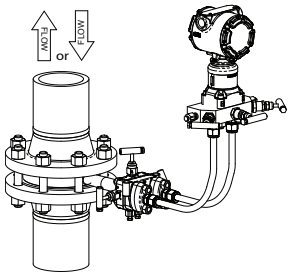


Figure 10. Rosemount 405 Remote Mount Flowmeter Orientation (Recommended)

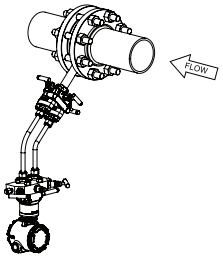
Gas (horizontal)



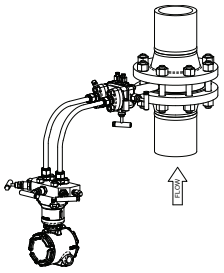
Gas (vertical)



Liquid and steam (horizontal)



Liquid and steam (vertical)

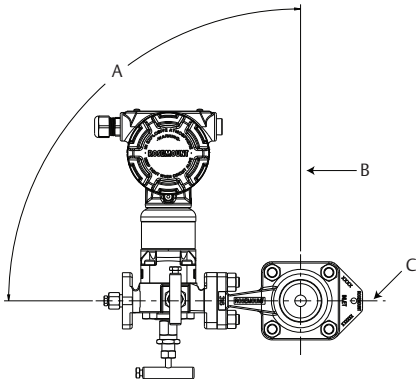


Rosemount 1195 Integral Orifice Flowmeter orientation

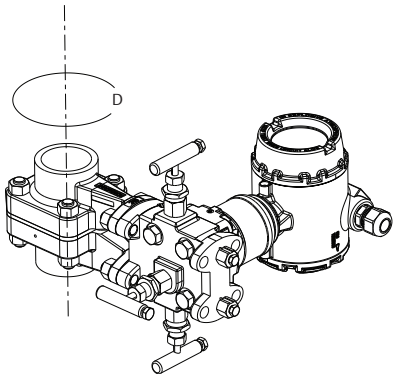
For Rosemount 3051SFP, 3051CFP, 2051CFP, and 1195

Figure 11. Rosemount 1195 Flowmeter Orientation with Traditional Style Manifold (Recommended)

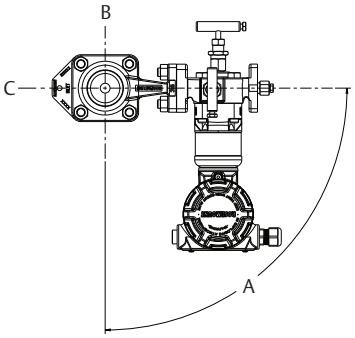
Gas (horizontal)



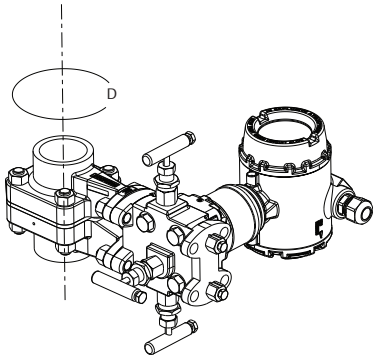
Gas (vertical)



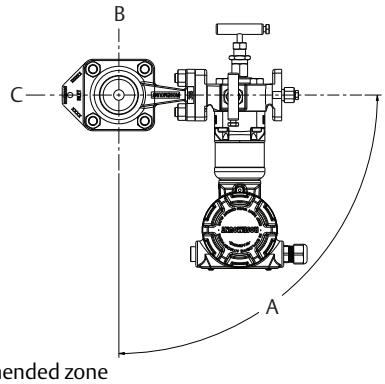
Liquid (horizontal)



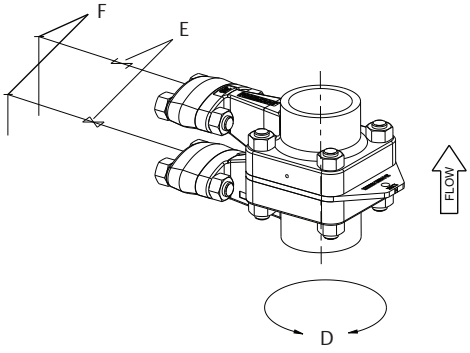
Liquid (vertical)



Steam (horizontal)



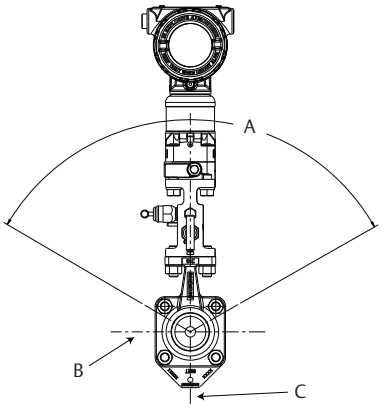
Steam (vertical)



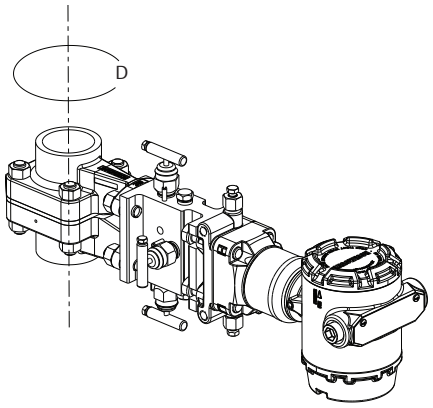
A. 90° recommended zone
B. Vertical plane
C. Horizontal plane
D. 360° recommended zone
E. Block valves
F. Vent valves

Figure 12. Rosemount 1195 Flowmeter Orientation with H-Pattern Manifold (Recommended)

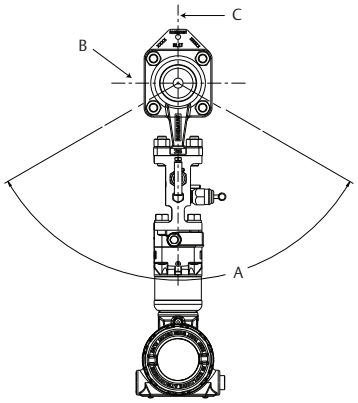
Gas (horizontal)



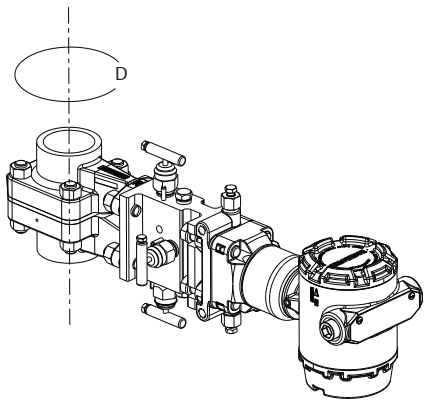
Gas (vertical)



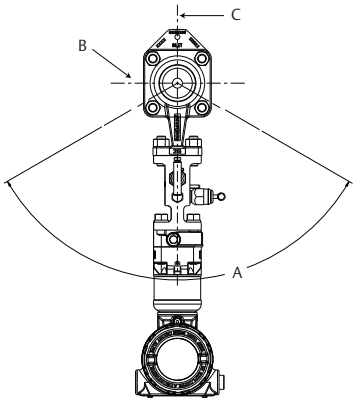
Liquid (horizontal)



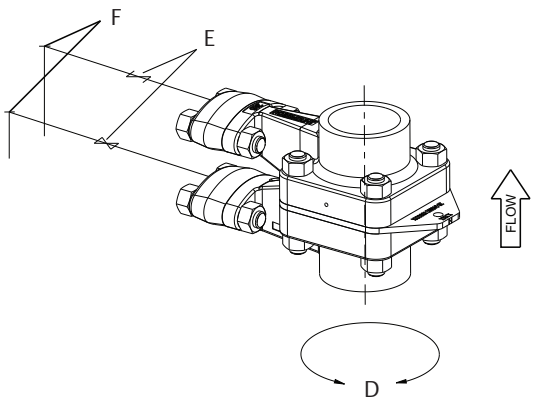
Liquid (vertical)



Steam (horizontal)



Steam (vertical)



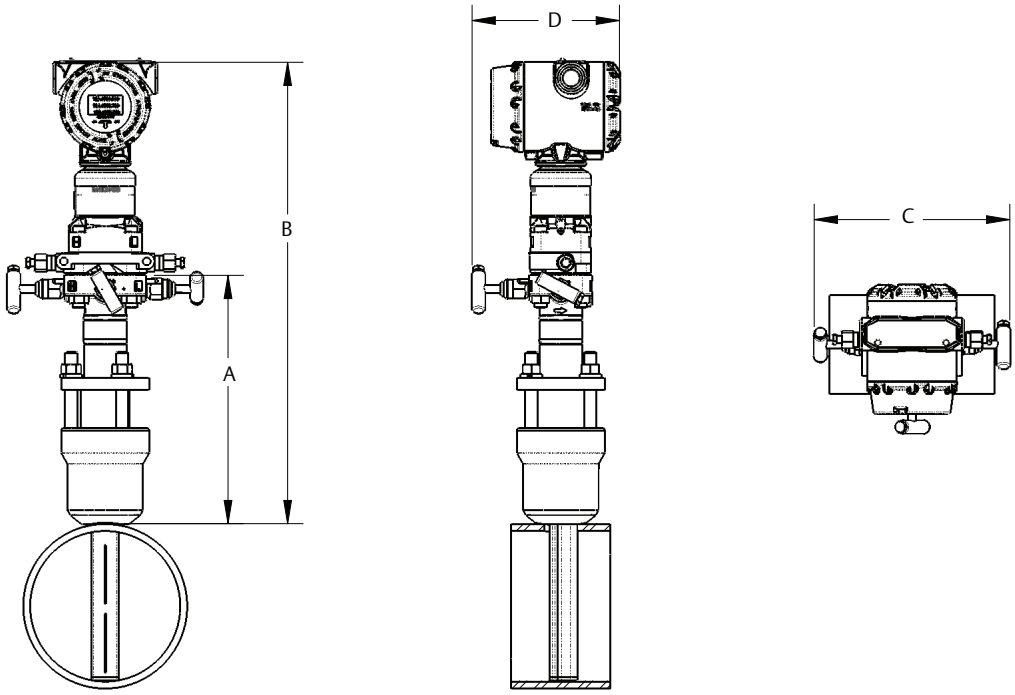
A. 120° recommended zone
B. Horizontal plane
C. Vertical plane
D. 360° recommended zone
E. Block valves
F. Vent valves

Dimensional drawings

Rosemount 3051SF DP Flowmeters

Figure 13. Rosemount 3051SFA Pak-Lok Annubar Flowmeter[1]

Front view **Side view** **Top view**



For A to D, see Table 72.

1. The Pak-Lok Annubar model is rated equivalent to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

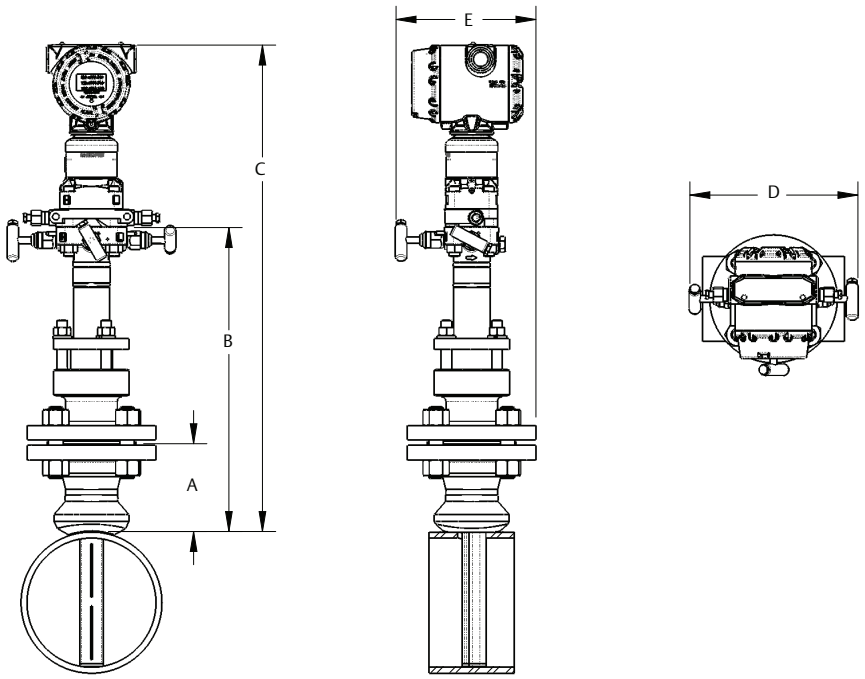
Table 72. Rosemount 3051SFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	17.10 (434,3)	9.00 (228.6)	7.00 (177,8)
2	11.00 (279.4)	19.60 (497,8)	9.00 (228.6)	7.00 (177,8)
3	12.00 (304.8)	20.60 (523,2)	9.00 (228.6)	7.00 (177,8)

Dimensions are in inches (millimeters).

Figure 14. Rosemount 3051SFA Flange-Lok Annubar Flowmeter[1]

Front view **Side view** **Top view**



For A to E, see Table 73.

1. The Flange-Lok Annubar model is available up to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 73. Rosemount 3051SFA Flange-Lok Annubar Flowmeter Dimensional Data

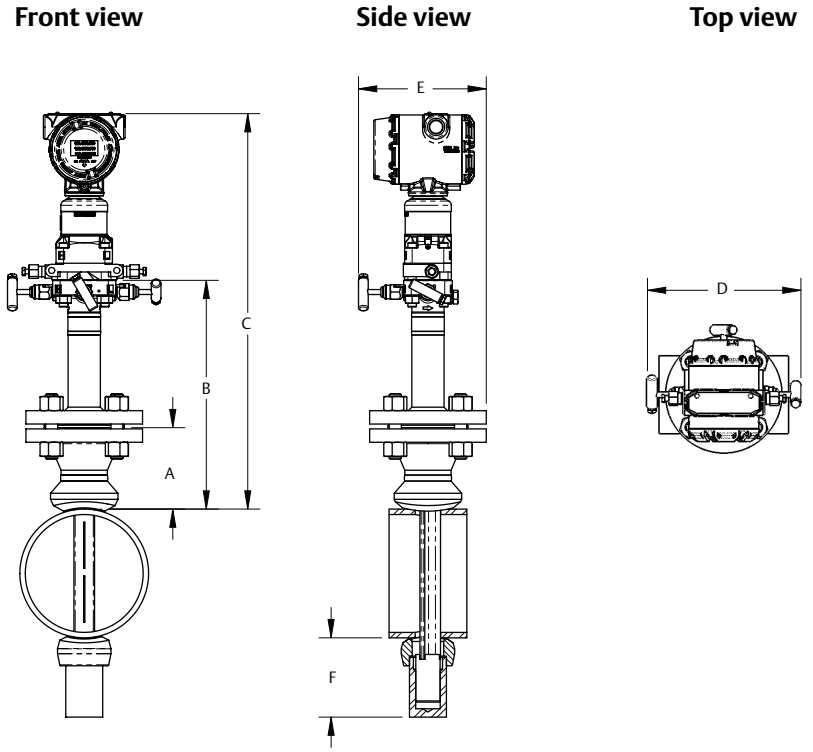
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – Class 150	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.30 (160.0)
1	1 1/2 – Class 300	4.13 (104.9)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	1 1/2 – Class 600	4.44 (112.8)	12.25 (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	DN4/PN100	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
2	2 – Class 150	4.13 (104.9)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	6.80 (172.7)
2	2 – Class 300	4.38 (111.3)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	2 – Class 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 – Class 150	4.63 (117.6)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.55 (191.8)
3	3 – Class 300	5.00 (127.0)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	3 – Class 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)

Table 73. Rosemount 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)
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).

Figure 15. Rosemount 3051SFA Flanged with Opposite Side Support Annubar Flowmeter



For A-F, see Table 74.

Table 74. Rosemount 3051SFA Flanged Annubar Flowmeter Dimensional Data

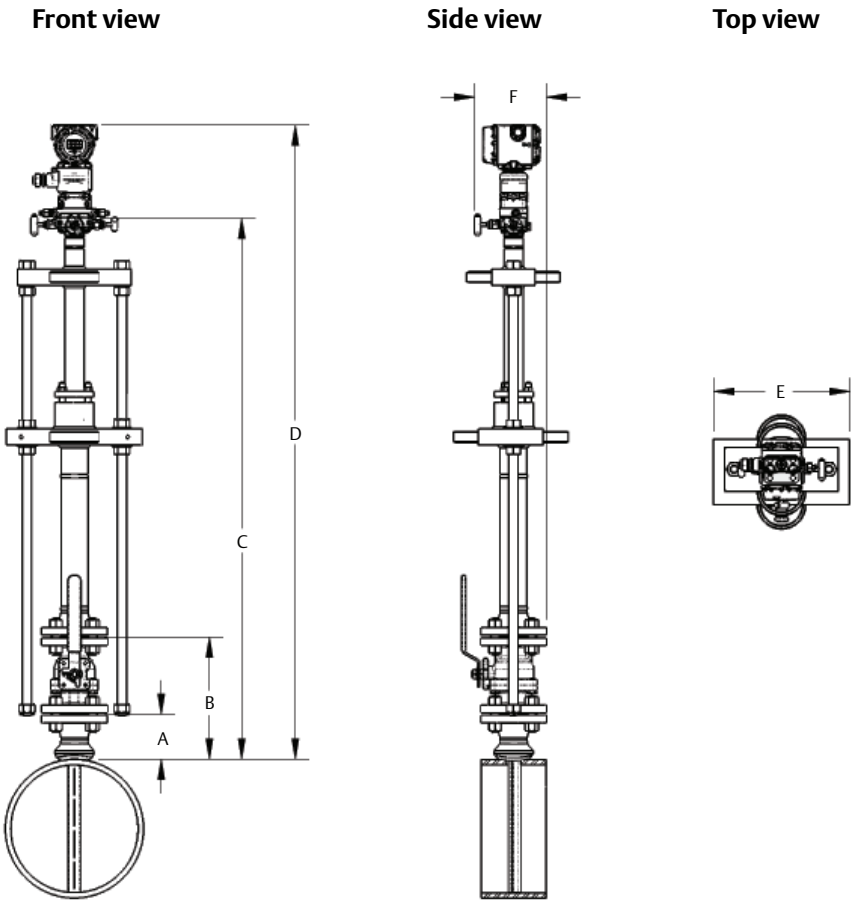
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – Class 150	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – Class 300	4.13 (104.9)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – Class 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 – Class 900	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – Class 1500	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – Class 2500	6.76 (171.7)	11.63 (295.4)	N/A	N/A	N/A	4.00 (101.6)
2	2 – Class 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 – Class 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 – Class 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)

Table 74. Rosemount 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)
2	2 –Class 900	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	2 – Class 1500	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	3 – Class 2500	9.88 (251.0)	15.63 (397.0)	N/A	N/A	N/A	4.50 (114.3)
3	3 – Class 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 – Class 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 – Class 600	5.38 (136.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN100	4.95 (125.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – Class 900	8.19 (208.0)	13.06 (331.7)	N/A	N/A	N/A	7.00 (177.8)
3	4 – Class 1500	8.56 (217.4)	13.81 (350.8)	N/A	N/A	N/A	7.00 (177.8)
3	4 – Class 2500	11.19 (284.2)	17.31 (439.7)	N/A	N/A	N/A	7.00 (177.8)

Dimensions are in inches (millimeters).

Figure 16. Rosemount 3051SFA Flanged Flo-Tap Annubar Flowmeter[1]



For A-F, see Table 75 on page 199.

1. The Flanged Flo-Tap Annubar Flowmeter is available with either the manual or gear drive options.

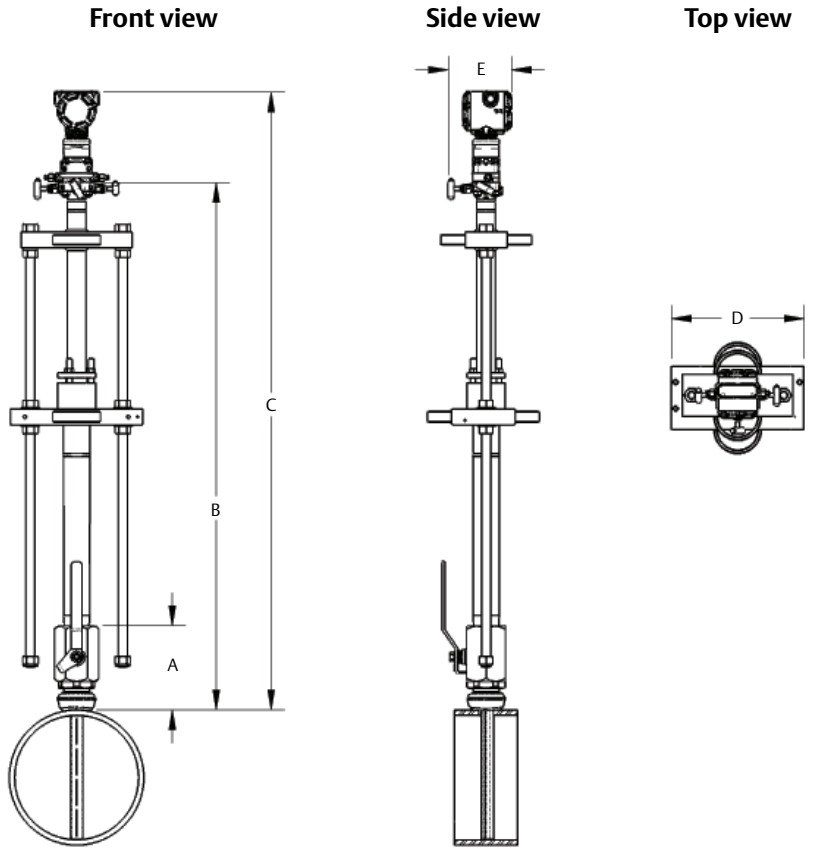
Table 75. Rosemount 3051SFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data[1][2]

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 – Class 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 – Class 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 – Class 60	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)
2	2 – Class 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 – Class 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 – Class 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 – Class 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 – Class 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 – Class 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 =Z 2 × (pipe I.D. + wall thickness + B) + C[I]
3. DIN Valves are not offered.

Figure 17. Rosemount 3051SFA Threaded Flo-Tap Annubar Flowmeter[1]



For A-E, see Table 76.

1. The Threaded Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

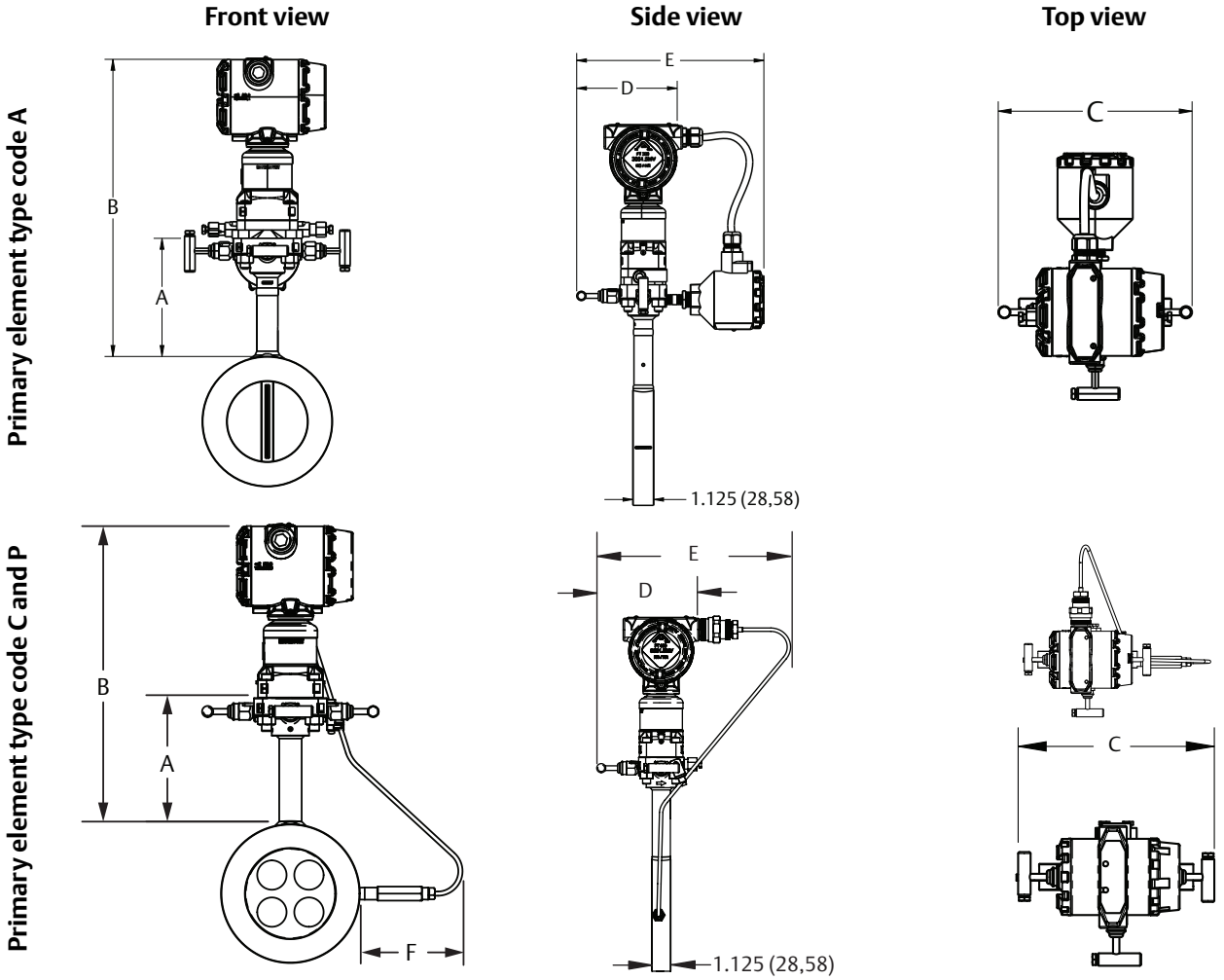
Table 76. Rosemount 3051SFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data[1][2]

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
2. Retracted, B Dimension = 2 × (pipe I.D. + wall thickness + A) + B[I]
3. Sensor size 3 is not available in a Threaded Flo-Tap.

Figure 18. Rosemount 3051SFC Compact Flowmeter



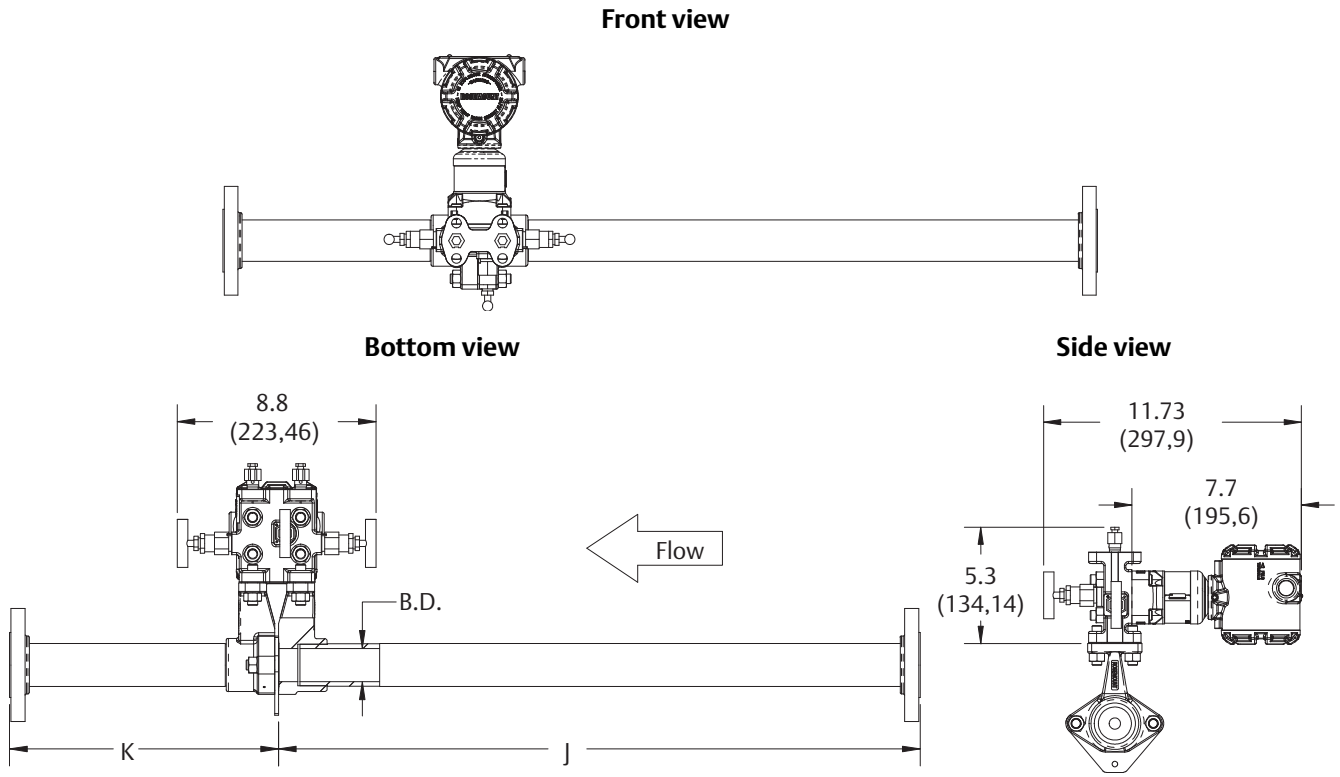
For A-F, see Table 77.

Table 77. Rosemount 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 7.2 (184)

Dimensions are in inches (millimeters).

Figure 19. Rosemount 3051SFP Integral Orifice Flowmeter



Dimensions are in inches (millimeters).

Table 78. Rosemount 3051SFP Integral Orifice Flowmeter Dimensional Data

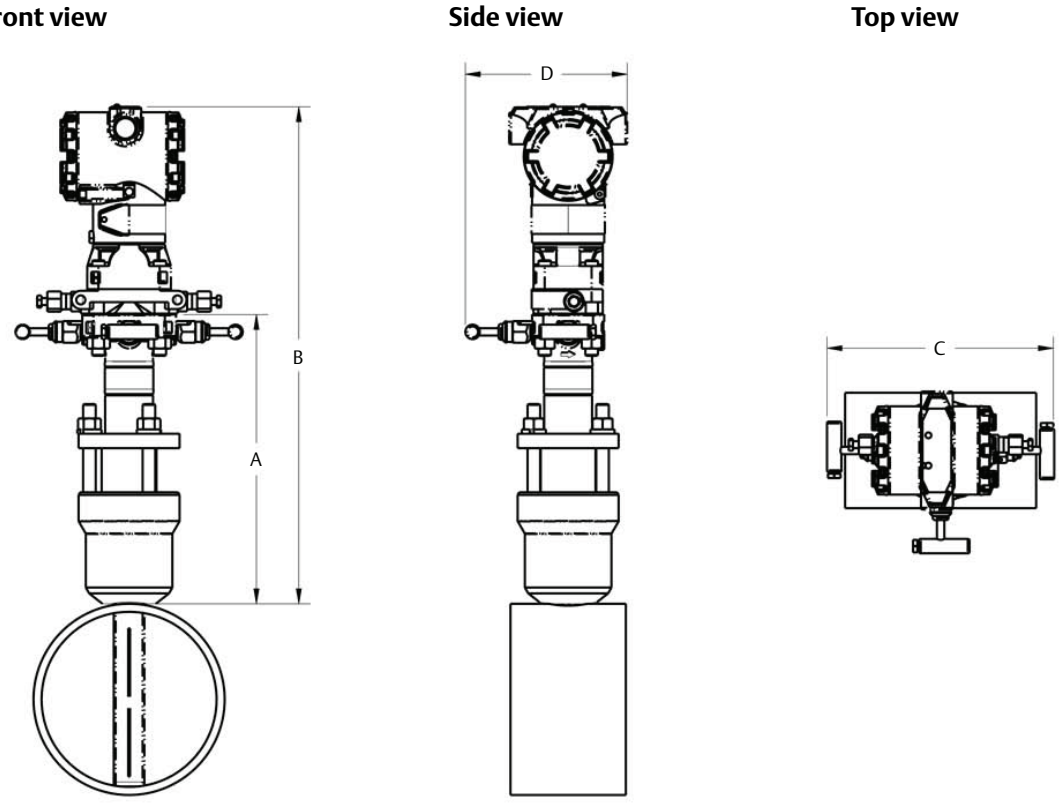
Dimension	Line size		
	½-in. (15 mm)	1-in. (25 mm)	1½-in. (40 mm)
J (Beveled/threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF Class 150, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF Class 300, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF Class 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 Class 150, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF Class 300, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF Class 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)
J (RF and RTJ Class 900, weld neck)	15.13 (384.3)	23.32 (592.3)	31.88 (809.8)
K (RF and RTJ Class 900, weld neck)	8.33 (211.6)	11.83 (300.5)	15.35 (389.9)

Dimensions are in inches (millimeters).

1. Downstream length shown here includes plate thickness of 0.162-in. (4,11 mm).

Rosemount 3051CF Flowmeter series

Figure 20. Rosemount 3051CFA Pak-Lok Annubar Flowmeter[1]



For A-D, see Table 79.

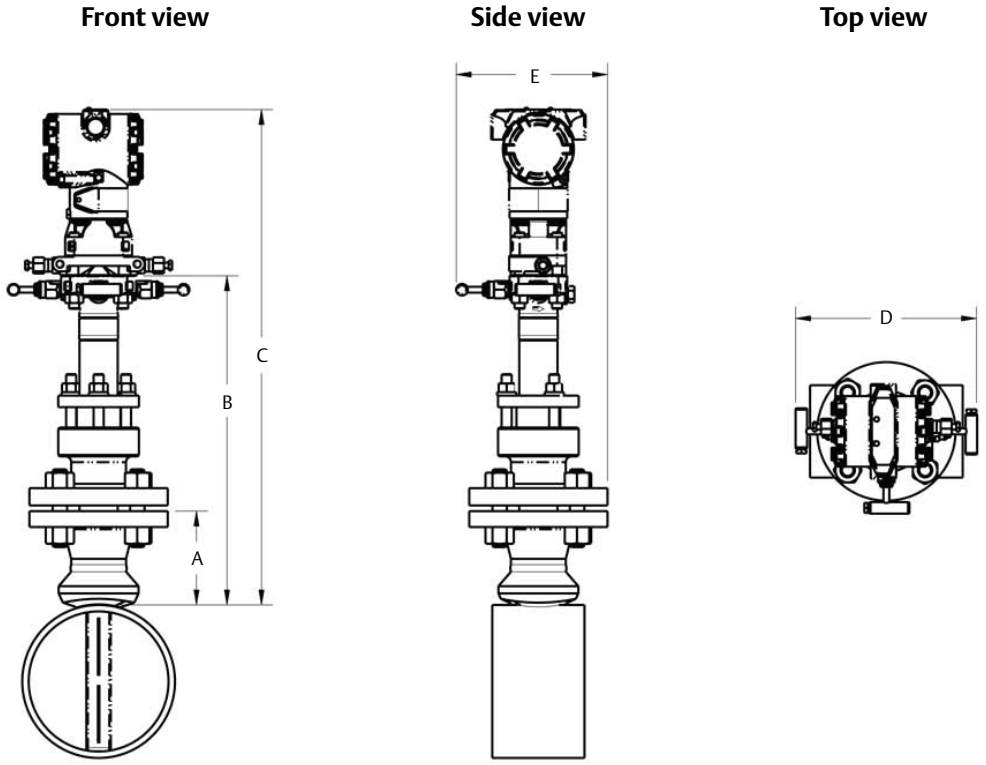
1. The Pak-Lok Annubar model is equivalent to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 79. Rosemount 3051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	15.60 (396.9)	9.00 (228.6)	6.00 (152.4)
2	11.0 (279.4)	18.10 (460.4)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.10 (485.8)	9.00 (228.6)	6.00 (152.4)

Dimensions are in inches (millimeters).

Figure 21. Rosemount 3051CFA Flange-Lok Annubar Flowmeter[(1)]



For A-E, see Table 80.

1. The Flange-Lok Annubar model can be direct mounted up to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 80. Rosemount 3051CFA Flange-Lok Annubar Flowmeter Dimensional Data

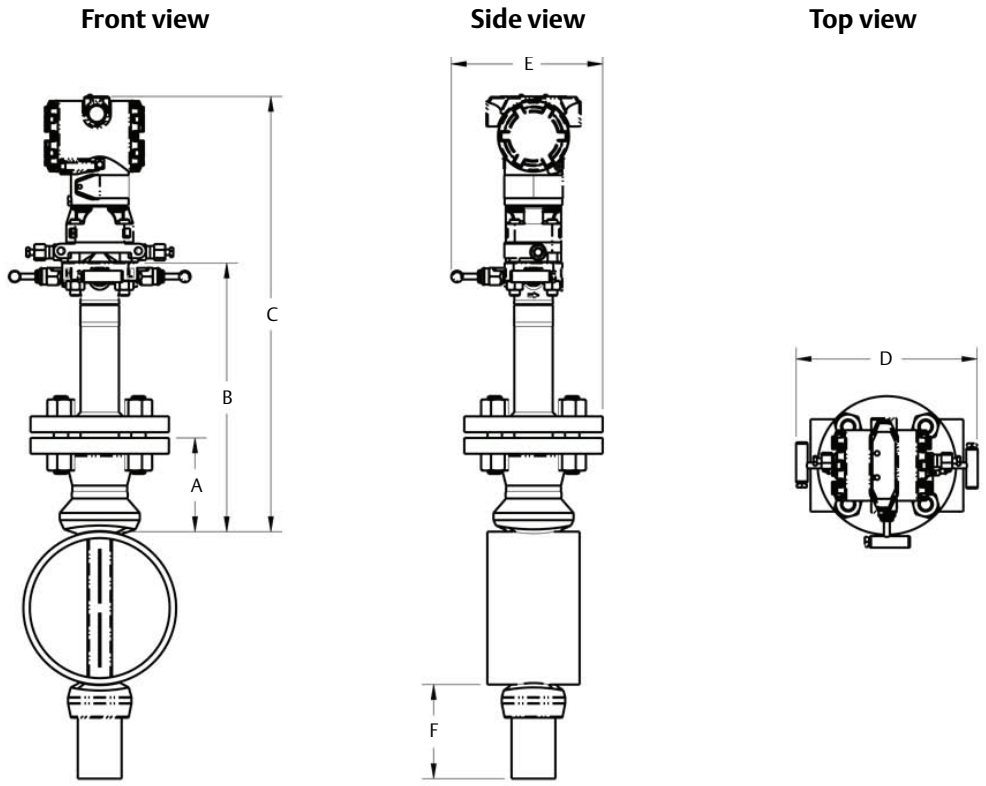
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – Class 150	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.30 (160.0)
1	1 1/2 – Class 300	4.13 (104.9)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	1 1/2 – Class 600	4.44 (112.8)	12.25 (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 – Class 150	4.13 (104.9)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	6.80 (172.7)
2	2 – Class 300	4.38 (111.3)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	2 – Class 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 – Class 150	4.63 (117.6)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.55 (191.8)
3	3 – Class 300	5.00 (127.0)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	3 – Class 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)

Table 80. Rosemount 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)
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).

Figure 22. Rosemount 3051CFA Flanged Annubar Flowmeter



For A-F, see Table 81.

Table 81. Rosemount 3051CFA Flanged Annubar Flowmeter Dimensional Data

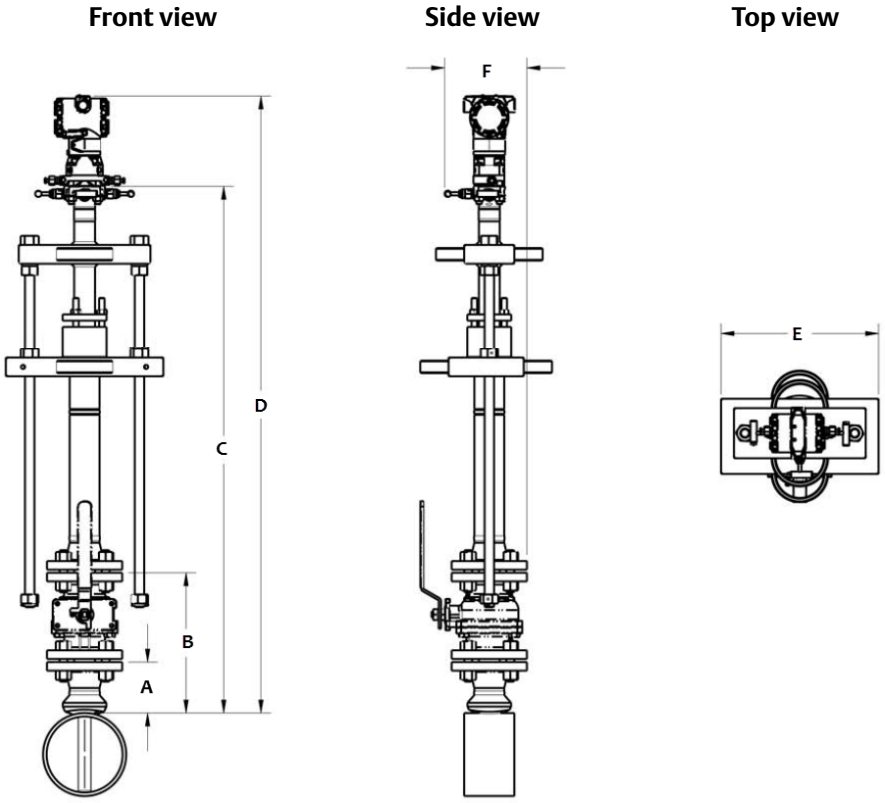
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – Class 150	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – Class 300	4.13 (104.9)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – Class 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 – Class 900	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – Class 1500	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – Class 2500	6.76 (171.7)	11.63 (295.4)	N/A	N/A	N/A	4.00 (101.6)
2	2 – Class 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 – Class 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 – Class 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)

Table 81. Rosemount 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)
2	2 – Class 900	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	2 – Class 1500	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	3 – Class 2500	9.88 (251.0)	15.63 (397.0)	N/A	N/A	N/A	4.50 (114.3)
3	3 – Class 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 – Class 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 – Class 600	5.38 (136.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – Class 900	8.19 (208.0)	13.06 (331.8)	N/A	N/A	N/A	7.00 (177.8)
3	4 – Class 1500	8.56 (217.4)	13.81 (350.8)	N/A	N/A	N/A	7.00 (177.8)
3	4 – Class 2500	11.19 (284.2)	17.31 (439.7)	N/A	N/A	N/A	7.00 (177.8)

Dimensions are in inches (millimeters).

Figure 23. Rosemount 3051CFA Flanged Flo-Tap Annubar Flowmeter[(1)]



For A-F, see Table 82.

1. The Flanged Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

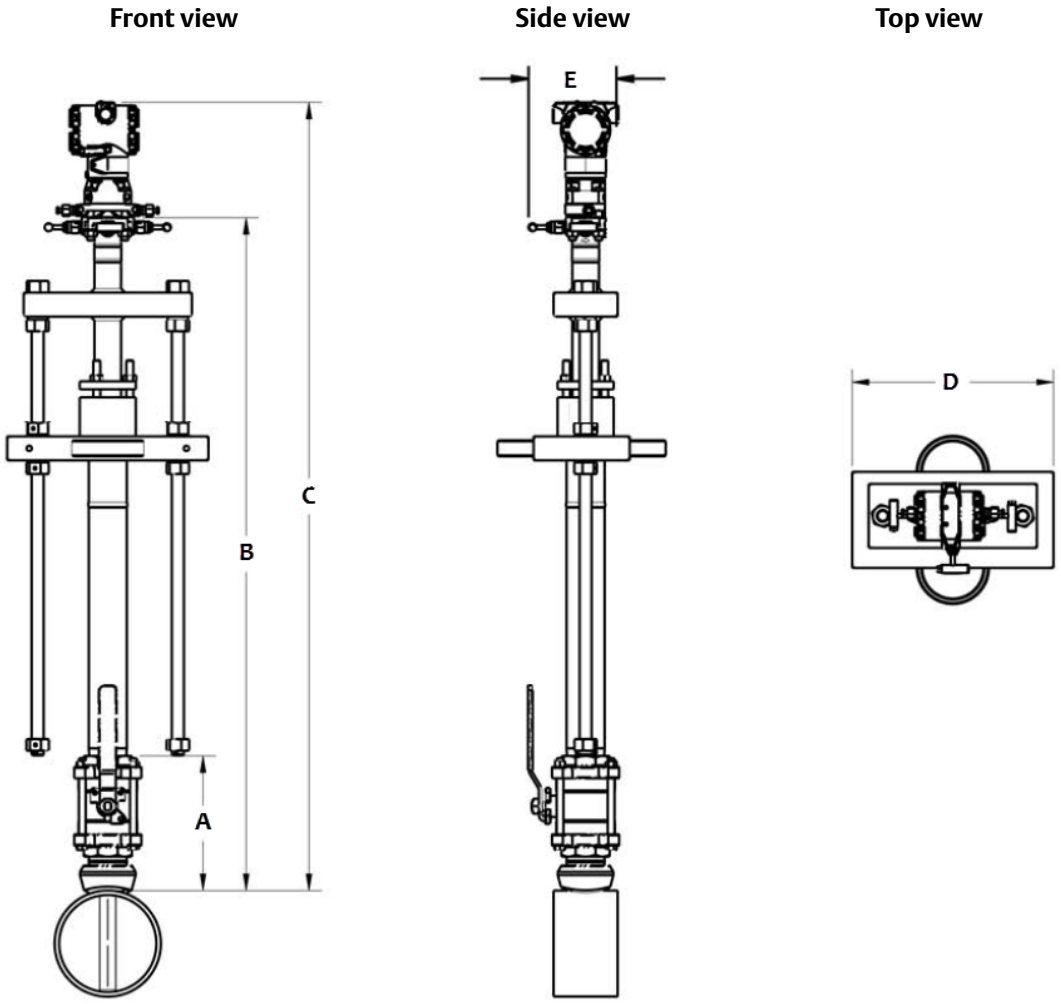
Table 82. Rosemount 3051CFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data[1][2]

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)
1	1 1/2 – Class 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)	[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)	[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)	[1]	N/A	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
2	2 – Class 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 – Class 300	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	2 – Class 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)	[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)	[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)	[1]	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
3	3 – Class 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 – Class 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 – Class 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)	[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)	[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)	[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 × (Pipe I.D. + Wall Thickness + B) + C[I]
3. DIN Valves are not offered.

Figure 24. Rosemount 3051CFA Threaded Flo-Tap Annubar Flowmeter[1]



For A-E, see Table 83.

1. The Threaded Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

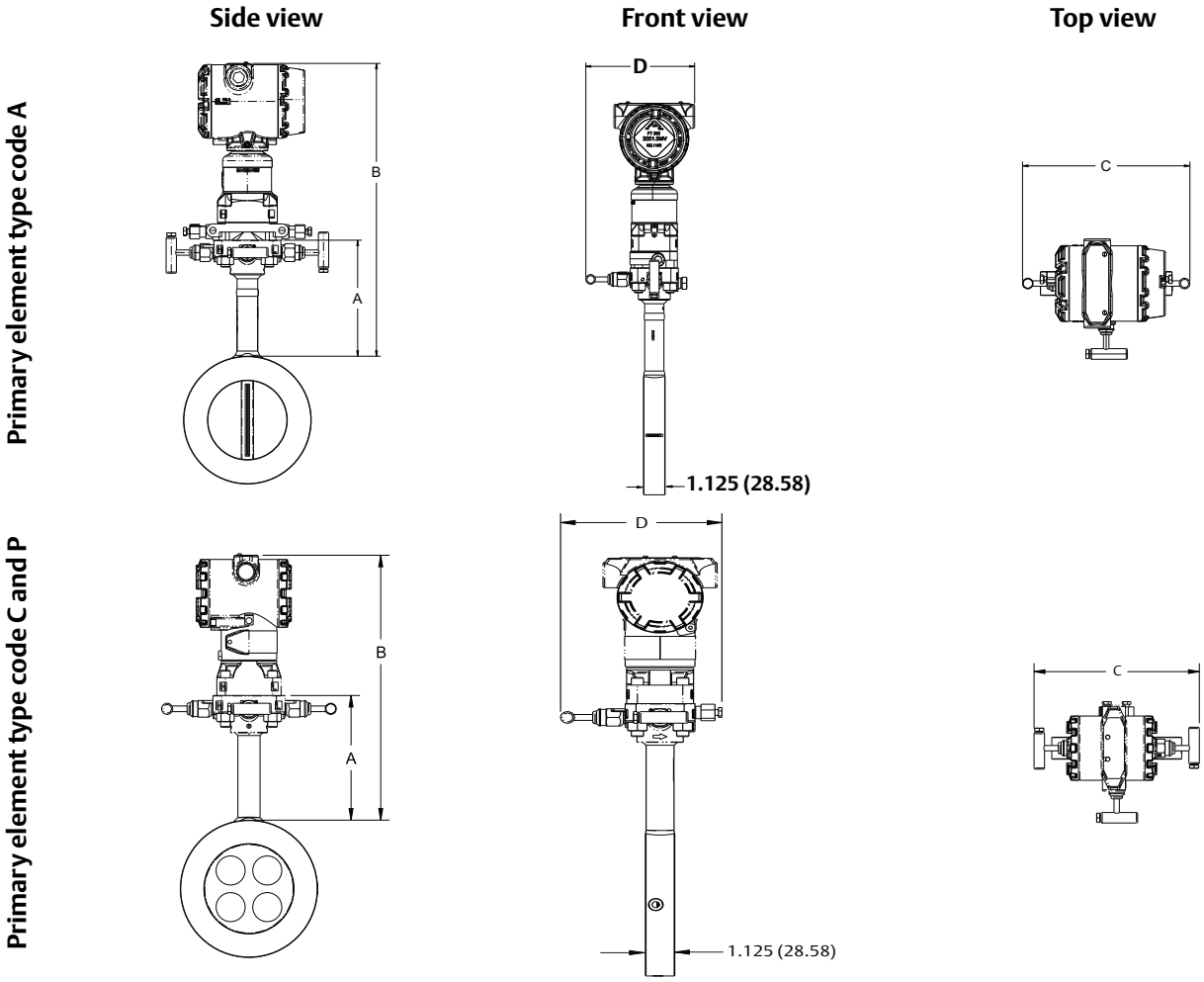
Table 83. Rosemount 3051CFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data[1][2]

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 + B[I]
2. Retracted, B Dimension = 2 × (pipe I.D. + wall thickness + A) + B[I]
3. Sensor Size 3 is not available in a Threaded Flo-Tap.

Figure 25. Rosemount 3051CFC Compact Flowmeter



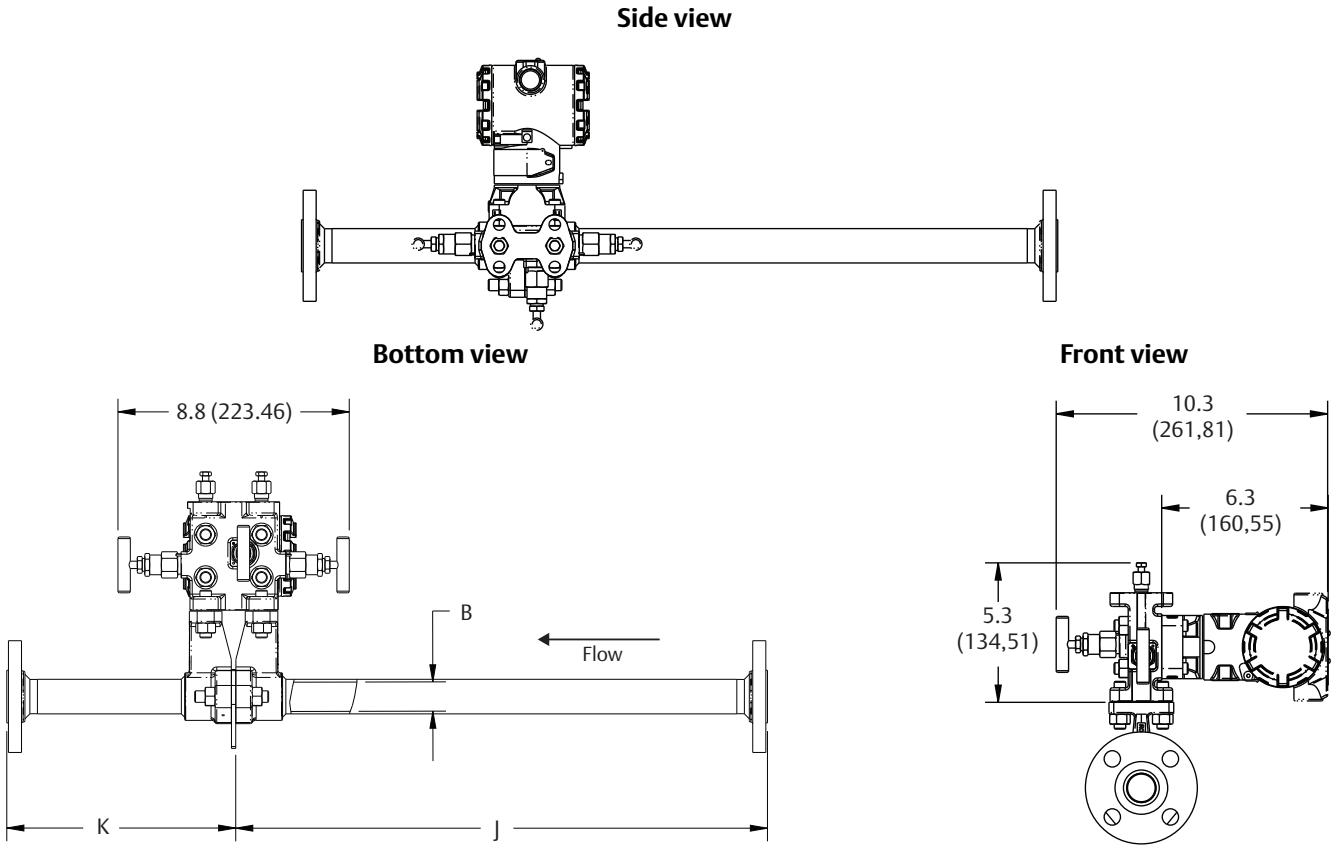
For A-D, see Table 84.

Table 84. Rosemount 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).

Figure 26. Rosemount 3051CFP Integral Orifice Flowmeter



Dimensions are in inches (millimeters).

Table 85. Rosemount 3051CFP Integral Orifice Dimensional Data

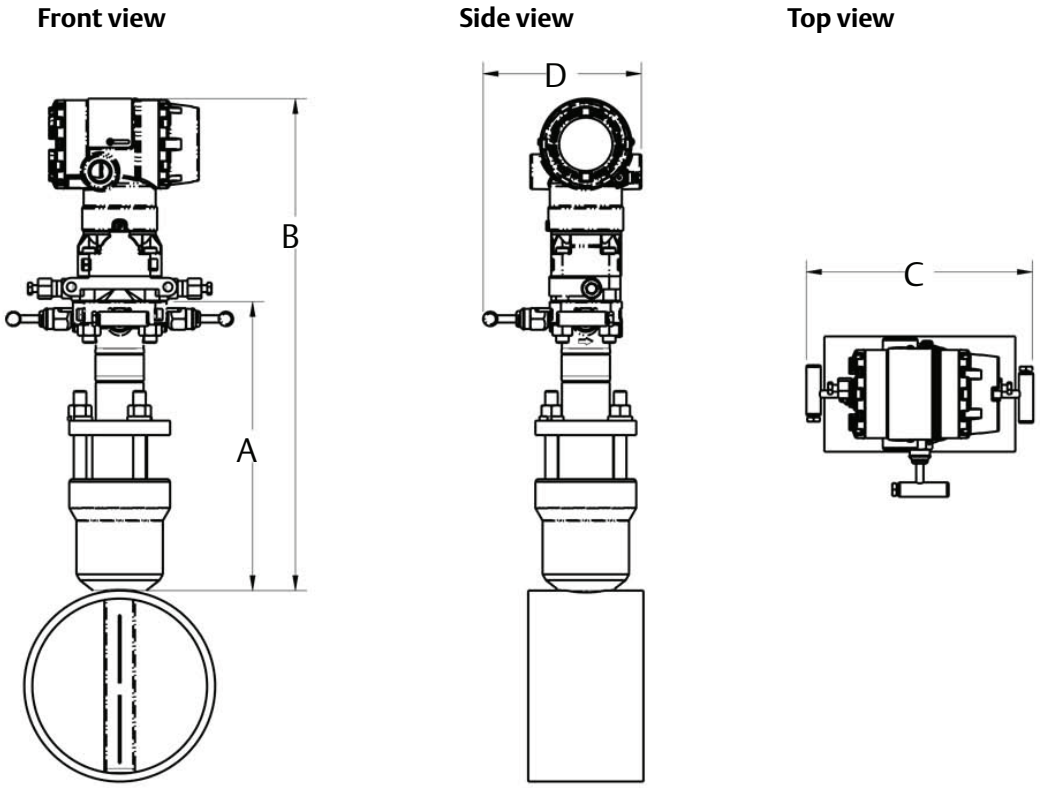
Dimension	Line size		
	½-in. (15 mm)	1-in. (25 mm)	1½-in. (40 mm)
J (Beveled/threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF Class 150, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF Class 300, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF Class 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 Class 150, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF Class 300, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF Class 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)
J (RF and RTJ Class 900, weld neck)	15.13 (384.3)	23.32 (592.3)	31.88 (809.8)
K (RF and RTJ Class 900, weld neck)	8.33 (211.6)	11.83 (300.5)	15.35 (389.9)

Dimensions are in inches (millimeters).

1. Downstream length shown here includes plate thickness of 0.162-in. (4,11 mm).

Rosemount 2051CF Flowmeter series

Figure 27. Rosemount 2051CFA Pak-Lok Annubar Flowmeter (1)



For A-D, Table 86.

1. The Pak-Lok Annubar model is equivalent to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 86. Rosemount 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).

Figure 28. Rosemount 2051CFA Flanged with Opposite Side Support Annubar Flowmeter

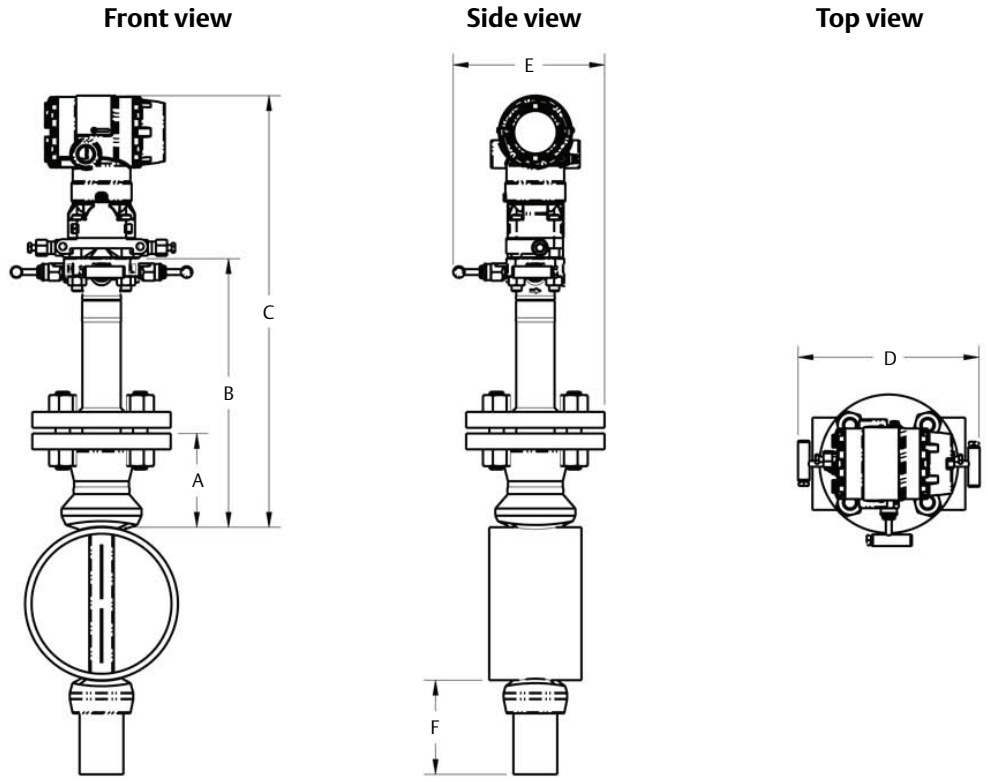


Table 87. Rosemount 2051CFA Flanged Annubar Dimensional Data

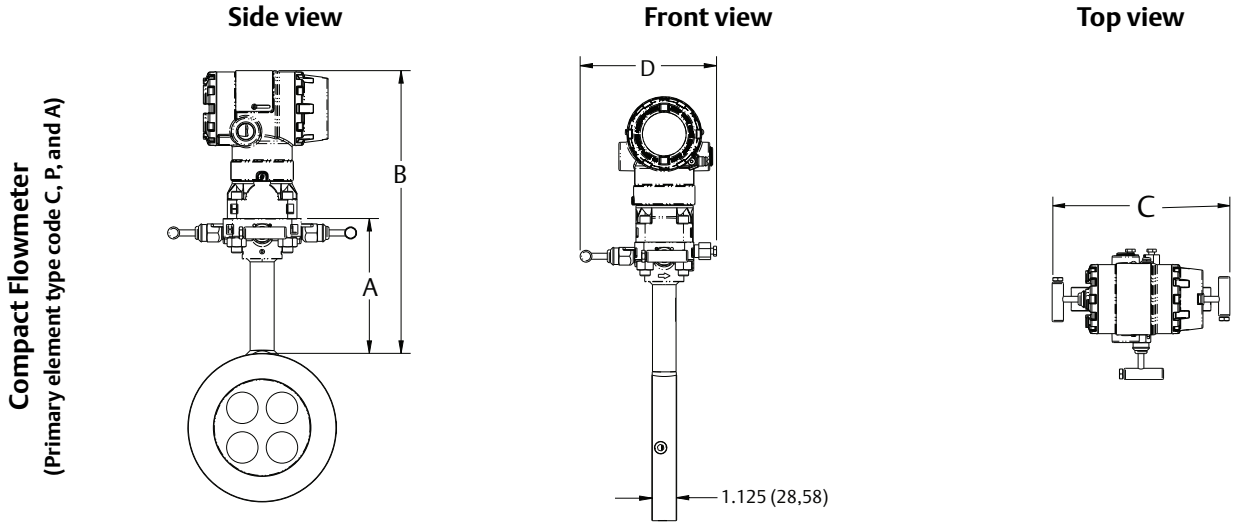
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – Class 150	3.88 (98.6)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – Class 300	4.13 (104.9)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – Class 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 – Class 900	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – Class 1500	4.94 (125.5)	9.31 (236.5)	N/A	N/A	N/A	3.50 (88.9)
1	1 1/2 – Class 2500	6.76 (171.7)	11.63 (295.4)	N/A	N/A	N/A	4.00 (101.6)
2	2 – Class 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 – Class 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 – Class 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 – Class 900	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	2 – Class 1500	5.88 (149.4)	10.50 (266.7)	N/A	N/A	N/A	5.00 (127.0)
2	3 – Class 2500	9.88 (251.0)	15.63 (397.0)	N/A	N/A	N/A	4.50 (114.3)
3	3 – Class 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 – Class 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 – Class 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 87. Rosemount 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	4 – Class 900	8.19 (208.0)	13.06 (331.7)	N/A	N/A	N/A	7.00 (177.8)
3	4 – Class 1500	8.56 (217.4)	13.81 (350.8)	N/A	N/A	N/A	7.00 (177.8)
3	4 – Class 2500	11.19 (284.2)	17.31 (439.7)	N/A	N/A	N/A	7.00 (177.8)

Dimensions are in inches (millimeters).

Figure 29. Rosemount 2051CFC Compact Flowmeter



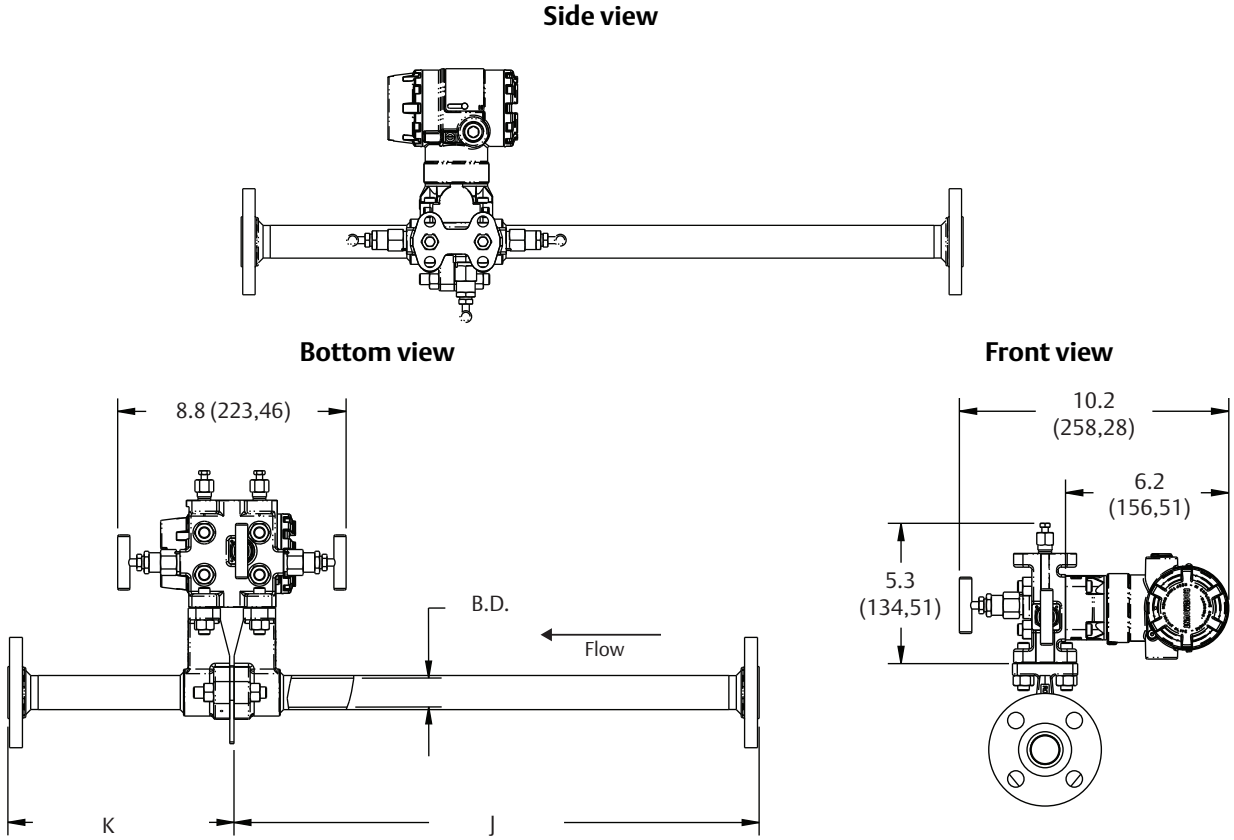
For A-D, see Table 88.

Table 88. Rosemount 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).

Figure 30. Rosemount 2051CFP Integral Orifice Flowmeter



Dimensions are in inches (millimeters).

Table 89. Rosemount 2051CFP Integral Orifice Dimensional Data

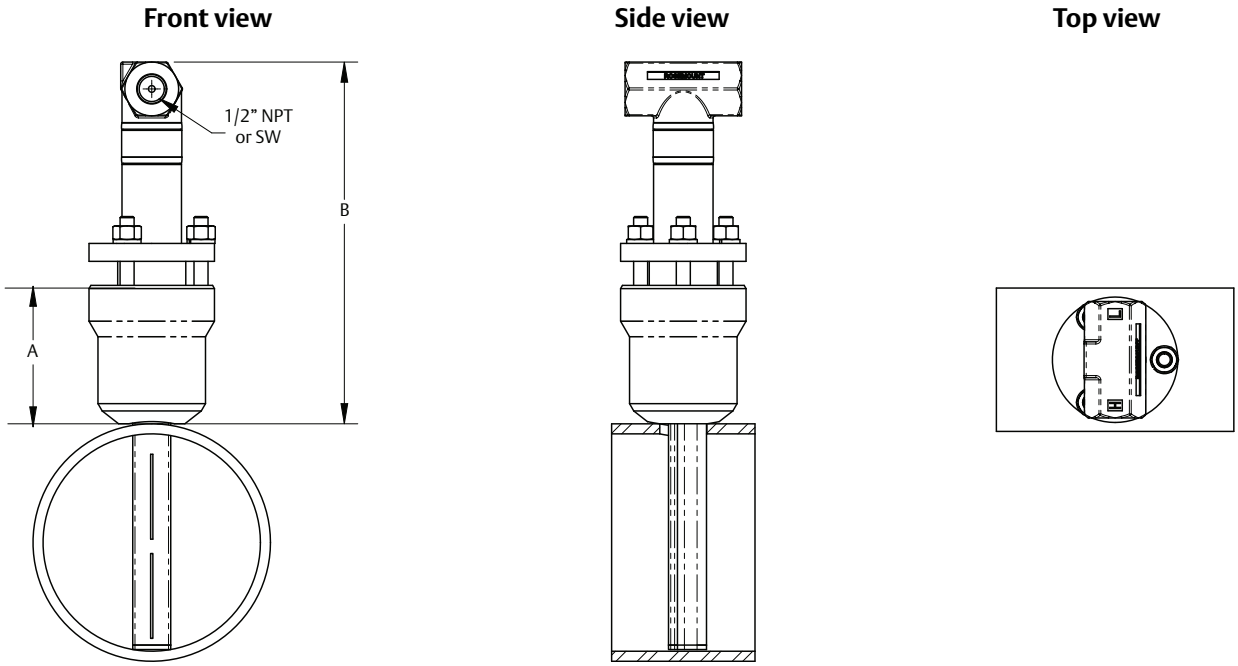
Dimension	Line size		
	1/2-in. (15 mm)	1-in. (25 mm)	1 1/2-in. (40 mm)
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF Class 150, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF Class 300, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF Class 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 Class 150, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF Class 300, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF Class 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)
J (RF and RTJ 900, weld neck)	15.13 (384.3)	23.32 (592.3)	31.88 (809.8)
K (RF and RTJ 900, weld neck)	8.33 (211.6)	11.83 (300.5)	15.35 (389.9)

Dimensions are in inches (millimeters).

1. Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

Rosemount 485 Annubar Primary Element

Figure 31. Rosemount 485 Pak-Lok Annubar Primary[1]



For A and B, see Table 90.

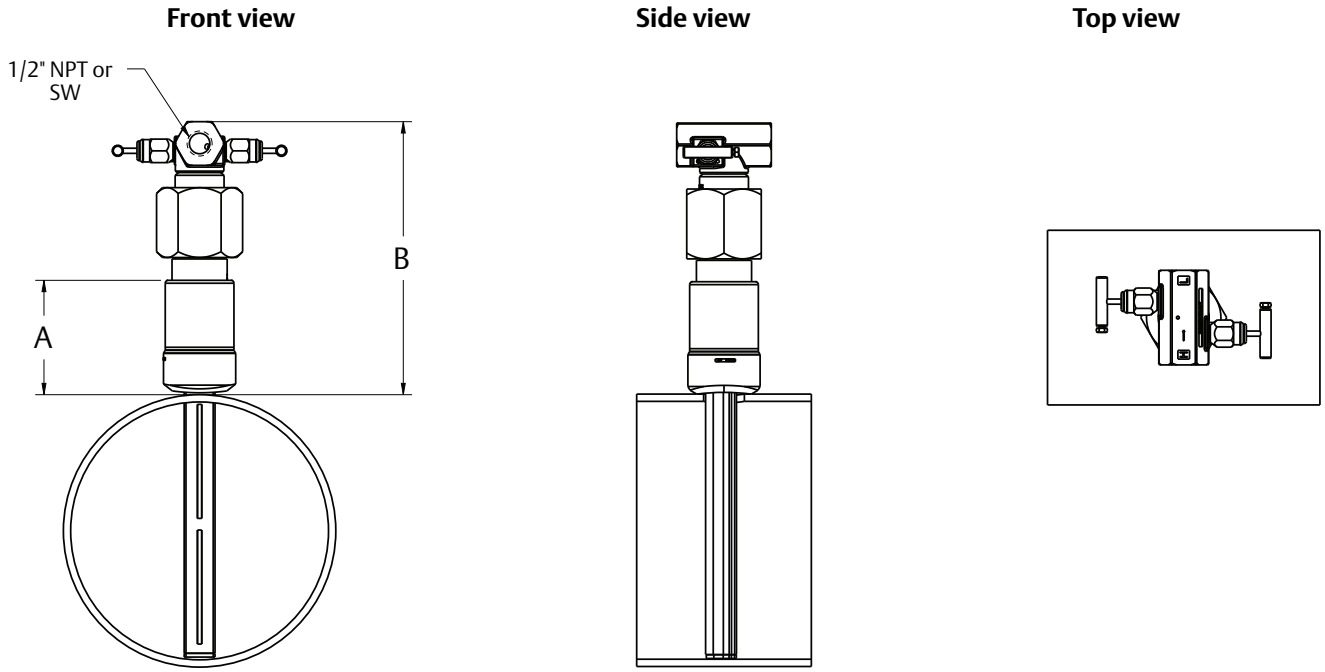
1. The Pak-Lok Annubar model is equivalent to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 90. Rosemount 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).

Figure 32. Rosemount 485 Threaded Annubar Primary[1]



For A and B, see Table 91.

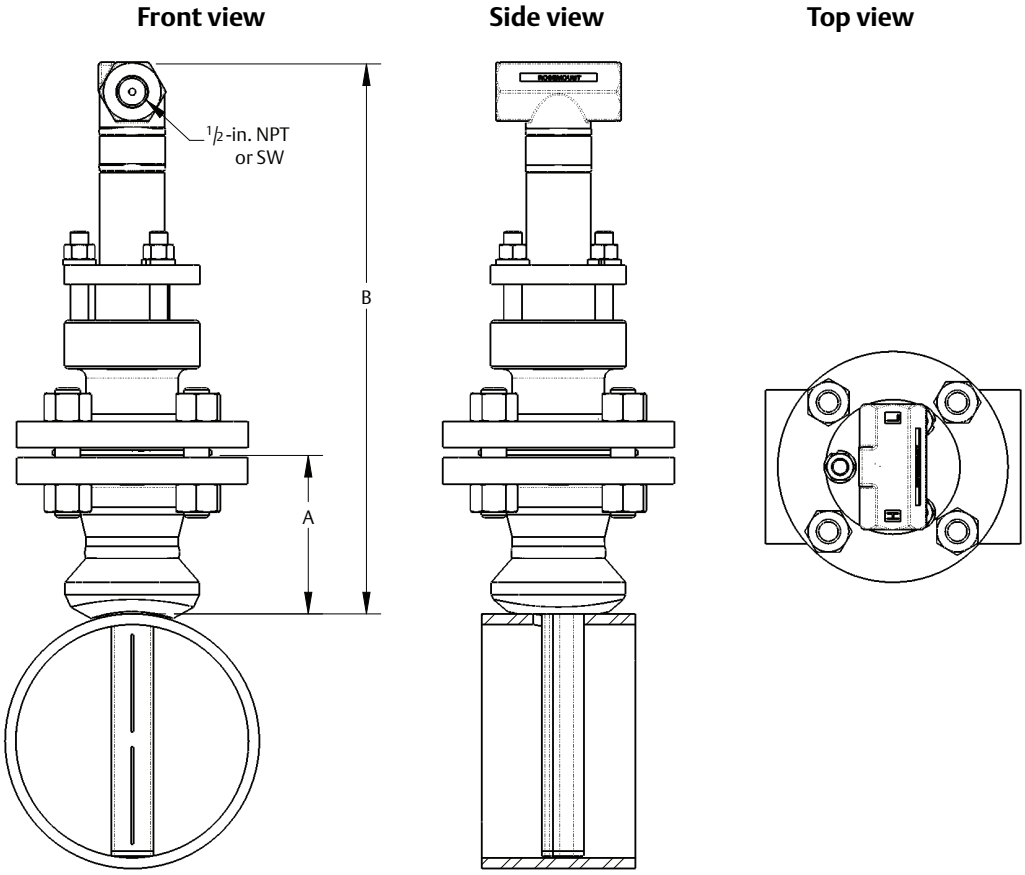
1. The Threaded Annubar model is available up to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 91. Rosemount 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).

Figure 33. Rosemount 485 Flange-Lok Annubar Primary [(1)]



For A and B, see Table 92.

1. The Flange-Lok Annubar model can be direct mounted up to Class 600 ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

Table 92. Rosemount 485 Flange-Lok Annubar Primary Dimensional Data

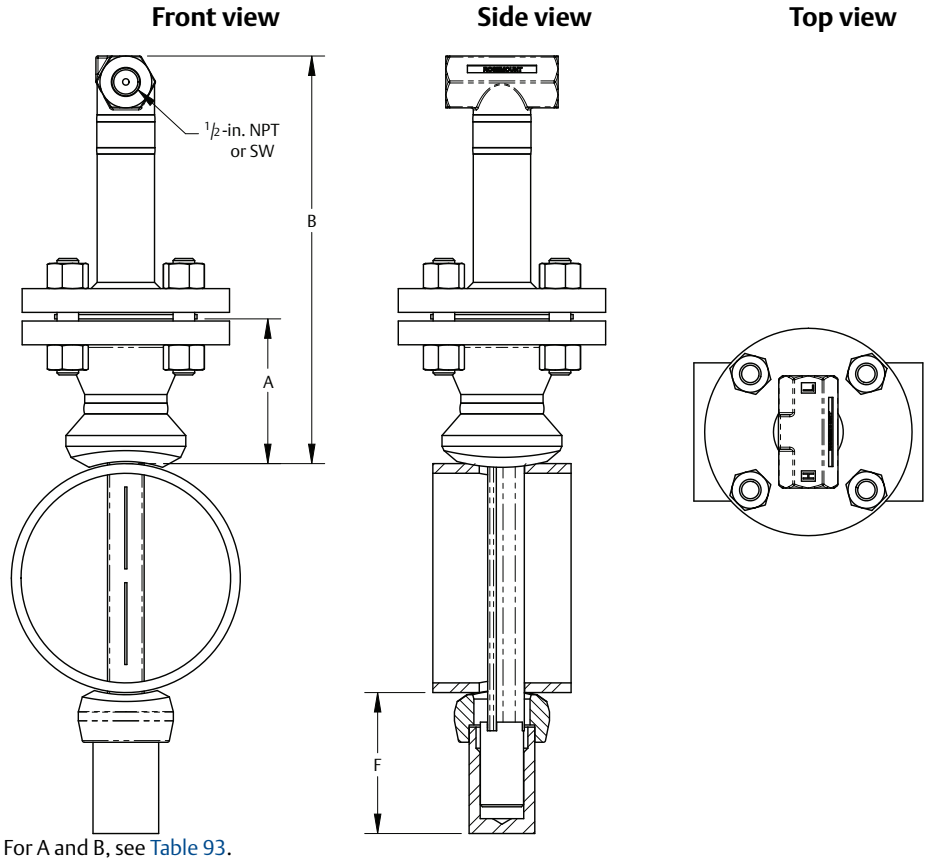
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)
1	1 1/2 – Class 150	3.88 (98.6)	12.25 (311.2)
1	1 1/2 – Class 300	4.13 (104.9)	12.25 (311.2)
1	1 1/2 – Class 600	4.44 (112.8)	12.25 (311.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)
1	DN40/PN100	3.88 (98.6)	12.25 (311.2)
2	2 – Class 150	4.13 (104.9)	14.25 (362.0)
2	2 – Class 300	4.38 (111.3)	14.25 (362.0)
2	2 – Class 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 – Class 150	4.63 (117.6)	17.50 (444.5)
3	3 – Class 300	5.00 (127.0)	17.50 (444.5)
3	3 – Class 600	5.38 (136.7)	17.50 (444.5)

Table 92. Rosemount 485 Flange-Lok Annubar Primary Dimensional Data

Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)
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).

Figure 34. Rosemount 485 Flanged Annubar Primary



For A and B, see Table 93.

Table 93. Rosemount 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 – Class 150	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – Class 300	4.13 (104.9)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – Class 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 – Class 900	4.94 (125.5)	9.31 (236.5)	3.50 (88.9)
1	1 1/2 – Class 1500	4.94 (125.5)	9.31 (236.5)	3.50 (88.9)
1	1 1/2 – Class 2500	6.76 (171.7)	11.63 (295.4)	4.00 (101.6)
2	2 – Class 150	4.13 (104.9)	12.00 (304.8)	5.00 (127.0)
2	2 – Class 300	4.38 (111.3)	12.00 (304.8)	5.00 (127.0)
2	2 – Class 600	4.75 (120.7)	12.00 (304.8)	5.00 (127.0)

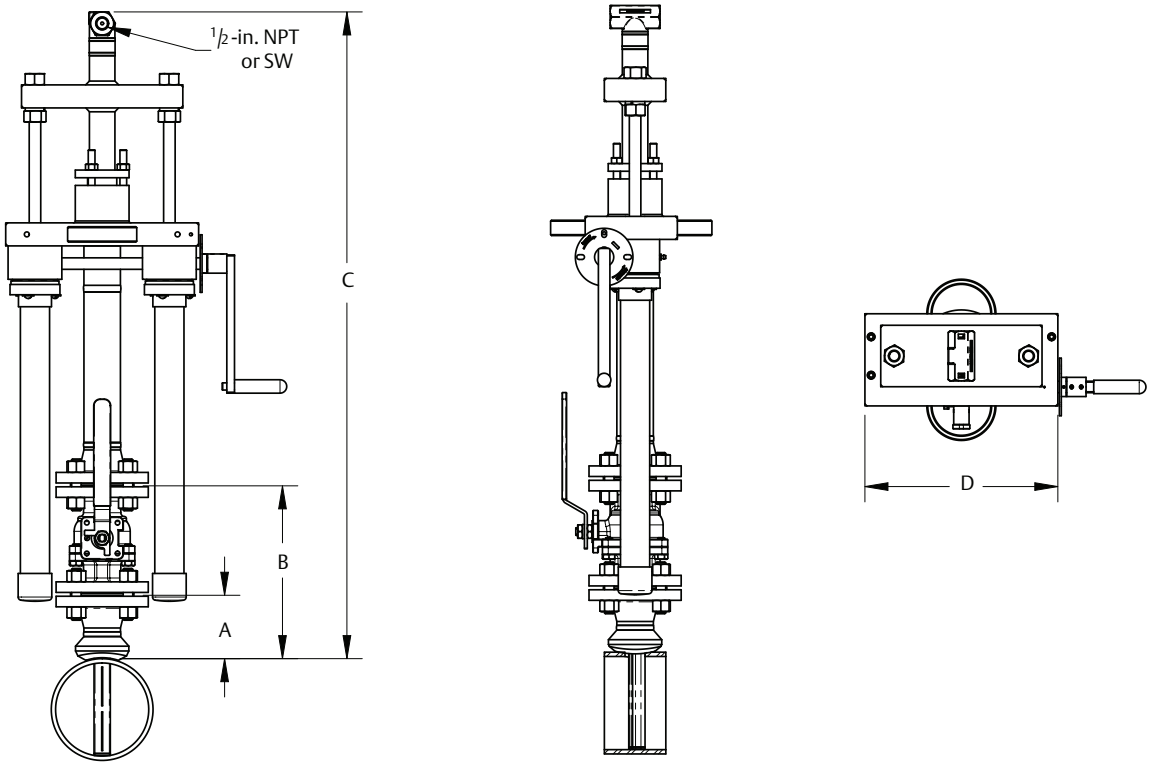
Table 93. Rosemount 485 Flanged Annubar Primary Dimensional Data

Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
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 – Class 900	5.88 (149.4)	10.50 (266.7)	5.00 (127.0)
2	2 – Class 1500	5.88 (149.4)	10.50 (266.7)	5.00 (127.0)
2	3 – Class 2500	9.88 (251.0)	15.63 (397.0)	4.50 (114.3)
3	3 – Class 150	4.63 (117.6)	13.50 (342.9)	4.00 (101.6)
3	3 – Class 300	5.00 (127.0)	13.50 (342.9)	4.00 (101.6)
3	3 – Class 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 – Class 900	8.19 (208.0)	13.06 (331.7)	7.00 (177.8)
3	4 – Class 1500	8.56 (217.4)	13.81 (350.8)	7.00 (177.8)
3	4 – Class 2500	11.19 (284.2)	17.31 (439.7)	7.00 (177.8)

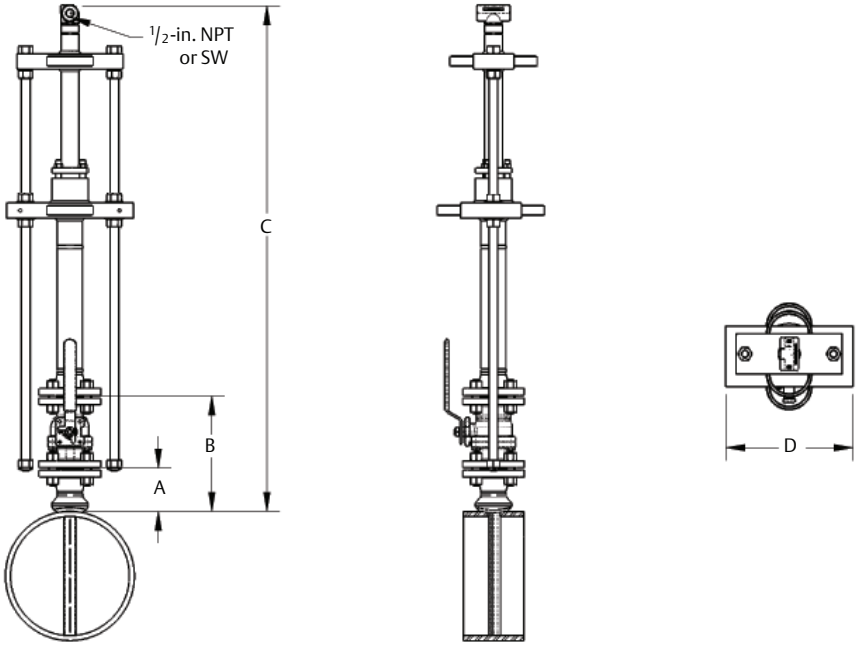
Dimensions are in inches (millimeters).

Figure 35. Rosemount 485 Flanged Flo-Tap Annubar Primary

Front view **Side view** **Top view**



Front view **Side view** **Top view**



For A-D, see Table 94.

Table 94. Rosemount 485 Flanged Flo-Tap Annubar Primary Dimensional Data

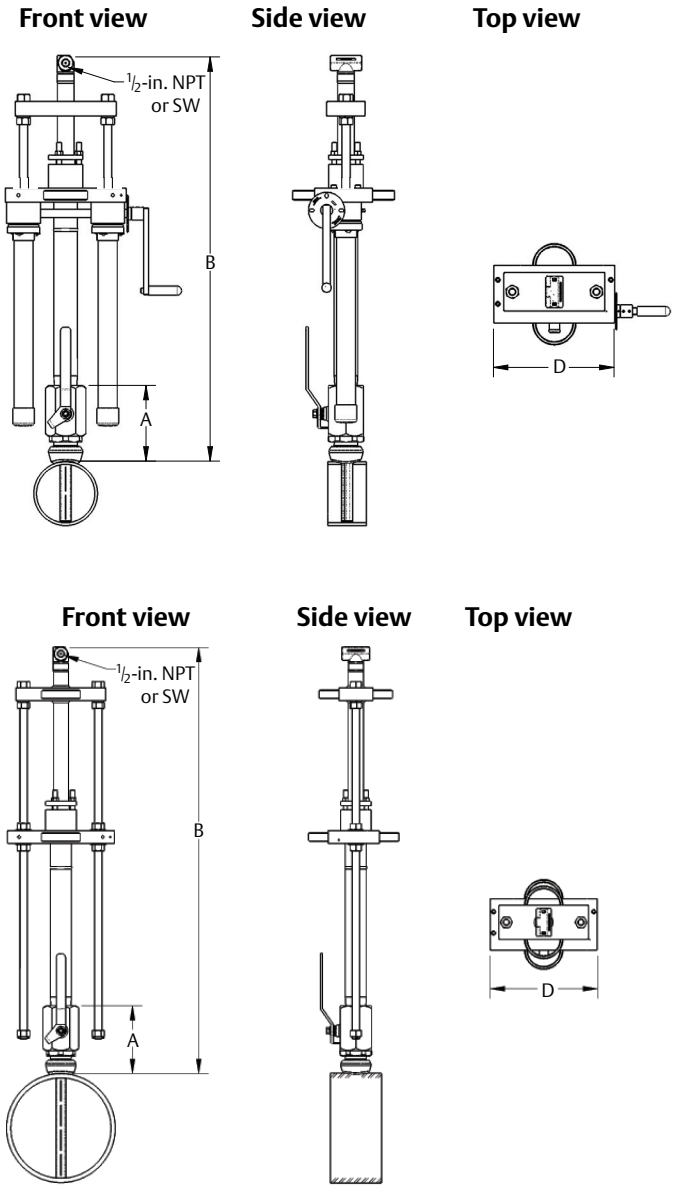
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C[1] (Max) (gear drive)	C[1] (Max) (manual)	D (Max)
1	1 1/2 – Class 150	3.88 (98.6)	10.50 (266.7)	N/A	17.77 (451.4)	10.50 (266.7)
1	1 1/2 – Class 300	4.13 (104.9)	11.75 (298.5)	N/A	17.77 (451.4)	10.50 (266.7)
1	1 1/2 – Class 600	4.44 (112.8)	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)	(1)	N/A	17.77 (451.4)	10.50 (266.7)
1	DN40/PN100	3.88 (98.6)	(1)	N/A	17.77 (451.4)	10.50 (266.7)
2	2 – Class 150	4.13 (104.9)	11.25 (285.8)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	2 – Class 300	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	2 – Class 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)	(1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN40	3.52 (89.4)	(1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN100	4.30 (109.2)	(1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
3	3 – Class 150	4.63 (117.6)	12.75 (323.9)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	3 – Class 300	5.00 (127.0)	16.25 (412.8)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	3 – Class 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)	(1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN40	4.16 (105.7)	(1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN100	4.95 (125.7)	(1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)

Use the appropriate formula to determine C value:
Inserted formula: Pipe I.D. + wall thickness + value B + C^1 (use the manual drive or gear drive values for C^1)
Retracted formula: [2 × (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.

Figure 36. Rosemount 485 Threaded Flo-Tap Annubar Primary - Gear Drive and Manual



For A, B, and D, see Table 94.

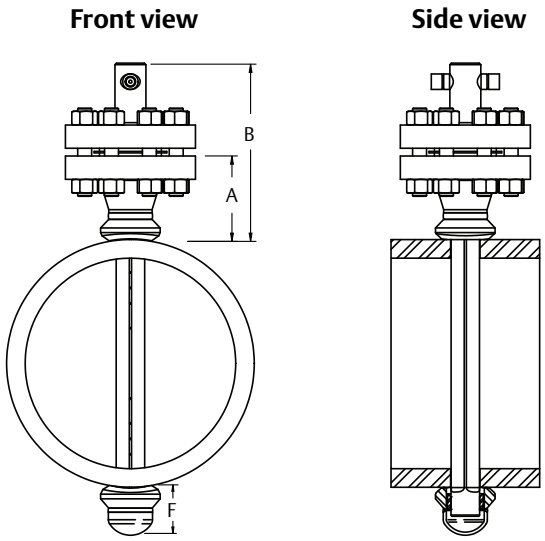
Table 95. Rosemount 485 Threaded Flo-Tap Annubar Primary Dimensional Data(1)(2)

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 × (pipe I.D. + wall thickness + A) + B[I]
3. Sensor size 3 is not available in a Threaded Flo-Tap.

Rosemount 585 Annubar Primary Element

Figure 37. Rosemount 585 Flanged with Opposite Side Support Annubar Primary



For A, B, and F, see Table 96.

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 96. Rosemount 585 Flanged with Opposite Side Support Annubar Dimensional Data

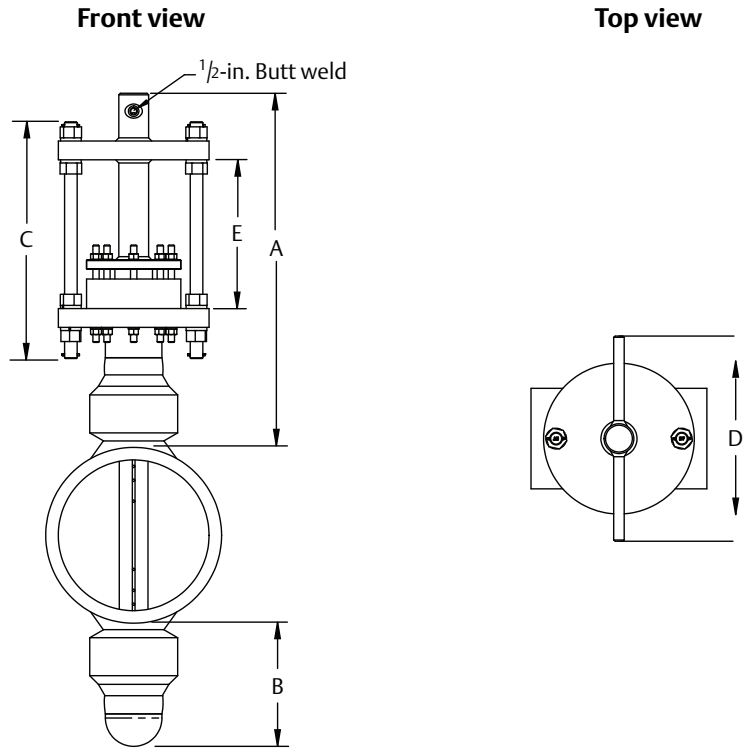
Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
11	1 1/2-in.– Class 150	3.88 (98.6)	9.70 (246.4)	3.10 (78.7)
11	1 1/2-in. – Class 300	4.13 (104.9)	10.07 (255.8)	3.10 (78.7)
11	1 1/2-in. – Class 600	4.44 (112.8)	10.70 (271.8)	3.10 (78.7)
11	DIN40/PN16	3.21 (81.5)	9.05 (229.9)	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. – Class 900	4.94 (125.5)	11.57 (293.9)	3.60 (91.4)
11	1 1/2-in. – Class 1500	4.94 (125.5)	11.57 (293.9)	3.60 (91.4)
11	1 1/2-in. – Class 2500	6.75 (171.5)	13.88 (352.6)	3.60 (91.4)
22	2-in. – Class 150	4.13 (104.9)	10.01 (254.3)	4.50 (114.3)
22	2-in. – Class 300	4.38 (111.3)	10.38 (263.7)	4.50 (114.3)
22	2-in. – Class 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. – Class 900	5.88 (149.4)	12.76 (324.1)	4.50 (114.3)
22	2-in. – Class 1500	5.88 (149.4)	12.76 (324.1)	4.50 (114.3)
22	3-in. – Class 2500	9.88 (250.1)	17.88 (454.2)	4.50 (114.3)
44	3-in. – Class 150	4.63 (117.6)	10.69 (271.5)	3.90 (99.1)
44	3-in. – Class 300	5.00 (127.0)	11.26 (286.6)	3.90 (99.1)

Table 96. Rosemount 585 Flanged with Opposite Side Support Annubar Dimensional Data

Sensor size	Flange size and rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
44	3-in. – Class 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. – Class 900	8.19 (208.8)	15.32 (389.1)	6.40 (162.6)
44	4-in. – Class 1500	8.56 (217.4)	16.07 (408.2)	6.40 (162.6)
44	4-in. – Class 2500	11.19 (284.2)	19.57 (497.1)	6.40 (162.6)

Dimensions are in inches (millimeters).

Figure 38. Rosemount 585 Main Steam Annubar with Opposite Side Support Annubar Primary



For A to E, see Table 97.

Table 97. Rosemount 585 Main Steam Annubar w/ Opposite Side Support Annubar Dimensional Data

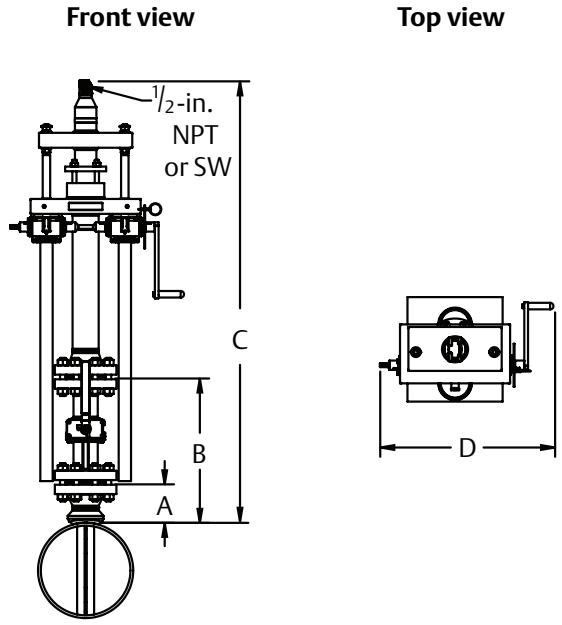
Sensor size	A (Max)	B	C	D	E
44	29.67 (753.6)	10.0 (254)	19.0 (483)	16.33 (414.0)	11.0 (279)

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.

Figure 39. Rosemount 585 Flanged Flo-Tap Annubar Primary



For A to D, see Table 98.

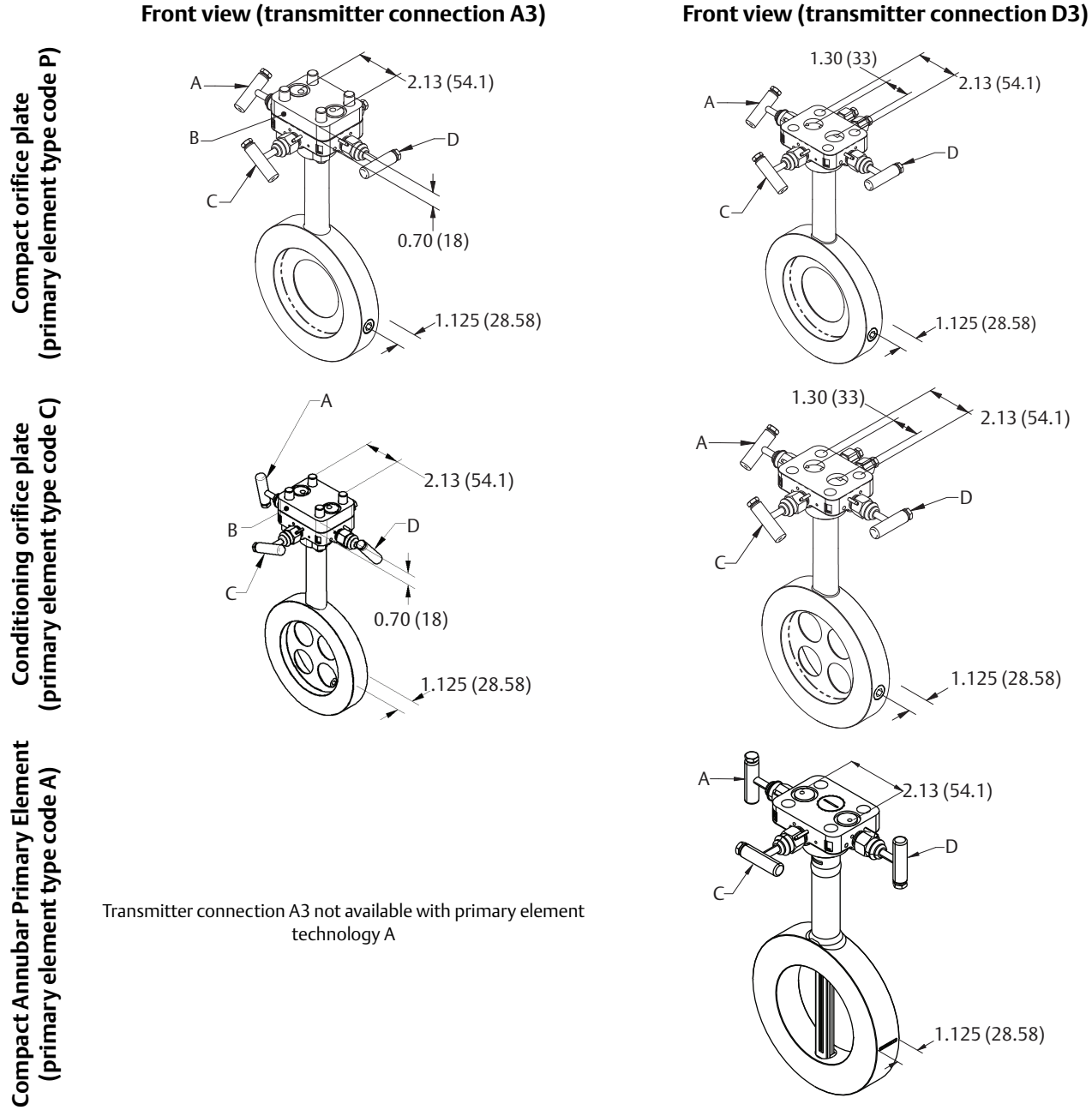
Table 98. Rosemount 585 Flanged Flo-Tap Annubar Primary Dimensional Data

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 – Class 150	4.63 (117,6)	12.75 (323,9)	25.58 (649.7)	23.3 (591,8)
44	3 – Class 300	5.00 (127,0)	16.25 (412,8)	25.58 (649.7)	23.3 (591,8)
44	3 – Class 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 × [pipe I.D. + wall thickness + value B]) + C[1] (use the Gear drive values for C[1])
Dimensions are in inches (millimeters).

Rosemount 405 Compact Primary Element

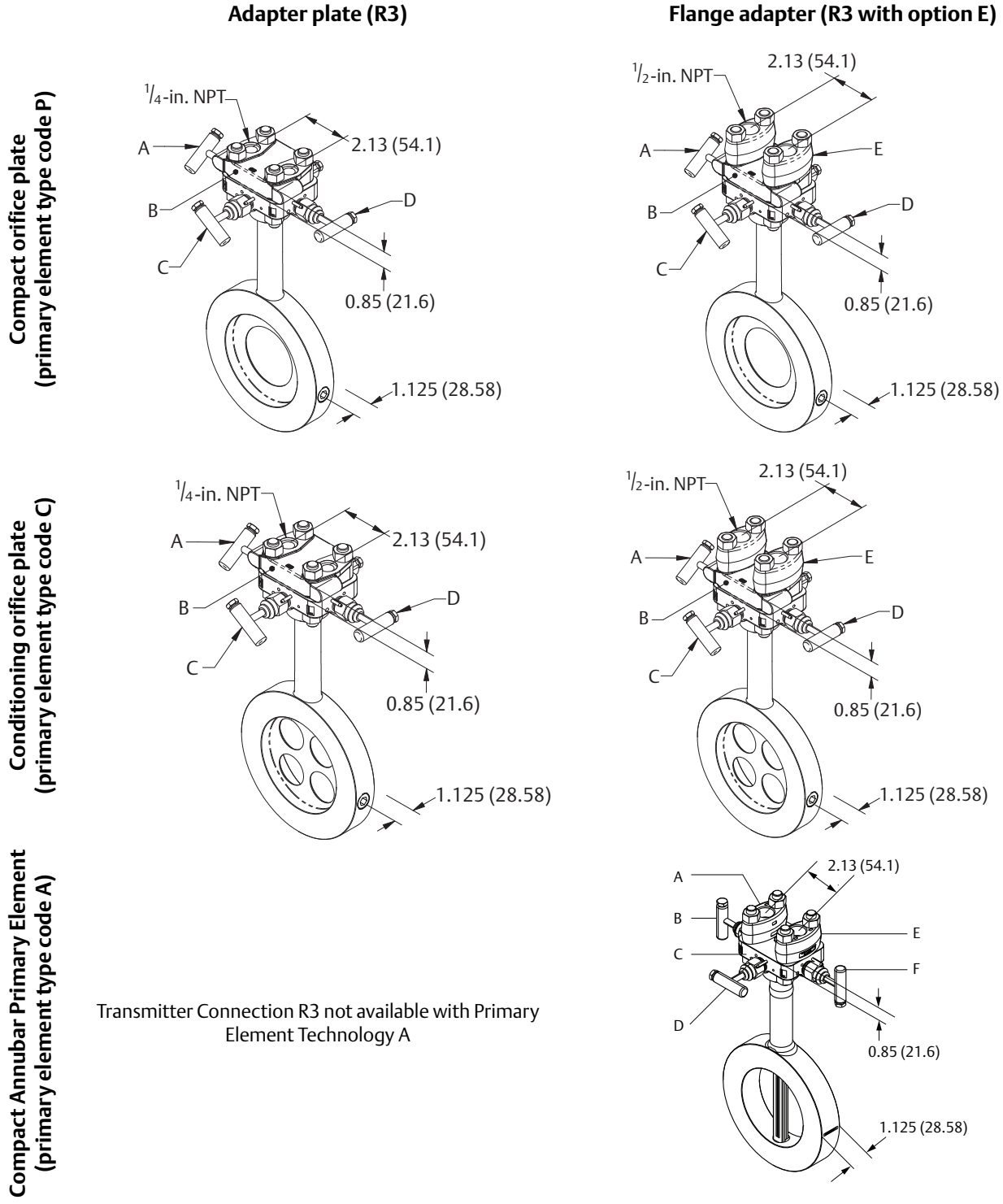
Figure 40. Rosemount 405 Compact Primary Element (Direct Mount)



A. High instrument valve
B. Adapter plate
C. Equalizer valve
D. Low instrument valve
Dimensions are in inches (millimeters).

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.

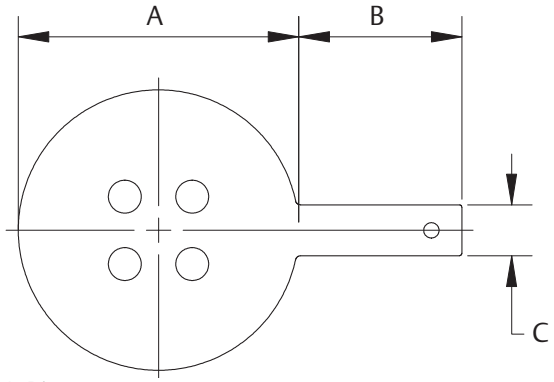
Figure 41. Rosemount 405 Compact Orifice Plate (Remote Mount Transmitter)



A. High instrument valve
B. Adapter plate
C. Equalizer valve
D. Low instrument valve
Dimensions are in inches (millimeters).

Rosemount 1595 Orifice plate

Figure 42. Rosemount 1595 Conditioning Orifice Plate (ANSI Flange, Paddle, Square Edged)



A. Diameter
B. Paddle length
C. Paddle width

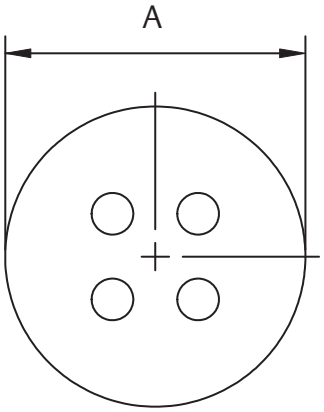
Table 99. Paddle Type Orifice Plate

Line size	Diameter for paddle type						Paddle length	Paddle width
	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 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.

Figure 43. Rosemount 1595U Orifice Universal Type (Universal, Square Edged)



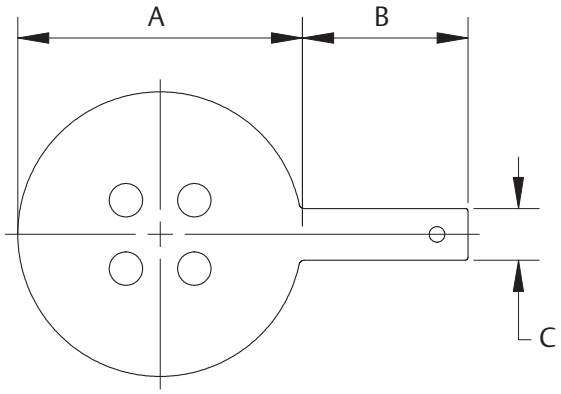
A. Diameter

Table 100. A.P.I Ring No.'s and Rating

Line size	Diameter for universal type	A.P.I ring no.	Rating (lb)
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 and 900
		R-32	2500
		R-35	1500
4-in. (100 mm)	4.406-in. (111.912 mm)	R-37	300–600 and 900
		R-38	2500
		R-39	1500
6-in. (150 mm)	6.437-in. (163.5 mm)	R-45	300–600 and 900
		R-46	1500
		R-47	2500
8-in. (200 mm)	8.437-in. (214.3 mm)	R-49	300–600 and 900
		R–50	1500
		R-51	2500
10-in. (250 mm)	10.687-in. (271.45 mm)	R-53	300–600 and 900
		R-54	1500
		R-55	2500
12-in. (300 mm)	12.593-in. (319.862 mm)	R-57	300–600 and 900
		R-58	1500
		R-59	2500

Note
Refer to Table 99 on page 228 for line size and pressure rating availability.

Figure 44. Rosemount 1595 Conditioning Orifice Plate (DIN Flange, Paddle, Square Edged)



A. Diameter
B. Paddle length
C. Paddle width

Table 101. Rosemount 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.

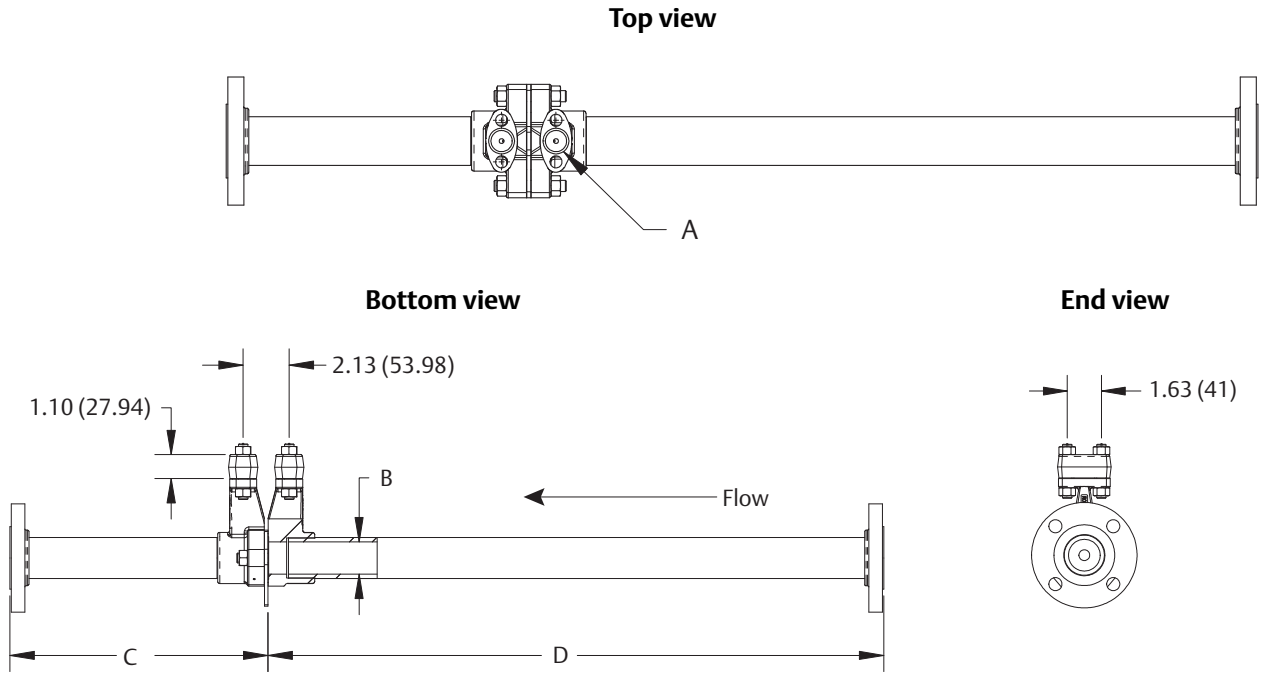
Table 102. Available Beta Ratio (β)

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

Rosemount 1195 Integral orifice plate

Figure 45. Rosemount 1195 Integral Orifice Plate



A. 1/2 NPT
B. Bore diameter
C. Downstream
D. Upstream
Dimensions are in inches (millimeters).

Table 103. Rosemount 1195 Integral Orifice Plate Dimensional Data

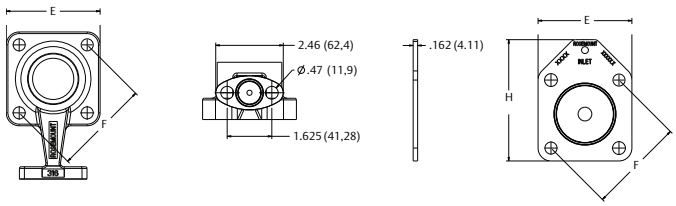
Dimension	Line size		
	1/2-in. (15 mm)	1-in. (25 mm)	1 1/2-in. (40 mm)
D (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
D (RF slip-on, RTJ slip-on, RF-DIN slip-on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
D (RF Class 150, weld-neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
D (RF Class 300, weld-neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
D (RF Class 600, weld-neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
C (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
C (RF slip-on, RTJ slip-on, RF-DIN slip-on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
C (RF Class 150, weld-neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
C (RF Class 300, weld-neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
C (RF Class 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)
D (RF and RTJ Class 900, weld neck)	15.13 (384.3)	23.32 (592.3)	31.88 (809.8)
C (RF and RTJ Class 900, weld neck)	8.33 (211.6)	11.83 (300.5)	15.35 (389.9)

Dimensions are in inches (millimeters).

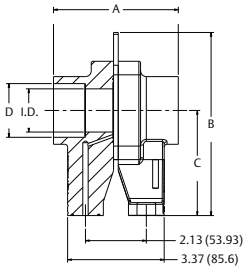
1. Downstream length shown here includes plate thickness of 0.162-in. (4,11 mm).
2. B.D is diameter of the precision bored portion of the upstream and downstream piping.

Figure 46. Enhanced Body Support

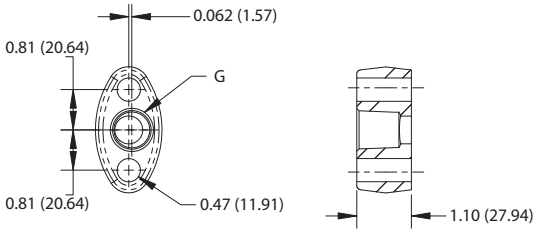
Orifice plate



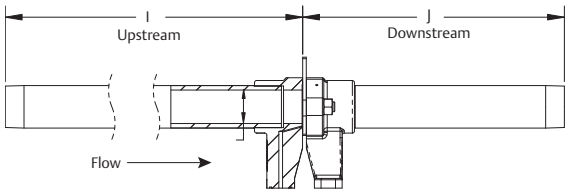
Socket-weld or threaded body



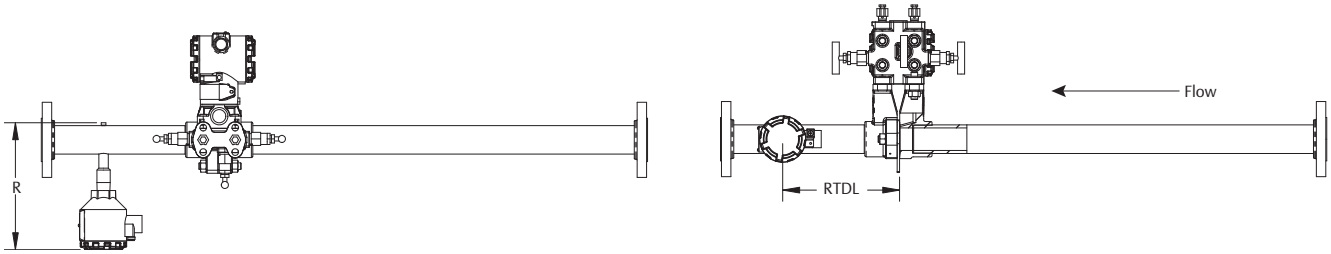
Remote adapter



NPT/beveled piping (prepared for welding)



Temperature sensor



For A, B,C, D, E, F, H,I, J, R,RTDL, B.D.,and I.D., see Table 104 on page 233.
G. 1/2–14 NPT
I. Upstream
J. Downstream
Dimensions are in inches (millimeters).

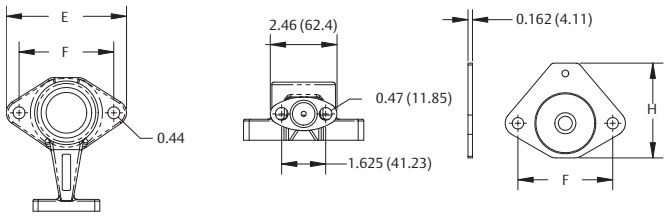
Table 104. Rosemount 1195 Integral Orifice - Enhanced Body Support Dimensional Data

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	5.126-in.	130.2mm	5.511-in.	140 mm	6.357-in.	161,5 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	2.8-in.	70,9 mm	3.1-in.	77,8 mm	3.4-in.	86,7 mm
F	2.6-in.	66,6 mm	3.0-in.	76,2 mm	3.5-in.	88.9 mm
H	3.5-in.	89,5 mm	3.8-in.	76,2 mm	4,4-in.	112,1 mm
I	12.54-in.	318,4 mm	20.24-in.	514 mm	28.44-in.	722,4 mm
J	5.74-in.	145,7 mm	8.75-in.	222,2 mm	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

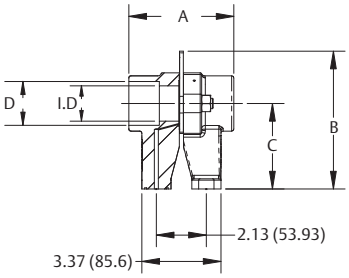
1. To improve pipe perpendicularity for gasket sealing, socket diameter “D” is smaller than standard pipe O.D. Pipe O.D. must be machined smaller than socket diameter “D” to ensure proper fit.
2. B.D is diameter of the precision bored portion of the upstream and downstream piping.

Figure 47. Traditional Body Support

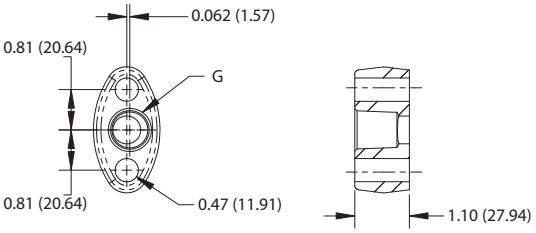
Orifice plate



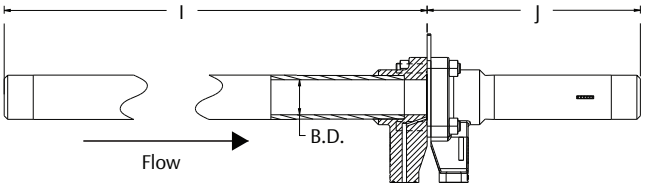
Socket-weld or threaded body



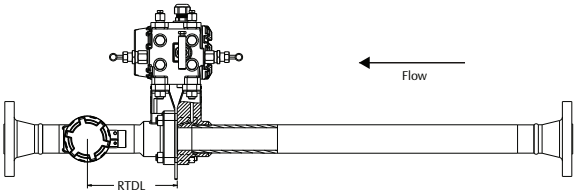
Remote adapter

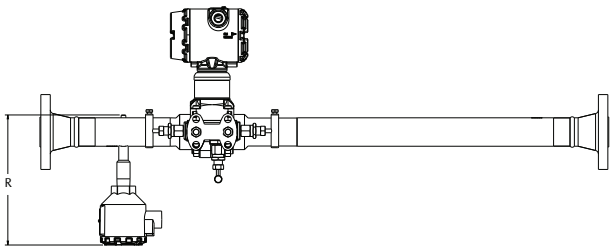


NPT/Beveled piping (prepared for welding)



Temperature sensor





For A, B,C, D, E, F, H, L, M, and R, see Table on page 234.
G. 1/2–14 NPT
I. Upstream
J. Downstream
Dimensions are in inches (millimeters).

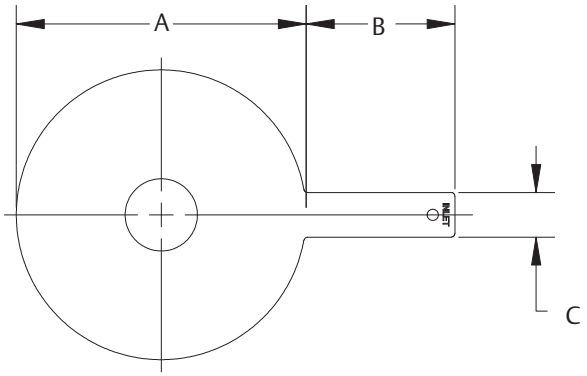
Table 105. Rosemount 1195 Integral Orifice - Traditional Body Support Dimensional Data

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.	222,2 mm	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.

Rosemount 1495 Orifice plate

Figure 48. Rosemount1495PC Paddle Type Orifice Plate (DIN, Paddle, Square Edged, Concentric)



A. Diameter
B, Handle length
C. Handle width

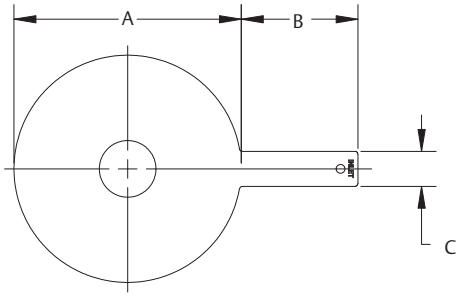
Table 106. Rosemount 1495 Orifice Plate Dimensions

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)

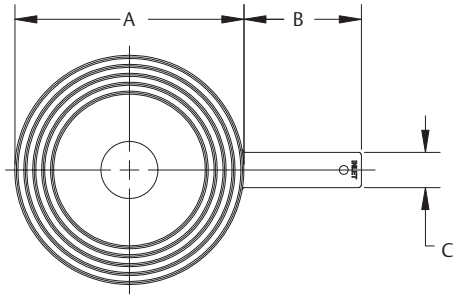
Measurement is in inches (millimeters).

Figure 49. Rosemount 1495 Orifice Paddle Type

1495PC Orifice paddle type (paddle, square edged, concentric)



1495PG Orifice paddle type (paddle, square edged, concentric, spiral finish)

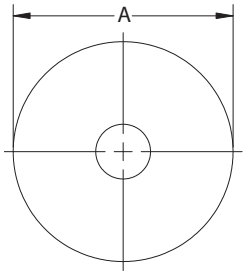


A. Diameter
B. Handle length
C. Handle width

Line size	Diameter for paddle type						Handle length	Handle width
	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 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).

Figure 50. Rosemount 1495UC Orifice universal type (universal, square edged, concentric)



A. Diameter

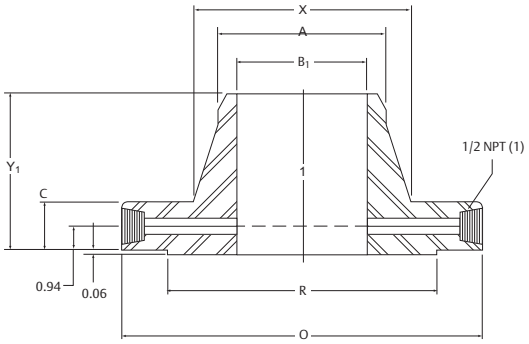
Line size	Diameter for universal type
2-in.	2.437 (61.8998)
2 1/2-in.	2.812 (71.4248)
3-in.	3.437 (87.2998)
4-in.	4.406 (111.912)
6-in.	6.437 (163.5)
8-in.	8.437 (214.3)
10-in.	10.687 (271.45)
12-in.	12.593 (319.862)
14-in.	14.000 (355.6)
16-in.	16.000 (406.4)
18-in.	18.000 (457.2)
20-in.	20.000 (508)
24-in.	24.000 (609.6)

Measurement is in inches (millimeters).

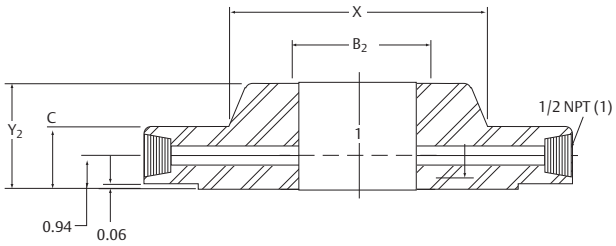
Rosemount 1496 Orifice flange union

Figure 51. Class 300

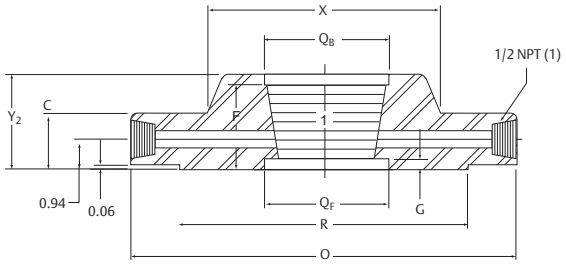
Weld neck



Slip-on



Threaded



ASME B16.36-1996

Table 107. 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	[(5)]
1 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 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	[(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	

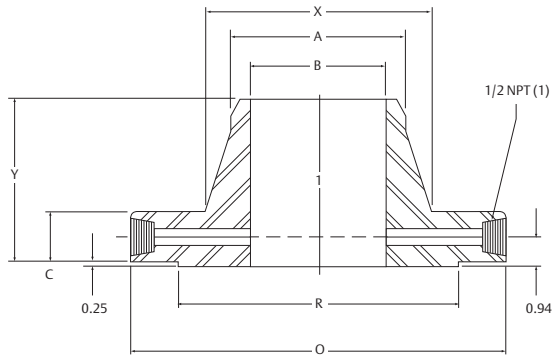
Nominal pipe size[(1)(2)]	Diameter of pressure connection TT	Drilling template				Bolt length[(3)(4)]	
		Bolt circle	Number of holes	Diameter of holes	Diameter of bolts	Machine bolts	Stud bolts
1	1/4	3.50	4	0.69	5/8	4.50	5.00
1 1/2	1/4	4.50	4	0.81	3/4	4.75	5.25
2	1/4	5.00	8	0.69	5/8	4.50	5.00
2 1/2	1/4	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.

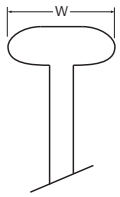
2. All other dimensions are in accordance with ASME B16.5.
3. Bolt lengths include allowance for orifice and gasket thickness of 0.25- in. for NPS 1–12 and 0.38-in. for NPS 14–24.
4. In conformance with ASME B16.5, stud bolt lengths do not include point heights.
5. Threaded flanges are furnished in NPS 1–8 only.
6. Bore diameter of weld neck flanges is to be specified by the purchaser.

Figure 52. Class 600, 900, 1500, and 2500

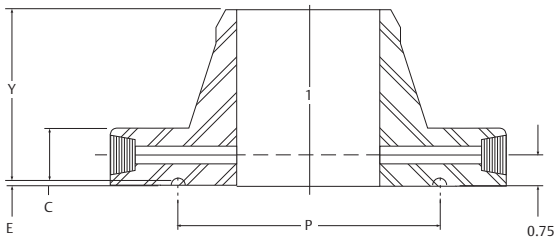
Raised face



Special one or two piece ring and orifice plate assembly



Ring type ring



Groove detail

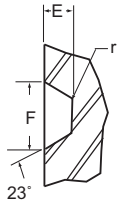


Table 108. Class 600 Orifice Flanges, Welding Neck[(1) (2)]

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

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.

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	[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.

Table 109. Other Dimensions (in accordance with ASME B16.5)

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 NPS 2 1/2 and smaller, use Class 1500.							
1 1/2								
2								
2 1/2								
3	[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.

Table 110. 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	[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.

Table 111. 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	Groove depth E	Groove width F	Radius at bottom r_{max}	Special oval ring height W		
1	2.00	6.25	1.50	3.62	R18	2.375	0.250	0.344	0.03	1.00	2.25	1.32
1.5	2.88	8.00	1.75	4.38	R23	3.250	0.312	0.469	0.03	1.06	3.12	1.90
2	3.62	9.25	2.00	5.00	R26	4.000	0.312	0.469	0.03	1.06	3.75	2.38
2.5	4.12	10.50	2.25	5.62	R28	4.375	0.375	0.531	0.06	1.19	4.50	2.88
3	5.00	12.00	2.62	6.62	R32	5.000	0.375	0.531	0.06	1.19	5.25	3.50
4	6.19	14.00	3.00	7350	R38	6.188	0.438	0.656	0.06	1.31	6.50	4.50
6	8.50	19.00	4.25	10.75	R47	9.000	0.500	0.781	0.06	1.31	6.50	4.50
8	10.62	21.75	5.00	12.50	R51	11.000	0.562	0.906	0.06	1.56	12.00	8.63
10	12.75	26.50	6.50	16.50	R55	13.500	0.688	1.188	0.09	1.88	14.75	10.75
12	15.00	30.00	7.25	18.25	R60	16.000	0.688	1.312	0.09	2.00	17.38	12.75

1. All other dimensions are in accordance with ASME B16.5.

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	(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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