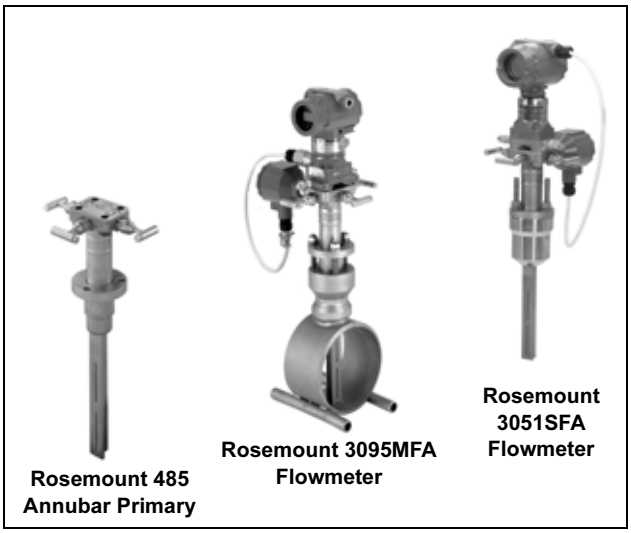
Product Data Sheet
00813-0100-4809, Rev GA
November 2008

Rosemount Annubar® Flowmeter Series

- *Industry leading integrated DP flowmeters are created when Annubar primary elements are packaged with Rosemount pressure transmitters*
- *Improved performance with innovative measuring techniques*
- *Real-time mass flow measurements available with integral temperature sensor design*
- *Increased plant uptime with the maintenance-free design*
- *Energy savings gained through minimal permanent pressure loss*
- *Scalable MultiVariable™ Transmitter enables pressure, temperature, and fully compensated mass and energy flow*
- *WirelessHART™ capabilities extend the full benefits of PlantWeb® to previously inaccessible locations*



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The Annubar Flowmeter Series

Industry leading integrated DP flowmeters

By integrating pressure transmitter electronics with the Annubar Averaging Pitot Tube (APT), Rosemount provides the highest performing insertion DP flowmeter. This fully integrated flowmeter eliminates the need for fittings, tubing, valves, adapters, manifolds, and mounting brackets, thereby reducing welding and installation time.

Improved performance with innovative measuring techniques

The Annubar's frontal slot design and revolutionary shape improve the accuracy and repeatability of every flow measurement point. Tight process control is gained by increased signal strength and reduced signal noise.

Real-time mass flow measurements are available with the integral temperature sensor design

The patented T-shaped sensor includes a sealed, pressure-retaining thermowell that permits mass flow in all line sizes with a single pipe penetration. Multivariable technology in gas and steam applications compensates for pressure and temperature variations, which can cause significant flow errors.

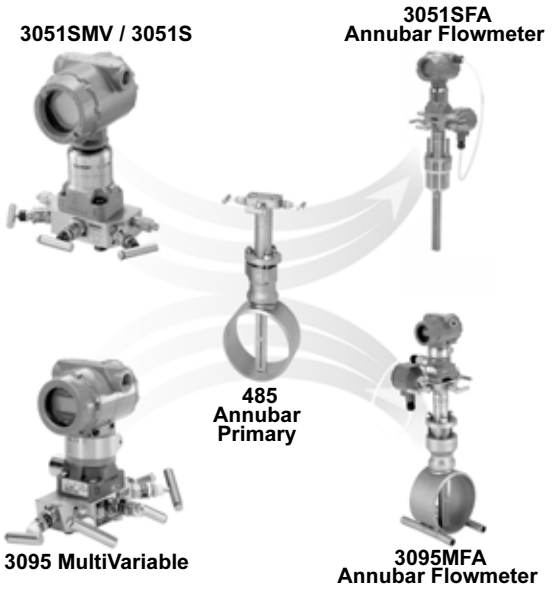
Plant uptime is increased with the maintenance-free design

The Annubar sensor is designed to prevent wear and blockage in the pipe. The electronics are the most stable in the industry and allows up to 10 year calibration cycles, providing significant maintenance savings.

Energy savings gained through minimal permanent pressure loss

The non-constricting design of the Annubar sensor creates minimal blockage in the pipe, which reduces permanent pressure loss. Permanent pressure loss can be converted directly into energy savings in the form of compressor cost for gas, electrical cost for pumping liquids, and fuel costs for generating steam.

Rosemount pressure transmitters combined with the Rosemount 485 Annubar Primary create Best-in-Class Flowmeters



Advanced *PlantWeb*® Functionality

Rosemount Annubar flowmeters power *PlantWeb* through a scalable architecture, advanced diagnostics, and MultiVariable capabilities. This reduces operational and maintenance expenditures while improving throughput and utilities management.

Rosemount Pressure Solutions

Rosemount 3051S Series of Instrumentation
Highest performing scalable pressure, flow and level measurement solutions drive better plant efficiency and more productivity. Innovative features include wireless, advanced diagnostics, and multivariable technologies.

Rosemount 3095 Mass Flow Transmitter
Accurately measures differential pressure, static pressure and process temperature to dynamically calculate fully compensated mass flow.

Rosemount 305, 306 and 304 Manifolds
Factory-assembled, calibrated and seal-tested transmitter-to-manifold assemblies reduce installation costs.

Rosemount 1199 Diaphragm Seals
Provides reliable, remote measurements of process pressure and protects the transmitter from hot, corrosive, or viscous fluids.

Orifice Plate Primary Element Systems: Rosemount 1495 and 1595 Orifice Plates, 1496 Flange Unions and 1497 Meter Sections
A comprehensive offering of orifice plates, flange unions and meter sections that are easy to specify and order. The 1595 Conditioning Orifice provides superior performance in tight fit applications.

Rosemount 3051SFA Annubar Flowmeters, Rosemount 3095MFA Annubar Flowmeters, and Rosemount 485 Annubar Flowmeter Series
The state-of-the-art, fifth generation Rosemount 485 Annubar combined with the Rosemount MultiVariable transmitter technology creates an accurate, repeatable and dependable insertion-type flowmeter.

Rosemount 3051SFC Compact Orifice Flowmeters, Rosemount 3095MFC Compact Orifice Flowmeters, and Rosemount 405 Compact Orifice Flowmeter Series
Compact Orifice Flowmeters can be installed between existing flanges, up to a Class 600 (PN100) rating. A conditioning orifice plate version offers installation in tight fit applications requiring only two diameters of straight run upstream after a flow disturbance.

Rosemount 3051SFP Integral Orifice Flowmeters, Rosemount 3095MFP Integral Orifice Flowmeters, and Rosemount 1195 Integral Orifice Flowmeter Series
These integral orifice flowmeters eliminate the inaccuracies that become more pronounced in small orifice line installations. The completely assembled, ready to install flowmeters reduce cost and simplify installation.

Annubar Flowmeter Series Selection Guide

Rosemount 3051SFA Annubar Flowmeter

See ordering information on page 25.

- Combines the Rosemount 3051S scalable pressure transmitter with the Rosemount 485 Annubar Primary Element
- Utilize the 3051S MultiVarable pressure transmitter for differential pressure, static pressure and process temperature measurement combinations
- Accuracy up to ±0.80% of flow rate
- Provides superior calculations including fully compensated mass, energy, and totalized flow
- Remote display and interface assembly enables direct mounting with “at-grade” operator interface
- *FOUNDATION*® fieldbus protocol available

Rosemount 3051SFA Annubar Flowmeter

Rosemount 3095MFA Annubar Flowmeter

See ordering information on page 45.

- Combines the Rosemount 3095 MultiVariable mass flow transmitter with the Rosemount 485 Annubar Primary
- Accuracy up to 0.90% of mass flow rate
- Measures differential pressure, static pressure, and process temperature with a single pipe penetration
- Dynamically calculates compensated mass flow
- *FOUNDATION* fieldbus protocol available

Rosemount 3095MFA Annubar Flowmeter

Rosemount 485 Annubar Primary

See ordering information on page 60.

- Innovative slot and T-shape design increases accuracy to ±0.75%
- Wide variety of mounting configurations
- Integral manifold head allows direct mounting of DP transmitters
- Flo-Tap design allows installation without system shutdown

Rosemount 485 Annubar Primary

Rosemount 3051SFA Annubar Flowmeter

SPECIFICATIONS

Performance

Fully-Compensated Mass, Energy, and Actual Volumetric Flow Accuracy

Flow performance specifications assume device is configured for full compensation of static pressure, process temperature, density, viscosity, gas expansion, discharge coefficient, and thermal correction variances over a specified operating range.

Percent (%) of flow rate

Classic MV(1) (8:1 flow turndown)	Ultra for Flow (14:1 flow turndown)
±0.85%	±0.80%

(1) For a Range 1 DP sensor, add 0.20% uncertainty.

Uncompensated Flow Accuracy

Percentage (%) of flow rate

Classic (8:1 flow turndown)	Ultra (8:1 flow turndown)	Ultra for Flow (14:1 flow turndown)
±1.10%	±0.90%	±0.80%

Repeatability

±0.1%

Line Sizes

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

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

TABLE 1. Reynolds Number and Probe Width

Sensor Size	Minimum Rod Reynolds Number (R_d)	Probe Width ($_d$)
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 (lb_m/ft^3)
μ = Viscosity of the fluid (lb_m/ft-sec)

Performance Statement Assumptions

- Measured pipe I.D
- Transmitter is trimmed for optimum flow accuracy

Sizing

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

Annubar Sensor Surface Finish

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

Functional

Service

- Liquid
- Gas
- Steam

4–20 mA/HART®

Zero and Span Adjustment

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

Output

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

Power Supply

External power supply required.

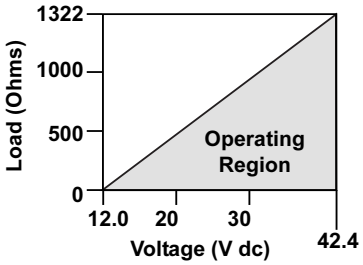
- 3051SFA with Measurement Type D (4–20 mA): 10.5 to 42.4 V dc with no load
- 3051SFA with Measurement Types 1-7: 12 to 42.4 V dc with no load
- 3051SFA HART Diagnostics transmitter: 12 to 42.4 Vdc with no load

Load Limitations

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

3051SFA with Measurement Types 1-7
3051S HART Diagnostics Transmitter (option code DA1)

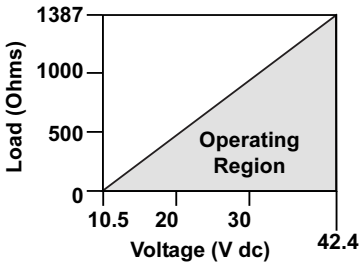
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 12.0)



The HART communicator requires a minimum loop resistance of 250Ω for communication.

3051SFA with Measurement Type D

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



The HART communicator requires a minimum loop resistance of 250Ω for communication.

ASP™ Diagnostics Suite for HART
(3051SFA with Measurement Type D and option DA1)

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

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

FOUNDATION fieldbus

Power Supply

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

Current Draw

17.5 mA for all configurations (including LCD display option)

FOUNDATION fieldbus Parameters

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

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

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

LCD Block

- Configures the local display.

2 Analog Input Blocks

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

PID Block with Auto-tune

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

Backup Link Active Scheduler (LAS)

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

Software Upgrade in the Field

Software for the 3051S 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 Bock

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

Output Splitter Block

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

Control Selector Block

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

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

Fully Compensated Mass Flow Block (Option Code H01)

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

ASP™ Diagnostics Suite for FOUNDATION fieldbus (Option Code D01)

3051S FOUNDATION fieldbus Diagnostics provide Abnormal Situation Prevention (ASP) indication and enhanced EDDL graphic displays for easy visual analysis.

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

Wireless Self-Organizing Networks (3051SFA with Measurement Type D only)

Output

WirelessHART, 2.4 GHz DSSS.
Wireless, 2.4 GHz DSSS or 900 MHz FHSS.

Local Display (WirelessHART only)

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

Local Display

The optional five-digit LCD can display primary variable in engineering units. Display updates at update rate up to once per minute.

Update Rate

WirelessHART, user selectable 8 sec. to 60 min.
Wireless, user selectable 15 sec. to 60 min.

Power Module (WirelessHART only)

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

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

Power Module

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

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)

Remote Mount Transmitter

- 1250 °F (677 °C) – Alloy C-276 Sensor Material
- 850 °F (454 °C) – Stainless Steel Sensor Material

Transmitter Temperature Limits

Ambient

- –40 to 185 °F (–40 to 85 °C)
- With Integral Display(1): –40 to 175 °F (–40 to 80 °C)

Storage

- –50 to 230 °F (–46 to 110 °C)
- With Integral Display: –40 to 185 °F (–40 to 85 °C)
- With wireless output (code X): –40 to 185 °F (–40 to 85 °C)

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

Pressure Limits(1)

Direct Mount Transmitter

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

Static Pressure Limits

3051SFA with Measurement Types 3, 4, 7, and D

Operates within specifications between static line pressures of 0.5 psia and 3626 psig;

4500 psig (310,3 bar) for option code P9

6092 psig (420 bar) for option code P0 (Classic only)
Range 1: 0.5 psia to 2000 psig (0,03 to137,90 bar)

3051SFA with Measurement Types 1, 2, 5, and 6

Operates within 0.5 psia (0,03 bar) and the values in the table below:

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

Burst Pressure Limits

Coplanar or traditional process flange

- 10000 psig (689,5 bar).

Overpressure Limits

Transmitters withstand the following limits without damage:

3051SFA with Measurement Types 3, 4, 7, and D

Range 1: 2000 psig (137,9 bar)
Ranges 2–3: 3626 psig (250,0 bar)

3051SFA with Measurement Types 1, 2, 5, and 6

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

Flowmeter Overpressure Limits(1)

Standard(1)	Type	Stainless Steel Rating
ANSI/ASME	Class 150	275 (19)
ANSI/ASME	Class 300	720 (50)
ANSI/ASME	Class 600	1440 (99)
At 100 °F (38 °C), the rating decreases with increasing temperature.		
DIN	PN 10/40	580 (40)
DIN	PN 10/16	232 (16)
DIN	PN 25/40	580 (40)
At 248 °F (120 °C), the rating decreases with increasing temperature.		

(1) Carbon Steel and Stainless Steel Ratings are measured in psig (bar).

Humidity Limits

0–100% relative humidity

Turn-On Time

Performance within specifications less than 5 seconds for 3051SFA with Measurement Types 1-7 and 2 seconds for 3051SFA with Measurement Type D (typical) after power is applied to the transmitter.

Damping

Analog output response to a step change is user-selectable from 0 to 60 seconds for one time constant. For 3051SFA with measurement types 1-7, differential pressure (DP), static pressure (AP/GP), process temperature (PT), Mass Flow, and Energy Flow can be individually adjusted. This software damping is in addition to sensor module response time.

Failure Mode Alarm

HART 4-20mA (output option codes A and B)

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 Table 2).

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

TABLE 2. 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	3.6 - 3.8 mA

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

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

3051S Safety-Certified Transmitter Failure Values (3051SFA with Measurement Type D Only)

Safety accuracy: 2.0%(1)

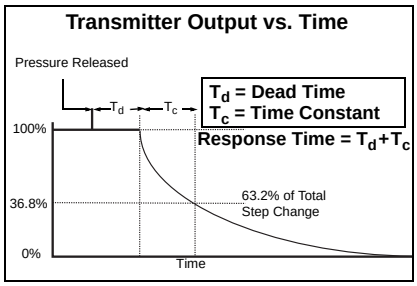
Safety response time: 1.5 seconds

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

(1) Static pressure selection may effect pressure limitations.

Dynamic Performance(1)

	4 - 20 mA (HART)(2)	Fieldbus protocol(3)(4)	Typical Transmitter Response Time
Total Response Time (Td + Tc)(5)			
3051SFA with Measurement			
Types 1-7:			
DP Range 1:	310 milliseconds		
DP Range 2:	170 milliseconds		
DP Range 3:	155 milliseconds		
AP & GP:	240 milliseconds		
Type D(6):			
DP Ranges 2-3:	100 milliseconds	152 milliseconds	
DP Range 1:	255 milliseconds	307 milliseconds	
Dead Time (Td)			
3051SFA with Measurement			
Types 1-7:			
DP:	100 milliseconds		
AP & GP:	140 milliseconds		
Type D(7):			
DP:	45 milliseconds (nominal)	97 milliseconds	
Types 1, 3, 5, and 7 only:			
Process Temp RTD Interface:	1 second		
Update Rate			
3051SFA with Measurement			
Types 1-7:			
DP:	22 times per second		
Type D:			
DP:	22 times per second	22 times per second	
Types 1, 2, 5, and 6 only:			
AP & GP:	11 times per second		
Types 1, 3, 5, and 7 only:			
Process Temp RTD Interface:	1 time per second		
Types 1-4 Calculated Variables:			
Mass or Volumetric Flow Rate:	22 times per second		
Energy Flow Rate:	22 times per second		
Totalized Flow:	1 time per second		



(1) Does not apply to wireless output code X. See "Wireless Self-Organizing Networks" on page 6 for wireless transmit rate.

(2) Dead time and update rate apply to all models and ranges; analog output only

(3) Transmitter fieldbus output only, segment macro-cycle not included.

(4) FOUNDATION fieldbus not applicable with 3051SFA with Measurement Types 1-7.

(5) Nominal total response time at 75 °F (24 °C) reference conditions.

(6) For option code DA1, add 45 milliseconds (nominal) to 4-20 mA (HART) total response time values.

(7) For option code DA1, dead time (Td) is 90 milliseconds (nominal).

Physical

Temperature Measurement

Integral RTD

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

Remote RTD

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

Thermowell with Remote RTD

- 1/2-in. x 1/2-in NPT, 316 Stainless Steel with 1/2-in. weld couplet to match pipe material

Housing Connections

1/2–14 NPT, G1/2, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 Stainless Steel
- Alloy C-276

Annubar Type

See “Dimensional Drawings” on page 19.

Pak-Lok Model (option P)

- Provided with a compression sealing mechanism rated up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Graphite Packing (–300 to 850 °F (–184 to 454 °C))

Flanged with Opposite Side Support Model (option F)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material
- Flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Alloy C-276: (–300 to 1250 °F (–184 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)
- –300 to 850 °F (–184 to 454 °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: –300 to 850 °F (–184 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
  - Ball valves have a 300# limitation
  - For threaded flo-tap models, the isolation valve NPT size is 1 1/4-in. (Sensor Size one) and 2-in. (Sensor Size 2).

Annubar Type Specification Chart

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

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

(2) Remote mount only.

Instrument Connections Temperature Ranges

TABLE 3. Minimum / Maximum Temperature Range

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

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
- Consult the factory for remote temperature measurement and ANSI ratings above 600# and DIN flanges
- Available in carbon steel (A105) and stainless steel

TABLE 4. Flanged Pipe Spool Section Schedule

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

TABLE 5. Flange Pipe Spool Section Length

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

Process-Wetted Parts

Process Isolating Diaphragms

316L SST (UNS S31603)
Alloy C-276 (UNS N10276)

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

Wetted O-rings

Glass-filled PTFE
(Graphite-filled PTFE with Isolating Diaphragm code 6)

Non-Wetted Parts

Electronics Housing

Low-copper aluminum alloy or SST: CF-3M (Cast 316L SST) 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

Coplanar Sensor Module Housing

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

Sensor Module Fill Fluid

Silicone or inert halocarbon (Inert is not available with 3051S_CA). In-Line series uses Fluorinert® FC-43.

Remote Mounting Brackets

SST

Sensor mounting (including nuts, bolts, and gasket)

Match Process Pipe material

Bolts

CS

Paint

Polyurethane

Cover O-rings

Buna-N

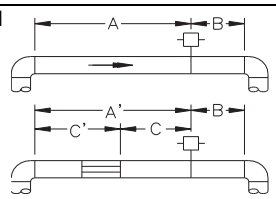
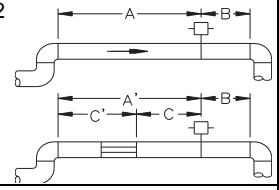
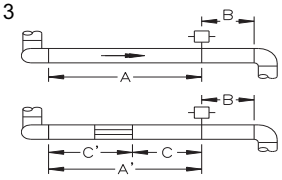
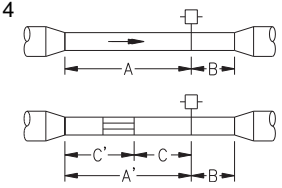
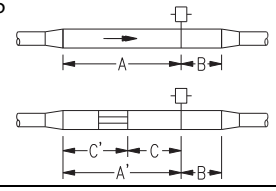
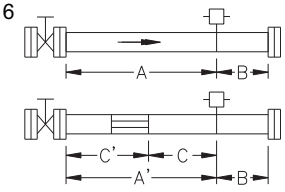
Wireless Antenna

PBT/ polycarbonate (PC) integrated omnidirectional antenna

Power Module

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

Straight Run Requirements[1]

	In Plane	Out of Plane	Upstream Dimensions (Pipe Diameters)					Downstream
			Without Vanes[2]		With Vanes[3]			
			In Plane A	Out of Plane A	A'	C	C'	B
1			8	10	—	—	—	4
			—	—	8	4	4	4
2			11	16	—	—	—	4
			—	—	8	4	4	4
3			23	28	—	—	—	4
			—	—	8	4	4	4
4			12	12	—	—	—	4
			—	—	8	4	4	4
5			18	18	—	—	—	4
			—	—	8	4	4	4
6			30	30	—	—	—	4
			—	—	8	4	4	4

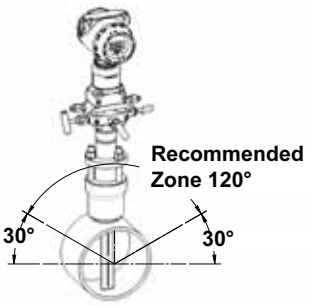
(1) Consult the factory for instructions regarding use in square or rectangular ducts.

(2) "In Plane A" means the bar is in the same plane as the elbow. "Out of Plane A" means the bar is perpendicular to the plane of the upstream elbow.

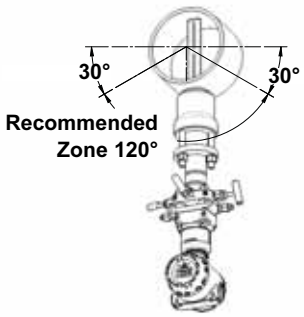
(3) Use straightening vane to reduce the required straight run length.

Flowmeter Orientation (Recommended)

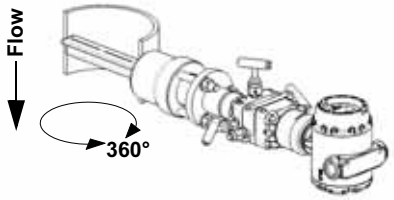
Gas (Horizontal)



Liquid and Steam (Horizontal)

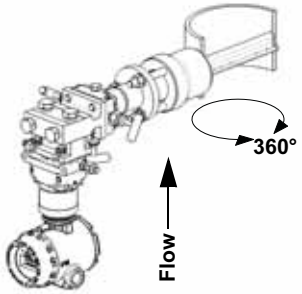


Gas (Vertical)



Note: Can also be mounted for Gas Vertical up applications.

Steam (Vertical)



Drill Hole Size According to Sensor Size

Sensor Size	Diameter
1	3/4-in. (19 mm)
2	1 5/16-in. (34 mm)
3	2 1/2-in. (64 mm)

Rosemount 3051SFA with Measurement Types 1-7 Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

Ordinary Location Certification for FM

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

European Directive Information

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

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

Models with Differential Pressure Ranges = 2 to 5 inclusive with Static Pressure = Range 4 only. P9 and P0 options also.
All other Model 3051SMV Pressure Transmitters
— Sound Engineering Practice

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

Primary Elements, Flowmeter
— See appropriate Primary Element QIG

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

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

Hazardous Locations Certifications

North American Certifications

FM Approvals

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

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

Canadian Standards Association (CSA)

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

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, CSA Enclosure Type 4X; conduit seal not required.

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

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: 08ATEX0064X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART
CE 1180

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART
I_i = 300 mA	HART
P_i = 1.0 W	HART
C_i = 14.8 nF	HART
L_i = 0	HART

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500V test as defined in Clause 6.3.12 of EN 60079-11. This must be considered during installation.

N1 ATEX Type n
Certificate No.: Baseefa 08ATEX0065X ⟨Ex⟩ II 3 G
Ex nA nL IIC T4 (T_a = -40 °C TO 70 °C)
Ui = 45 Vdc max
IP66
CE

Special conditions for safe use (x)

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

ND ATEX Dust
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1 D
T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 volts max
A = 24 mA
IP66
CE 1180

Special conditions for safe use (x)

1. The user must ensure that the maximum rated voltage and current (42.4 volts, 22 milliampere, DC) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category “ib” circuit according to EN 60079-11.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
5. The 3051SMV must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051SMV SuperModule must be properly assembled to the 3051SMV housing to maintain ingress protection.)

E1 ATEX Flameproof
Certificate No.: KEMA 00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V
CE 1180

Special conditions for safe use (x)

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

Japanese Certifications

E4 TIIS Flameproof
Consult factory for availability

I4 TIIS Intrinsically Safe
Consult factory for availability

China (NEPSI) Certifications

E3 China Flameproof
Ex d II B+H_2T3~T5

I3 China Intrinsic Safety
Ex ia IIC T3/T4

IECEx Certifications

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

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART
I_i = 300 mA	HART
P_i = 1.0 W	HART
C_i = 14.8 nF	HART
L_i = 0	HART

Special conditions for safe use (x)

The 3051SMV HART 4-20mA is not capable of withstanding the 500V test as defined in clause 6.3.12 of IEC 60079-11. This must be taken into account during installation.

N7 IECEx Type n
Certificate No.: IECExBAS08.0026X
Ex nAnL IIC T4 (Ta = -40 °C to 70 °C)
Ui = 45 Vdc MAX
IP66

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of IEC 60079-15.

E7 IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V

Special conditions for safe use (x)

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

Combinations of Certifications

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

K1 Combination of E1, I1, N1, and ND
K2 Combination of E2 and I2
K4 Combination of E4 and I4
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, E6, I1, and I6
KB Combination of E5, E6, I5, and I6
KC Combination of E5, E1, I5 and I1
KD Combination of E5, E6, E1, I5, I6, and I1

Rosemount 3051SFA with Measurement Type D Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

Emerson Process Management LTDA — Sorocaba, Brazil

Emerson Process Management (India) Pvt. Ltd. — Daman, India

Ordinary Location Certification for FM

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

European Directive Information

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

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; *(also with P9 option)* Pressure Transmitters — QS Certificate of Assessment - EC No. PED-H-100, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

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

Primary Elements, Flowmeter — See appropriate Primary Element QIG

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

EN 61326-1:1997 + A1, A2, and A3 – Industrial

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

Emerson Process Management complies with the R&TTE Directive.

HART & FOUNDATION Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

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

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

Canadian Standards Association (CSA)

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

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

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

European Certifications

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

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform / Quick Connect
C_i = 11.4 nF	HART / HART Diagnostics
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display

Special conditions for safe use (x)

1. The apparatus, excluding the Types 3051 S-T and 3051 S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of EN 50020. This must be considered during installation.
2. The terminal pins of the Types 3051 S-T and 3051 S-C must be protected to IP20 minimum.

N1 ATEX Type n
Certificate No.: BAS01ATEX3304X ⟨Ex⟩ II 3 G
EEx nAnL IIC T4 (T_a = -40 °C TO 70 °C)
Ui = 45 Vdc max
IP66
CE

Special conditions for safe use (x)

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

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 volts max
A = 22 mA
IP66
CE 1180

Special conditions for safe use (x)

1. The user must ensure that the maximum rated voltage and current (42.4 volts, 22 milliampere, DC) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category “ib” circuit according to EN 50020.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
5. The 3051S must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

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

Special conditions for safe use (x)

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

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6

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

China (NEPSI) Certifications

I3 China Intrinsic Safety
Certificate No. (manufactured in Chanhassen, MN): GYJ081078
Certificate No. (manufactured in Singapore): GYJ06367
Ex ia IIC T3~T5

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform / Quick Connect
C_i = 11.4 nF	HART / HART Diagnostics
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display

E3 China Flameproof
Certificate No.: GYJ06366
Ex d IIB+H_2 T3~T5

IECEx Certifications

E7 IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V

Special conditions for safe use (x)

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

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

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform / Quick Connect
C_i = 11.4 nF	HART / HART Diagnostics
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO / Quick Connect / HART Diagnostics
L_i = 0	HART / FOUNDATION fieldbus / FISCO / Quick Connect / HART Diagnostics
L_i = 60 µ H	Remote Display

Special conditions for safe use (x)

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

N7 IECEx Type n
Certificate No.: IECExBAS04.0018X
Ex nC IIC T4 (T_a = -40 °C to 70 °C)
Ui = 45 Vdc MAX
IP66
Special conditions for safe use (x)
The apparatus is not capable of withstanding the 500 V insulation test required by Clause 8 of IEC 60079-15.

Combinations of Certifications

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

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

Rosemount 3051SFA Wireless Certifications

Approved Manufacturing Locations

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

Telecommunication Compliance

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

FCC and IC Approvals

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

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

Ordinary Location Certification for FM

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

European Directive Information

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

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; *(also with P9 option)*
Pressure Transmitters — QS Certificate of Assessment - EC No. PED-H-100, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters
— Sound Engineering Practice

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

Primary Elements, Flowmeter
— See appropriate Primary Element QIG

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

EN 61326-1:1997 A1, A2, A3(1)
EN 61326-1:2006
EN 61326-2-3:2006

(1) Only applies to "Operating Frequency and Protocol" option code 1.

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

Emerson Process Management complies with the R&TTE Directive.

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM) Approvals

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

CSA - Canadian Standards Association

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

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

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C)
IP66
For use with Rosemount SmartPower options
00753-9220-0001 only.
CE 1180

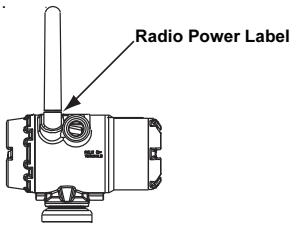
CE ⓘ

Country(1)	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10mW e.i.r.p.
Italy	If used outside of own premises, general authorization is required.
Norway	May be restricted in the geographical area within a radius of 20 km from the center of Ny-Alesund.
Romania	Use on a secondary basis. Individual license required.

(1) Only applies to "Operating Frequency and Protocol" option code 1.

Radio Power Label (See Figure 1) indicates output power configuration of the radio. Devices with this label are configured for output power less than 10 mW e.i.r.p. At time of purchase the customer must specify ultimate country of installation and operation.

Figure 1.

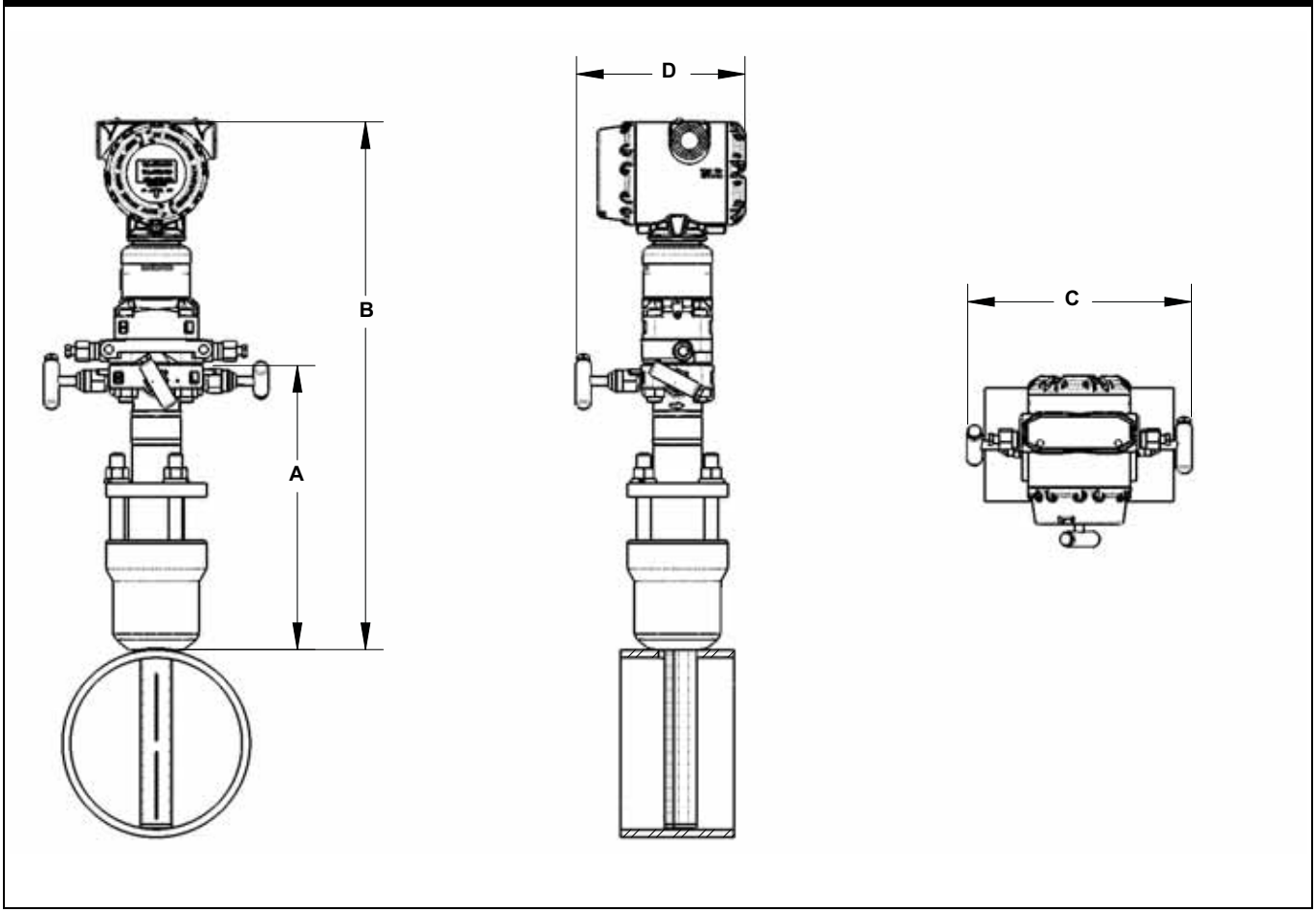


IECEx Certifications

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

DIMENSIONAL DRAWINGS

Pak-Lok Annubar Flowmeter(1)



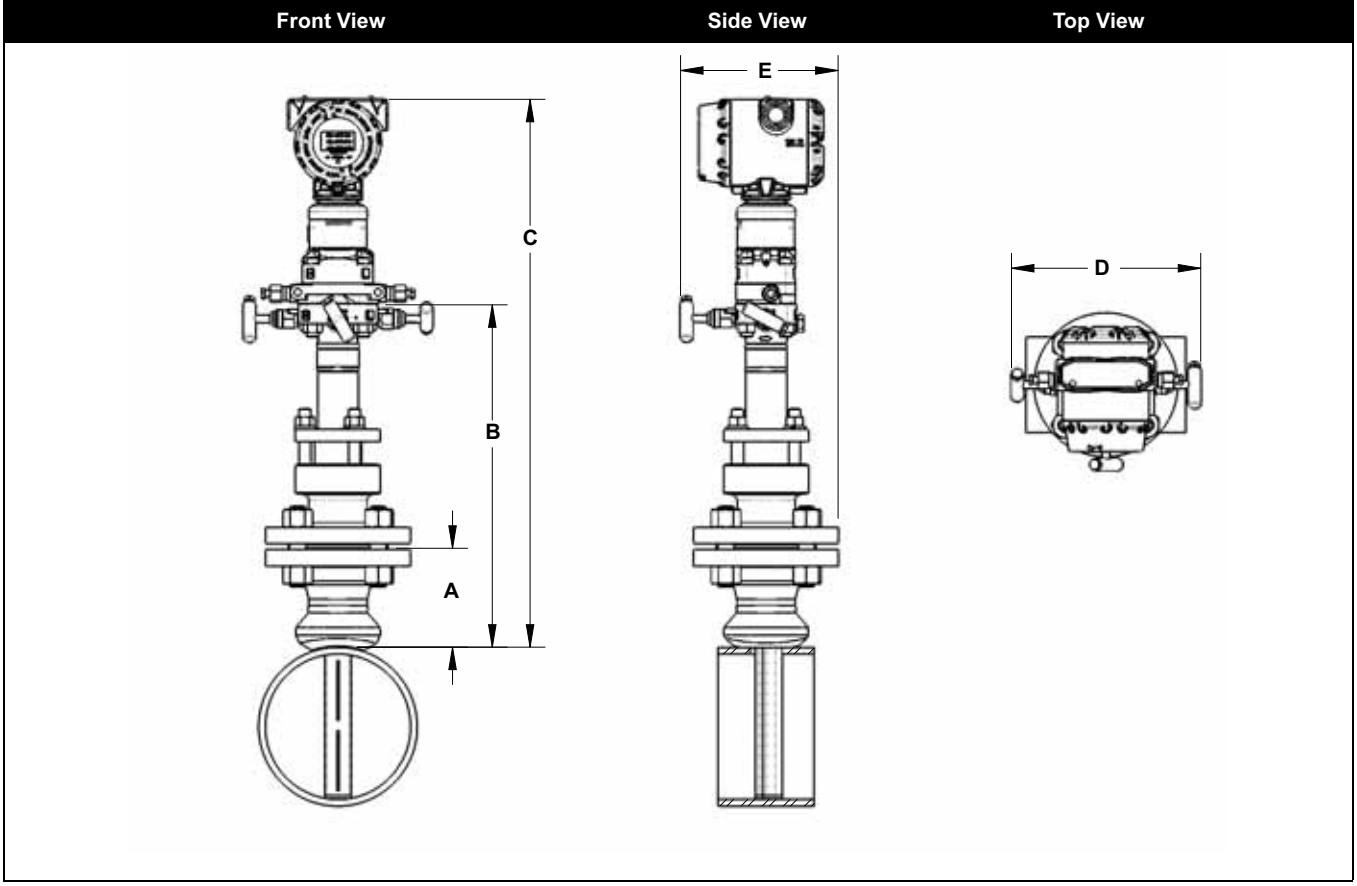
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

TABLE 6. Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	7.50 (190.5)	16.03 (407.2)	9.00 (228.6)	6.90 (175.3)
2	9.25 (235.0)	17.78 (451.6)	9.00 (228.6)	6.90 (175.3)
3	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	6.90 (175.3)

Dimensions are in inches (millimeters)

Flange-Lok Annubar Flowmeter(1)



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

TABLE 7. Flange-Lok Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	2 – 600#	4.76 (120.9)	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	3.51 (89.2)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN16	3.84 (97.5)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)

Dimensions are in inches (millimeters)

Flanged Annubar Flowmeter

Front View | Side View | Top View

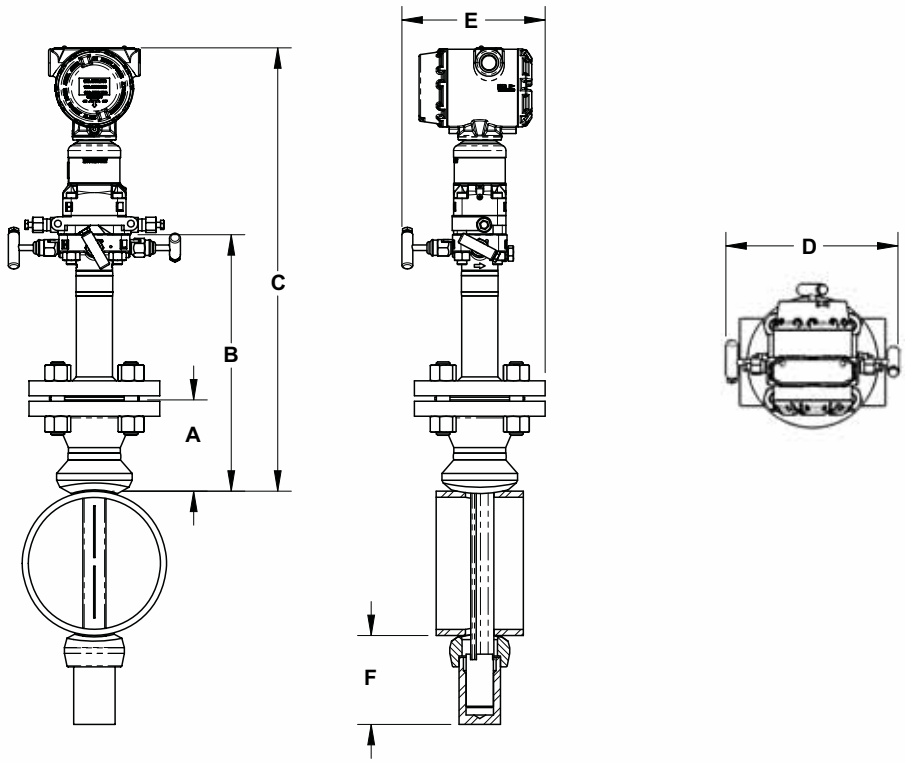


TABLE 8. Flanged Annubar Flowmeter Dimensional Data

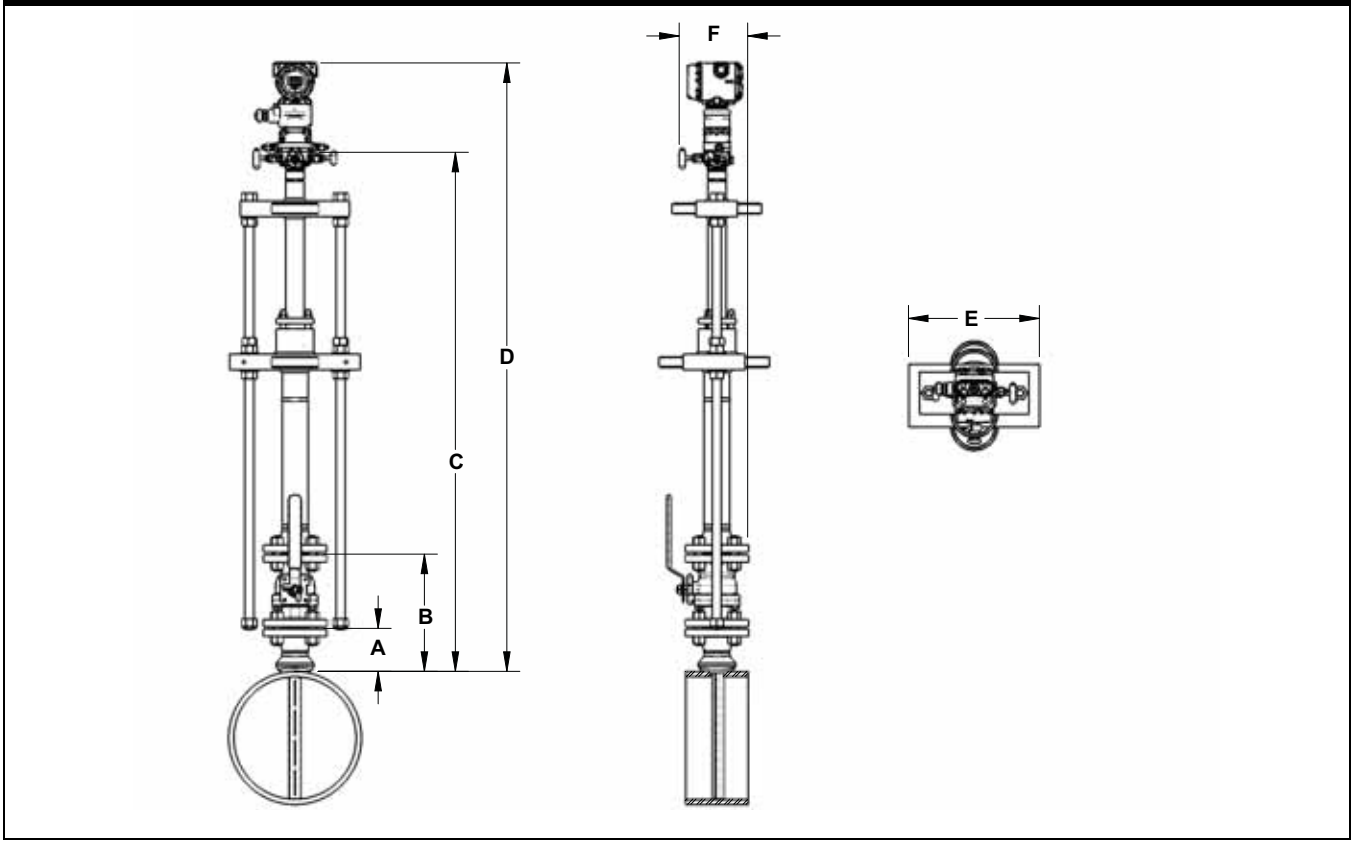
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	19.53 (496.1)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.64 (295.5)	—	—	—	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	6.80 (172.7)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 600#	4.76 (120.9)	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	3.51 (89.2)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.51 (266.8)	—	—	—	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.51 (266.8)	—	—	—	5.00 (127.0)
2	3 – 2500#	9.87 (250.7)	15.62 (396.7)	—	—	—	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.55 (191.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)

TABLE 8. 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)
			Table 8 Continued on Next Page				
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.84 (97.5)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.44 (341.3)	—	—	—	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	—	—	—	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.32 (439.8)	—	—	—	7.00 (177.8)

Dimensions are in inches (millimeters)

Flanged Flo-Tap Annubar Flowmeter(1)



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

TABLE 9. Flanged Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.5)	10.50 (266.7)	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN16	3.09 (78.5)	See Note.	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	See Note.	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN100	3.88 (98.6)	See Note.	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.6 (624.8)	21.4 (543.6)	C + 8.53 (216.7)	12.56 (319.0)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.6 (624.8)	21.4 (543.6)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	2 – 600#	4.76 (120.9)	16.38 (416.0)	24.6 (624.8)	21.4 (543.6)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN16	3.40 (86.4)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN40	3.51 (89.2)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN100	4.30 (109.2)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.5 (673.1)	23.3 (591.8)	C + 8.53 (216.7)	14.13 (358.9)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.5 (673.1)	23.3 (591.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	19.50 (495.4)	26.5 (673.1)	23.3 (591.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN16	3.84 (97.5)	See Note.	26.5 (673.1)	23.3 (591.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	See Note.	26.5 (673.1)	23.3 (591.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN100	4.95 (125.7)	See Note.	26.5 (673.1)	23.3 (591.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)

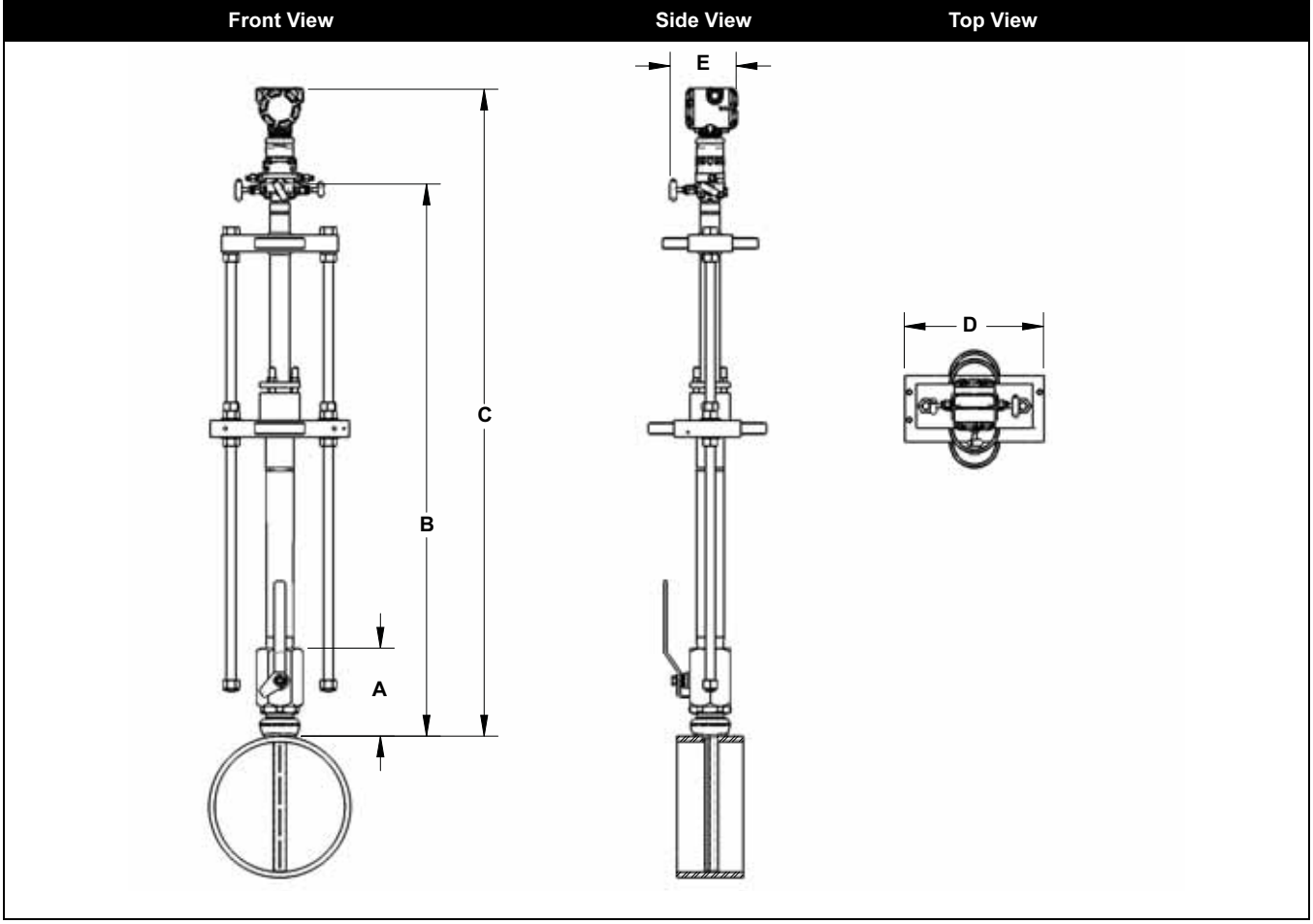
Dimensions are in inches (millimeters)

Note: Customer Supplied.

Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I

Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

Threaded Flo-Tap Annubar Flowmeter(1)



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

TABLE 10. Threaded Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	C (Max)	D (Max)	E (Max)
1	6.76 (171.8)	—	17.40 (442.0)	B + 8.53 (216.7)	10.50 (266.7)	6.90 (175.3)
2	8.17 (207.5)	23.70 (602.0)	20.80 (528.3)	B + 8.53 (216.7)	12.56 (319.0)	6.90 (175.3)

Sensor Size 3 is not available in a Threaded Flo-Tap.

Dimensions are in inches (millimeters)

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

ORDERING INFORMATION

Rosemount 3051SFA Annubar Flowmeter Ordering Information

Model	Product Description
3051SFA	Annubar Flowmeter
Code	**Measurement Type**
1	MultiVariable (Fully Compensated Flow) – Differential and Static Pressures with Temperature
2	MultiVariable (Compensated Flow) – Differential and Static Pressures
3	MultiVariable (Compensated Flow) – Differential Pressure and Temperature
4	MultiVariable (Compensated Flow) – Differential Pressure
5	MultiVariable (Direct Measurement) – Differential and Static Pressures with Temperature
6	MultiVariable (Direct Measurement) – Differential and Static Pressures
7	MultiVariable (Direct Measurement) – Differential Pressure and Temperature
D	Differential Pressure
Code	**Fluid Type**
L	Liquid
G	Gas
S	Steam

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

Code	Pipe I.D. Range (Refer to Table 11 on page 31)
A	Range A from the Pipe I.D. table
B	Range B from the Pipe I.D. table
C	Range C from the Pipe I.D. table
D	Range D 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
Code	**Pipe Material / Mounting Assembly Material**
C(1)	Carbon steel
S	316 Stainless Steel
G	Chrome-Moly Grade F-11
N	Chrome-Moly Grade F-22
J	Chrome-Moly Grade F-91
0(2)	No Mounting (Customer Supplied)
Code	**Piping Orientation**
H	Horizontal Piping
D	Vertical Piping with Downwards Flow
U	Vertical Piping with Upwards Flow
Code	**Annubar Type**
P	Pak-Lok
F	Flanged with opposite side support
L	Flange-Lok
G	Gear-Drive Flo-Tap
M	Manual Flo-Tap

Rosemount 3051SFA Annubar Flowmeter Ordering Information

Code	Sensor Material		
S	316 Stainless Steel		
H	Alloy C-276		
Code	**Sensor Size**		
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)		
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)		
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)		
Code	**Mounting Type**		
T1	Compression or Threaded Connection		
A1	150# RF ANSI		
A3	300# RF ANSI		
A6	600# RF ANSI		
A9(3)	900# RF ANSI		
AF(3)	1500# RF ANSI		
AT(3)	2500 # RF ANSI		
D1	DN PN16 Flange		
D3	DN PN40 Flange		
D6	DN PN100 Flange		
R1	150# RTJ Flange		
R3	300# RTJ Flange		
R6	600# RTJ Flange		
R9(3)	900# RTJ Flange		
RF(3)	1500# RTJ Flange		
RT(3)	2500# RTJ Flange		
Code	**Opposite Side Support and 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	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite
Code	**Isolation Valve for Flo-Tap Models**		
1	Gate Valve, Carbon Steel		
2	Gate Valve, Stainless Steel		
5	Ball Valve, Carbon Steel		
6	Ball Valve, Stainless Steel		
0(2)	Not Applicable or Customer Supplied		
Code	**Temperature Measurement**		
T(4)	Integral RTD – not available with Flanged model greater than class 600		
R(4)	Remote Thermowell and RTD		
0(5)	No Temperature Sensor		
Code	**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		
6	Direct-mount, high temperature 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.)		
Code	**Differential Pressure Ranges**		
1	0 to 25 in H_2O (0 to 62,2 mbar)		
2	0 to 250 in H_2O (0 to 623 mbar)		
3	0 to 1000 in H_2O (0 to 2,5 bar)		

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Code	Static Pressure Ranges		
A[6]	None		
D	Absolute 0.5 to 800 psia (0,033 to 55,2 bar)		
E[7]	Absolute 0.5 to 3626 psia (0,033 to 250 bar)		
J	Gage -14.2 to 800 psig (-0,979 to 55,2 bar)		
K[7]	Gage -14.2 to 3626 psig (-0,979 to 250 bar)		
Code	**Output Protocol**		
A	4–20 mA with digital signal based on HART protocol		
F[8][9]	FOUNDATION fieldbus protocol: AI block, Link Master, Input Selector Block (requires PlantWeb housing)		
X[9][10]	Wireless (Requires wireless options and wireless housing 5A)		
Code	**Transmitter Housing Style**	**Material[11]**	**Conduit Entry Size**
00	None (Customer-supplied electrical connection)		
01[9][12]	Assemble to Rosemount 753R Web-based Monitoring Indicator		
1A	PlantWeb Housing	Aluminum	1/2-14 NPT
1B	PlantWeb Housing	Aluminum	M20 x 1.5 (CM20)
1C	PlantWeb Housing	Aluminum	G1/2
1J	PlantWeb Housing	SST	1/2-14 NPT
1K	PlantWeb Housing	SST	M20 x 1.5 (CM20)
1L	PlantWeb Housing	SST	G1/2
2A[9]	Junction Box Housing	Aluminum	1/2-14 NPT
2B[9]	Junction Box Housing	Aluminum	M20 x 1.5 (CM20)
2C[9]	Junction Box Housing	Aluminum	G1/2
2E[9]	Junction Box housing with output for remote display and interface	Aluminum	1/2-14 NPT
2F[9]	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5 (CM20)
2G[9]	Junction Box housing with output for remote display and interface	Aluminum	G1/2
2J[9]	Junction Box Housing	SST	1/2-14 NPT
2M[9]	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT
5A[9]	Wireless PlantWeb housing	Aluminum	M20 x 1.5 (CM20)
7J[9][13]	Quick Connect (A size Mini, 4-pin male termination)		
Code	**Transmitter Performance Class**		
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6			
3	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability. limited 12-year warranty		
5	Classic MV: 0.85% flow rate accuracy, 8:1 flow turndown, 5-yr stability		
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D			
1[14]	Ultra: up to 0.9% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty		
2	Classic: up to 1.1% flow rate accuracy, 8:1 flow turndown, 5-year stability		
3[15]	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability. limited 12-year warranty		
Code	**Options**		
Pressure Testing			
P1[16]	Hydrostatic Testing with Certificate		
PX[16]	Extended Hydrostatic Testing		
Special Cleaning			
P2	Cleaning for Special Processes		
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		
Surface Finish			
RL	Surface finish for Low Pipe Reynolds Number in Gas and Steam		
RH	Surface finish for High Pipe Reynolds Number in Liquid		

Rosemount 3051SFA Annubar Flowmeter Ordering Information

Material Traceability Certification	
Q8[17]	Material Traceability Certificate per EN 10204:2004 3.1
Code Conformance	
J2[18]	ANSI B31.1
J3[18]	ANSI B31.3
J4[18]	ANSI B31.8
Material Conformance	
J5[19]	NACE MR-0175 / ISO 15156
Country Certification	
J1	Canadian Registration
J6	European Pressure Directive (PED)
Installed in Flanged Pipe Spool Section	
H3	150# Flanged Connection with Rosemount Standard Length and Schedule
H4	300# Flanged Connection with Rosemount Standard Length and Schedule
H5	600# Flanged Connection with Rosemount Standard Length and Schedule
Instrument Connections for Remote Mount Option	
G1	Needle Valves, Carbon Steel
G2	Needle Valves, Stainless Steel
G3	Needle Valves, Alloy C-276
G5	OS&Y Gate Valve, Carbon Steel
G6	OS&Y Gate Valve, Stainless Steel
G7	OS&Y Gate Valve, Alloy C-276
Special Shipment	
Y1	Mounting Hardware Shipped Separately
Special Dimensions	
VM	Variable Mounting
VT	Variable Tip
VS	Variable length Spool Section
V9	Special Dimension
Transmitter Calibration Certification	
Q4	Calibration Data Certificate for Transmitter
Safety Certification	
QS[9][20][21]	Certificate of FMEDA data
QT[9][22]	Safety certified to IEC 61508 with certificate of FMEDA data
Product Certifications	
E1	ATEX Flameproof
I1	ATEX Intrinsic Safety
IA[9]	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
I4[23]	TIIS Intrinsic Safety
K4[23]	TIIS Flameproof, Intrinsic Safety (combination of E4 and I4)
E5	FM Explosion-proof, Dust Ignition-proof
I5	FM Intrinsically Safe, Division 2
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2
I6	CSA Intrinsically Safe
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)
E7	IECEx Flameproof, Dust Ignition-proof
I7	IECEx Intrinsic Safety
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)
E3[24]	China Flameproof
I3[24]	China Intrinsic Safety
KA[25]	ATEX and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6) *Note: Only available on Housing Style codes 00, 1A, 1J, 2A, 2J, 2E, or 2M.*
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6) *Note: Only available on Housing Style codes 00, 1A, 1J, 2A, 2J, 2E, or 2M.*

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KC[25]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1) *Note: Only available on Housing Style codes 00, 1A, 1J, 2A, 2J, 2E, or 2M.*
KD[25]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1) *Note: Only available on Housing Style codes 00, 1A, 1J, 2A, 2J, 2E, or 2M.*
Alternate Transmitter Material of Construction	
L1	Inert Sensor Fill Fluid *Note: Silicone fill fluid is standard.*
L2	Graphite-Filled (PTFE) o-ring
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) o-ring
Digital Display[26]	
M5	PlantWeb LCD display (Requires PlantWeb housing)
M7[27][28]	Remote mount LCD display and interface, no cable; PlantWeb housing, SST bracket
M8[27][28][29]	Remote mount LCD display and interface, 50 ft. (15 m) cable; PlantWeb housing, SST bracket
M9[27][28][29]	Remote mount LCD display and interface, 100 ft. (31 m) cable; PlantWeb housing, SST bracket
Terminal Blocks	
T1[30]	Transient terminal block
T2[9][31]	Terminal block with WAGO® spring clamp terminals
T3[9][31]	Transient terminal block with WAGO spring clamp terminals
Manifold for Remote Mount Option	
F1	3-Valve Manifold, Carbon Steel
F2	3-Valve Manifold, Stainless Steel
F3	3-Valve Manifold, Alloy C-276
F5	5-Valve Manifold, Carbon Steel
F6	5-Valve Manifold, Stainless Steel
F7	5-Valve Manifold, Alloy C-276
PlantWeb Control Functionality	
A01[9][32]	FOUNDATION fieldbus Advanced Control Function Block Suite
PlantWeb Diagnostic Functionality	
D01[9][32]	FOUNDATION fieldbus Diagnostics Suite
DA1[9][33]	HART Diagnostic Suite
PlantWeb Enhanced Measurement Functionality	
H01[9][32][34]	Fully Compensated Mass Flow Block
Code	**Wireless Options - Select code from each wireless category (example: WA3WK1)**
Wireless Transmitter Rate	
WA	User Configurable Transmit Rate
Operating Frequency and Protocol	
3	2.4 GHz DSSS, WirelessHART™
Omnidirectional Wireless Antenna	
WK	Long Range, Integral Antenna
SmartPower™	
1	Long-life Power Module Adapter, Intrinsically Safe NOTE: Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.
Code	**Options**
Special Configuration (Software)	
C4[20][21]	NAMUR Alarm and Saturation Signal Levels, High Alarm
C5[20][21]	NAMUR Alarm and Saturation Signal Levels, Low Alarm
C6[20][21]	Custom Alarm and Saturation Signal Levels, High Alarm *Note: A Configuration Data Sheet (00806-0100-4809) must be completed.*
C7[20][21]	Custom Alarm and Saturation Signal Levels, Low Alarm *Note: A Configuration Data Sheet (00806-0100-4809) must be completed.*
C8[20][21]	Low Alarm (Standard Rosemount Alarm and Saturation Signal Levels)
Special Configuration (Hardware)	
D1[21][27]	Hardware Adjustment (zero, span, security)
D4	External Ground Screw
DA[21][27]	Hardware Adjustment (zero, span, security) and External Ground Screw

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Conduit Electrical Connector	
GE[35]	M12, 4-pin, Male Connector (*eurofast*®)
GM[35]	A size Mini, 4-pin, Male Connector (*minifast*®)
Cold Temperature	
BRR[23]	-60 °F (-51 °C) Cold Temperature Start-up

Typical Model Number: 3051SFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3

(1) Material specified is A105 carbon steel.

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

(3) Available in remote mount applications only.

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

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

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

(7) For Measurement Type 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) Only available with Measurement Type D.

(10) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1; only available with 2.4 GHz), and IECEx Intrinsic Safety (option code I7; only available with 2.4 GHz).

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

(12) Available with output code A only. Not available with approvals. See Rosemount 753R Product Data Sheet, 00813-0100-4379, to specify Web-Based Monitoring Indicator. Does not integrate into plant host systems.

(13) Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson Process Management representative for additional information.

(14) Not available with Wireless Operating Frequency and Protocol option codes 1 or 2.

(15) Not available with Wireless Operating Frequency and Protocol option codes 1 or 2 or Housing code 01. This option is only available with differential pressure ranges 2 and 3, and silicone fill fluid.

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

(17) Isolation and Instrument valves not included in Traceability Certification.

(18) Not available with Transmitter Connection Platform 6.

(19) 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.

(20) Not available with output code X.

(21) Not available with Output Protocol code F or Housing code 01.

(22) Not available with output code F or X. Not available with housing code 01 or 7J.

(23) Only available with Measurement Types 1-7.

(24) Consult an Emerson Process Management representative for availability.

(25) Not available with Temperature Measurement code T or R.

(26) Not available with Housing code 01 or 7J.

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

(28) Not available with output code F, Housing code 01, option code DA1, or option code QT.

(29) Cable supplied is Belden 3084A, rated for ambient temperatures up to 167°F (75°C).

(30) Not available with Housing code 00, 01, 5A, or 7J.

(31) Available with Output Protocol code A and Plantweb housing only.

(32) Requires PlantWeb housing and output code F.

(33) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard. Not available with option code QT.

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

(35) Not available with Housing code 00, 01, 5A, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Pipe I.D. Range Code–measured in inches (millimeters)

See “Rosemount 3051SFA Annubar Flowmeter Ordering Information” on page 25

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 HART Configuration Data Sheet (See document 00806-0100-4809). The Emerson process Management Sizing program will determine this code, based on the application piping.

TABLE 11. Pipe I.D. Range Code

	Line Size				Pipe Wall Thickness		I.D.
	Nominal	Max. O.D.	Option Code	Inner Diameter (I.D.) Range	ANSI Pipes	Non-ANSI Pipes	Range Code
	2-in. (50 mm)	2.625-in. (66.68 mm)	020	1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
	2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025	2.207 to 2.322-in. (56.06 to 58.98 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.448-in. (2.1 to 11.4 mm)	B
				2.323 to 2.469-in. (59.00 to 62.71 mm)		0.083 to 0.417-in. (2.1 to 10.6 mm)	C
				2.470 to 2.598-in. (62.74 to 65.99 mm)		0.083 to 0.435-in. (2.1 to 11.0 mm)	D
				2.599 to 2.647-in. (66.01 to 67.23 mm)		0.083 to 0.515-in. (2.1 to 13.1 mm)	E
	3-in. (80 mm)	3.75-in. (95.25 mm)	030	2.648 to 2.751-in. (67.26 to 69.88 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.460-in. (2.1 to 11.7 mm)	A
				2.752 to 2.899-in. (69.90 to 73.63 mm)		0.083 to 0.416-in. (2.1 to 10.6 mm)	B
				2.900 to 3.068-in. (73.66 to 77.93 mm)		0.083 to 0.395-in. (2.1 to 10.0 mm)	C
				3.069 to 3.228-in. (77.95 to 81.99 mm)		0.083 to 0.404-in (2.1 to 10.3 mm)	D
	3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035	3.229 to 3.333-in. (82.02 to 84.66 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.496-in. (3.0 to 12.6 mm)	B
				3.334 to 3.548-in. (84.68 to 90.12 mm)		0.120 to 0.386-in. (3.0 to 9.8 mm)	C
				3.549 to 3.734-in. (90.14 to 94.84 mm)		0.120 to 0.415-in. (3.0 to 10.5 mm)	D
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	B
				3.826 to 4.026-in. (97.18 to 102.26 mm)		0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.027 to 4.237-in. (102.29 to 107.62 mm)		0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.238 to 4.437-in. (107.65 to 112.70 mm)		0.120 to 0.401-in. (3.0 to 10.2 mm)	E
	5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.438 to 4.571-in. (112.73 to 116.10 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	A
				4.572 to 4.812-in. (116.13 to 122.22 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				4.813 to 5.047-in. (122.25 to 128.19 mm)		0.134 to 0.380-in. (3.4 to 9.7 mm)	C
				5.048 to 5.249-in. (128.22 to 133.32 mm)		0.134 to 0.413-in. (3.4 to 10.5 mm)	D
Sensor Size 1	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 138.99 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.3919-in. (3.4 to 9.9 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 0.327-in. (3.4 to 8.3 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 0.31-in. (3.4 to 7.9 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 0.297-in. (3.4 to 7.5 mm)	D
Sensor Size 2	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 139.99 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 1.067-in. (3.4 to 27.1 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 1.05-in. (3.4 to 26.7 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 1.037-in. (3.4 to 26.3 mm)	D
Sensor Size 1	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.216-in. (3.4 to 5.5 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.246-in. (3.4 to 6.2 mm)	D
Sensor Size 2	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.114-in. (3.4 to 28.3 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.956-in. (3.4 to 24.3 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.986-in. (3.4 to 25.0 mm)	D
Sensor Size 1	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
Sensor Size 2	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 1.052-in. (6.4 to 26.7 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
	10-in. (250 mm)	11.75-in. (298.45 mm)	100	8.767 to 9.172-in. (222.68 to 232.97 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.065-in. (6.4 to 27.1 mm)	A
				9.173 to 9.561-in. (232.99 to 242.85 mm)		0.250 to 1.082-in. (6.4 to 27.5 mm)	B
				9.562 to 10.020-in. (242.87 to 254.51 mm)		0.250 to 1.012-in. (6.4 to 25.7 mm)	C
				10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.945-in. (6.4 to 24.0 mm)	D
				10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 1.018-in. (6.4 to 25.9 mm)	E
	12-in. (300 mm)	13.0375-in. (331.15 mm)	120	11.000 to 11.373-in. (279.40 to 288.87 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.097-in. (6.4 to 27.9 mm)	B
				11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 0.906-in. (6.4 to 23.0 mm)	C
				11.939 to 12.250-in. (303.25 to 311.15 mm)		0.250 to 1.159-in. (6.4 to 29.4 mm)	D

Rosemount 3095MFA Annubar Flowmeter

SPECIFICATIONS

Performance

System Reference Accuracy
±0.90% (10:1 turndown) of mass flow rate accuracy

Repeatability
±0.1%

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

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

TABLE 12. 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)

Output
Two-wire 4–20 mA, user-selectable for DP, AP, GP, PT, mass flow, or totalized flow. Digital HART protocol superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol

Performance Statement Assumptions
- Measured pipe I.D.
- Electronics are trimmed for optimum flow accuracy.

Sizing
Contact a Emerson Process Management sales representative for assistance. A “Configuration Data Sheet” is required prior to order for application verification

Optional Performance Class Specification
Ultra for Flow (Code U3): up to 0.95% mass flow rate accuracy, 10:1 turndown, 10-year stability, limited 12-year warranty

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

Functional

Service
- Liquid
- Gas
- Steam

Power Supply
4–20 mA option
- External power supply required. Standard transmitter (4–20 mA) operates on 11 to 55 v dc with no load

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)

Remote Mount Transmitter
- 1250 °F (677 °C) – Alloy C-276 Sensor Material
- 850 °F (454 °C) – Stainless Steel Sensor Material

Transmitter Temperature Limits
Ambient
- –40 to 185 °F (–40 to 85 °C)
- With Integral Display: –4 to 175 °F (–20 to 80 °C)

Storage
- –50 to 230 °F (–46 to 110 °C)
- With Integral Display: –40 to 185 °F (–40 to 85 °C)

Pressure Limits(1)
Direct Mount Transmitter
- Up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Integral temperature measurement is not available with Flanged mounting type greater than class 600

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

(1) Static pressure selection may effect pressure limitations.

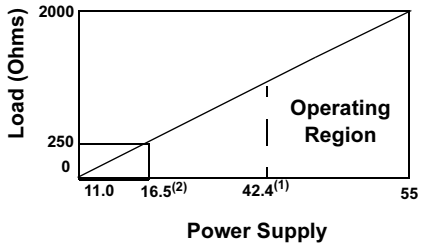
Overpressure Limits
0 to 2 times the absolute pressure range with a maximum of 3626 psia (250 bar).

Static Pressure Limits
- Operates within specification between static pressures of 0.5 psia (0.03 bar-A) and the URL of the static pressure sensor.

Load Limitations

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

$$\text{Maximum Loop Resistance} = \frac{\text{Power Supply} - 11.0}{0.022}$$



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

(2) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.

FOUNDATION fieldbus (output option code V)

Power Supply

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

Current Draw

17.5 mA for all configurations (including LCD display option).

Humidity Limits

- 0–100% relative humidity

Turn-On Time

Digital and analog measured variables will be within specification 7 – 10 seconds after power is applied to the transmitter.
Digital and analog flow output will be within specifications 10 – 14 seconds after power is applied to the transmitter.

Damping

Analog output response to a step input change is user-selectable from 0 to 29 seconds for one time constant. This software damping is in addition to sensor module response time

Failure Mode Alarm

Output Code A

If self-diagnostics detect a non-recoverable transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. High or low alarm signal is user-selectable by internal jumper pins.

Output Code V

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

Configuration

HART Hand-held Communicator (Model 275 or 375)

- Performs traditional transmitter maintenance functions

3095 Multivariable Engineering Assistant (EA) software package

- Contains built-in physical property database
- Enables mass flow configuration, maintenance, and diagnostic functions via HART modem (output option code A)
- Enables mass flow configuration via PCMCIA Interface for FOUNDATION fieldbus (output option code V)

Physical Properties Database

- Maintained in Engineering Assistant Software Configurator
- Physical properties for over 110 fluids
- Natural gas per AGA
- Steam and water per ASME
- Other database fluids per American Institute of Chemical Engineers (AIChE)
- Optional custom entry

FOUNDATION fieldbus Function Blocks

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

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

LCD Block

- Configures the local display.

5 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.

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 Bock

- 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.

Physical

Temperature Measurement

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

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

Thermowell
- 1/2-in. x 1/2-in NPT, 316 Stainless Steel with 1/2-in. Weld coupling material to match process pipe.

Housing Connections

1/2–14 NPT, G1/2, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 Stainless Steel
- Alloy C-276

Annubar Type

See “Dimensional Drawings” on page 39

Pak-Lok Model (option P)
- Provided with a compression sealing mechanism rated up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Graphite Packing (–300 to 850 °F (–184 to 454 °C))

Flanged with Opposite Side Support Model (option F)
- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material
- Flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Alloy C-276: (–300 to 1250 °F (–184 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)
- –300 to 850 °F (–184 to 454 °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: –300 to 850 °F (–184 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
  - Ball valves have a 300# limitation
  - For threaded flo-tap models, the isolation valve NPT size is 1 1/4-in. (Sensor Size one) and 2-in. (Sensor Size 2).

Process-Wetted Parts

Integral Manifolds
- 316 SST
- Alloy C-276

Remote Manifolds
- 316 SST
- Alloy C-276

Transmitter Vent Valves and Process Flanges
- 316 SST
- Alloy C-276
- Glass-filled PTFE O-rings

Process Isolation Diaphragms
- 316 SST
- Alloy C-276

Integral Manifold O-Rings
- PTFE/Graphite

Non-Wetted Parts

Sensor Module Fill Fluid
- Silicone oil
- Inert Fill optional

Cover O-rings
- Buna-N

Remote Mounting Brackets
- SST

Sensor Mounting (including nuts, bolts, and gasket)
- Match Process Pipe Material

Transmitter Housing
- Low copper aluminum, NEMA 4x, IP65
- SST (optional)

Paint
- Polyurethane

Bolts
- CS

Annubar Type Specification Chart

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

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

(2) Remote mount only.

Instrument Connections Temperature Ranges

TABLE 13. Minimum / Maximum Temperature Range

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

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

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

TABLE 14. Flanged Pipe Spool Section Schedule

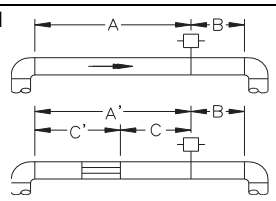
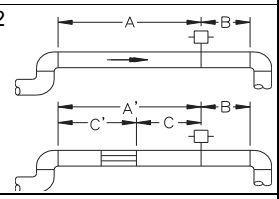
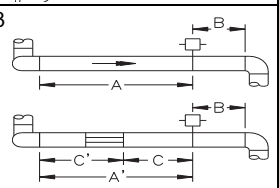
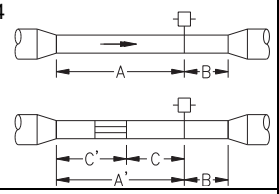
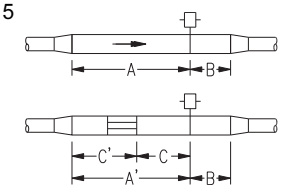
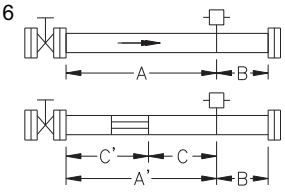
ANSI	Schedule
150# ANSI	40
300# ANSI	40
600# ANSI	80

TABLE 15. 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)

Installation Considerations.

Straight Run Requirements[1]

	In Plane	Out of Plane	Upstream Dimensions (Pipe Diameters)					Downstream
			Without Vanes[2]		With Vanes[3]			
			In Plane A	Out of Plane A	A'	C	C'	B
1			8	10	—	—	—	4
			—	—	8	4	4	4
2			11	16	—	—	—	4
			—	—	8	4	4	4
3			23	28	—	—	—	4
			—	—	8	4	4	4
4			12	12	—	—	—	4
			—	—	8	4	4	4
5			18	18	—	—	—	4
			—	—	8	4	4	4
6			30	30	—	—	—	4
			—	—	8	4	4	4

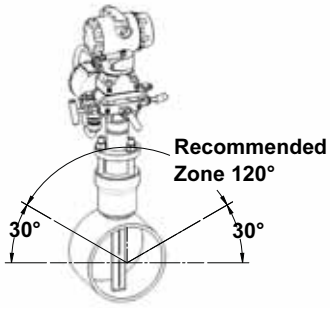
(1) Consult the factory for instructions regarding use in square or rectangular ducts.

(2) "In Plane A" means the bar is in the same plane as the elbow. "Out of Plane A" means the bar is perpendicular to the plane of the upstream elbow.

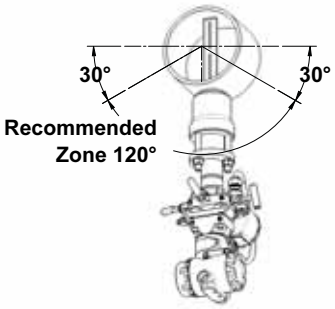
(3) Use straightening vane to reduce the required straight run length.

Flowmeter Orientation (Recommended)

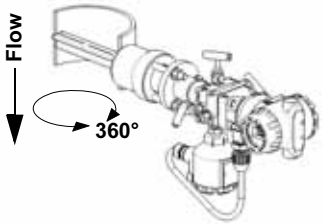
Gas (Horizontal)



Liquid and Steam (Horizontal)

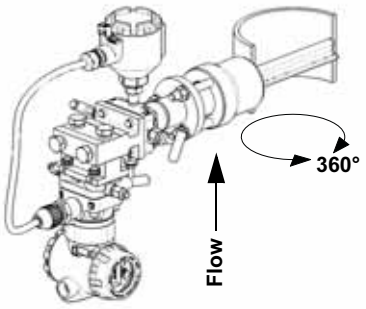


Gas (Vertical)



Note: Can also be mounted for Gas Vertical up applications.

Steam (Vertical)



Drill Hole Size According to Sensor Size

Sensor Size	Diameter
1	3/4-in. (19 mm)
2	1 5/16-in. (34 mm)
3	2 1/2-in. (64 mm)

PRODUCT CERTIFICATIONS

Rosemount 3095 with HART

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

3095M_2/3,4/D Flow Transmitters — QS Certificate of Assessment - EC No. PED-H-20
Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller — Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold — Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095MV Flow Transmitters

— EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1:1997 – Industrial

Ordinary Location Certification for Factory Mutual

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

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Canadian Standards Association (CSA)

E6 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A, B, C, and D.Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C.

For input parameters and installation see control drawing 03095-1021.

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: BAS98ATEX1359X ⟨Ex⟩ II 1 G
EEx ia IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx ia IIC T4 (T_{amb} = –45 °C to 70 °C)
CE 1180

TABLE 16. Connection Parameters (Power/Signal Terminals)

U_i = 30V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 0

TABLE 17. Temperature Sensor Connection Parameters

U_o = 30V
I_o = 19 mA
P_o = 140 mW
C_i = 0.002 µF
L_i = 0

TABLE 18. Temp Sensor Terminals Connection Parameters

C_o = 0.066 µF	Gas Group IIC
C_o = 0.560 µF	Gas Group IIB
C_o = 1.82 µF	Gas Group IIA
L_o = 96 mH	Gas Group IIC
L_o = 365 mH	Gas Group IIB
L_o = 696 mH	Gas Group IIA
L_o/R_o = 247 µH/ohm	Gas Group IIC
L_o/R_o = 633 µH/ohm	Gas Group IIB
L_o/R_o= 633 µH/ohm	Gas Group IIA

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 volts insulation test required by EN50 020, Clause 6.4.12 (1994). This condition must be accounted for during installation.

N1 ATEX Type N

Certificate Number: BAS98ATEX3360X ⟨Ex⟩ II 3 G

EEx nL IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx nL IIC T4 (T_{amb} = –45 °C to 70 °C)

U_i = 55V

CE

The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD)

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 volts insulation test required by EN50 021, Clause 9.1 (1995). This condition must be accounted for during installation.

E1 ATEX Flameproof
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50°C ≤ T_{amb} ≤ 80°C)
T6 (-50°C ≤ T_{amb} ≤ 65°C)
CE 1180

Special Conditions for Safe Use (x):

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.

ND ATEX Dust
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

Combinations of Certifications

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

K5 E5 and I5 combination

K6 E6 and I6 combination

K1 I1, N1, E1, and ND combination

Rosemount 3095 with *Fieldbus*

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

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

3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters

— QS Certificate of Assessment - EC No. PED-H-20 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller

— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold

— Sound Engineering Practice

Primary Elements, Flowmeter

— See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095 Flow Transmitters

— EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1:1997 – Industrial

Ordinary Location Certification for Factory Mutual

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

Rosemount 3095 Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

IE FISCO for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Combinations of Certifications

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

K5 E5 and I5 combination

Canadian Standards Association (CSA)

IF CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

European Certifications

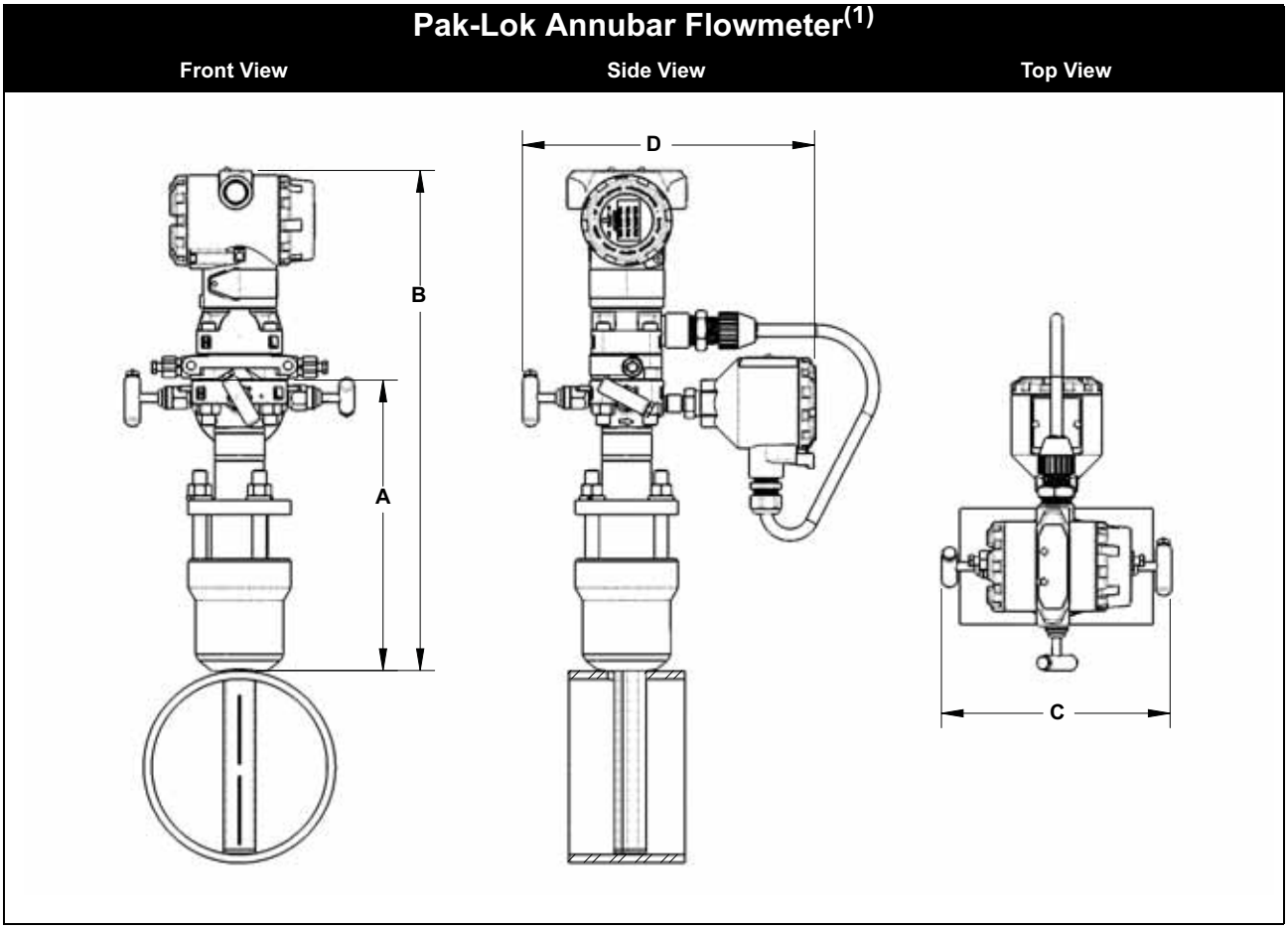
IA ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

Australian Certifications

IG IECEx FISCO Intrinsic Safety

DIMENSIONAL DRAWINGS

Pak-Lok Annubar Flowmeter(1)



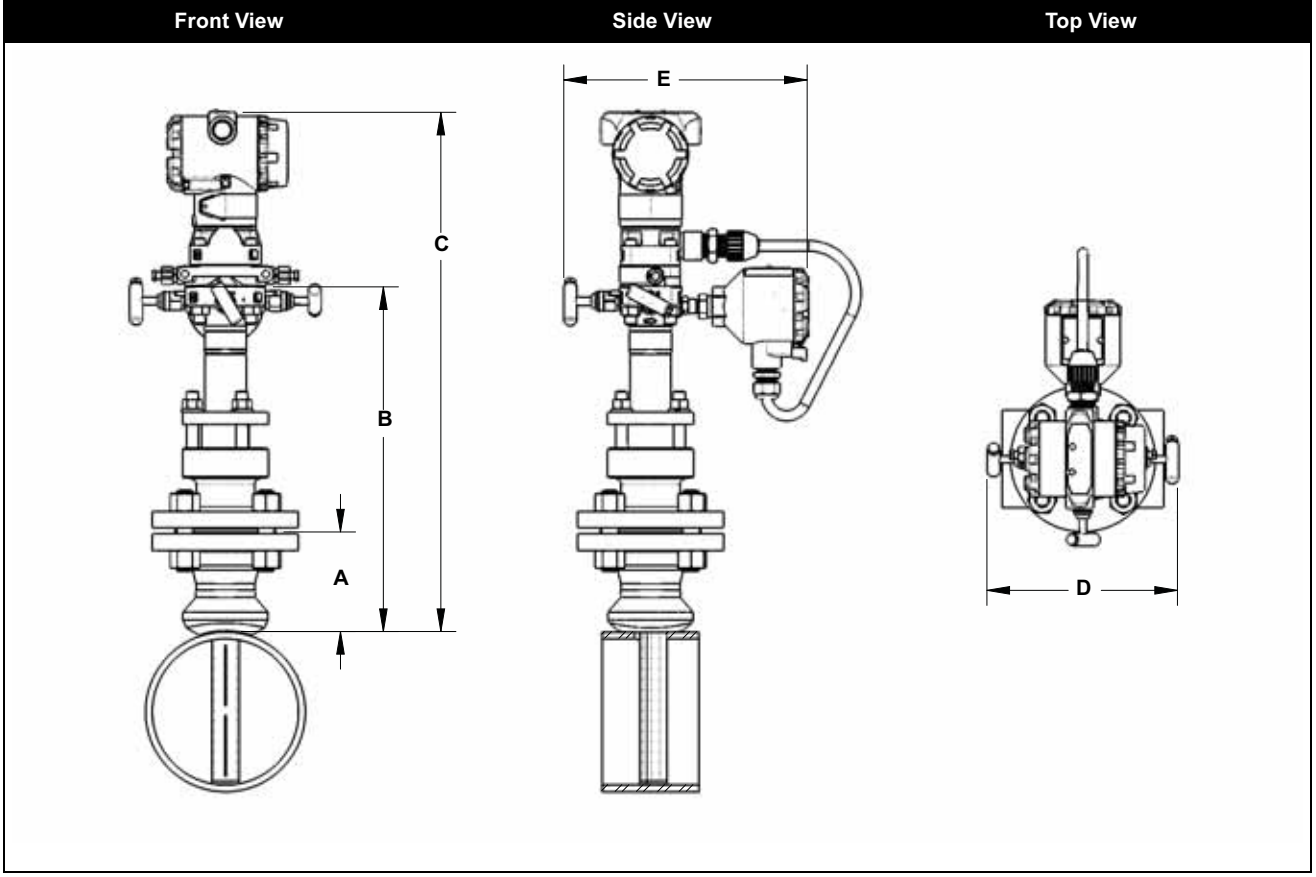
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

TABLE 19. Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	7.50 (190.5)	14.60 (370.8)	9.00 (228.6)	11.25 (285.8)
2	9.25 (235.0)	16.35 (415.3)	9.00 (228.6)	11.25 (285.8)
3	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)

Dimensions are in inches (millimeters)

Flange-Lok Annubar Flowmeter(1)



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

TABLE 20. Flange-Lok Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	2 – 600#	4.76 (120.9)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN40	3.51 (89.2)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN100	4.30 (109.2)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN16	3.84 (97.5)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN100	4.95 (125.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)

Dimensions are in inches (millimeters)

Flanged Annubar Flowmeter

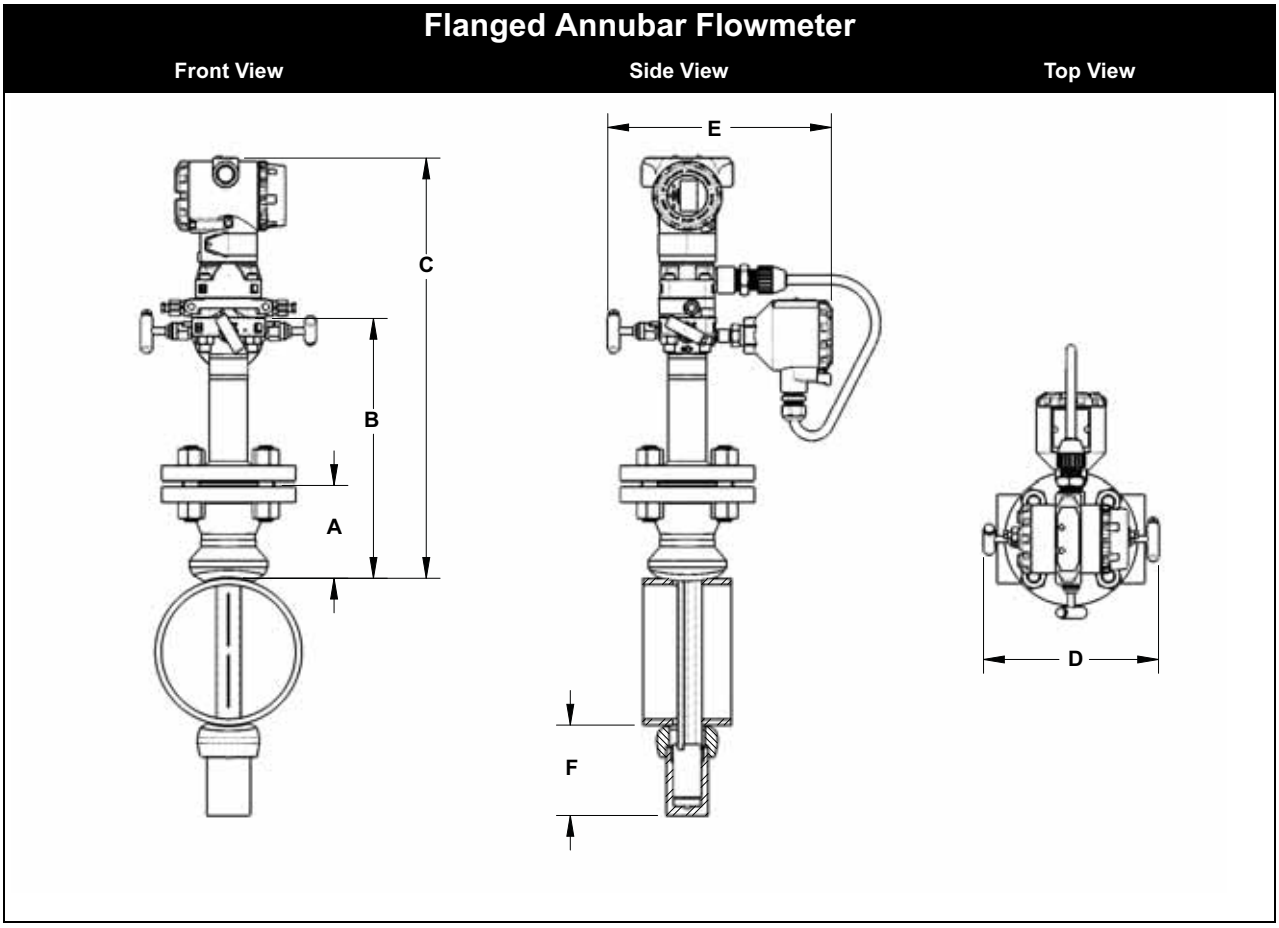


TABLE 21. Flanged Annubar Flowmeter Dimensional Data

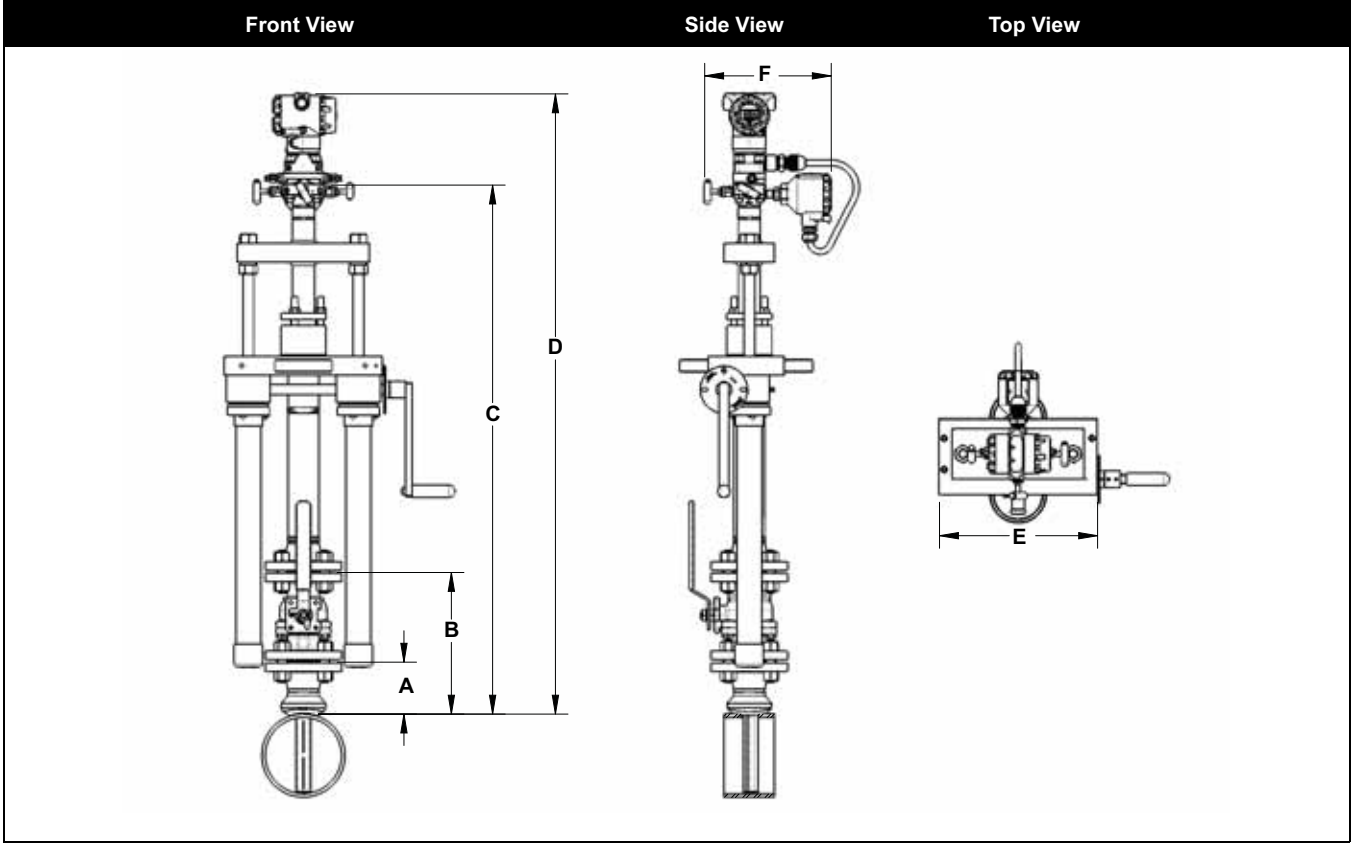
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	18.10 (459.7)	9.00(228.6)	11.25 (285.8)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.64 (295.5)	—	—	—	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	2 – 600#	4.76 (120.9)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	DN50/PN40	3.51 (89.2)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.51 (266.8)	—	—	—	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.51 (266.8)	—	—	—	5.00 (127.0)
2	3 – 2500#	9.87 (250.7)	15.62 (396.7)	—	—	—	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)

TABLE 21. 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)
Table 23 Continued on Next Page							
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	DN80/PN16	3.84 (97.5)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.44 (341.3)	—	—	—	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	—	—	—	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.32 (439.8)	—	—	—	7.00 (177.8)

Dimensions are in inches (millimeters)

Flanged Flo-Tap Annubar Flowmeter(1)



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

TABLE 22. Flanged Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.5)	10.50 (266.7)	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN16	3.09 (78.5)	See Note.	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN40	3.21 (81.5)	See Note.	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN100	3.88 (98.6)	See Note.	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	2 – 600#	4.76 (120.9)	16.38 (416.0)	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	DN50/PN16	3.40 (86.4)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	DN50/PN40	3.51 (89.2)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	DN50/PN100	4.30 (109.2)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	3 – 600#	5.38 (136.7)	19.50 (495.4)	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	DN80/PN16	3.84 (97.5)	See Note.	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	DN80/PN40	4.16 (105.7)	See Note.	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	DN80/PN100	4.95 (125.7)	See Note.	26.5 (673.1))	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)

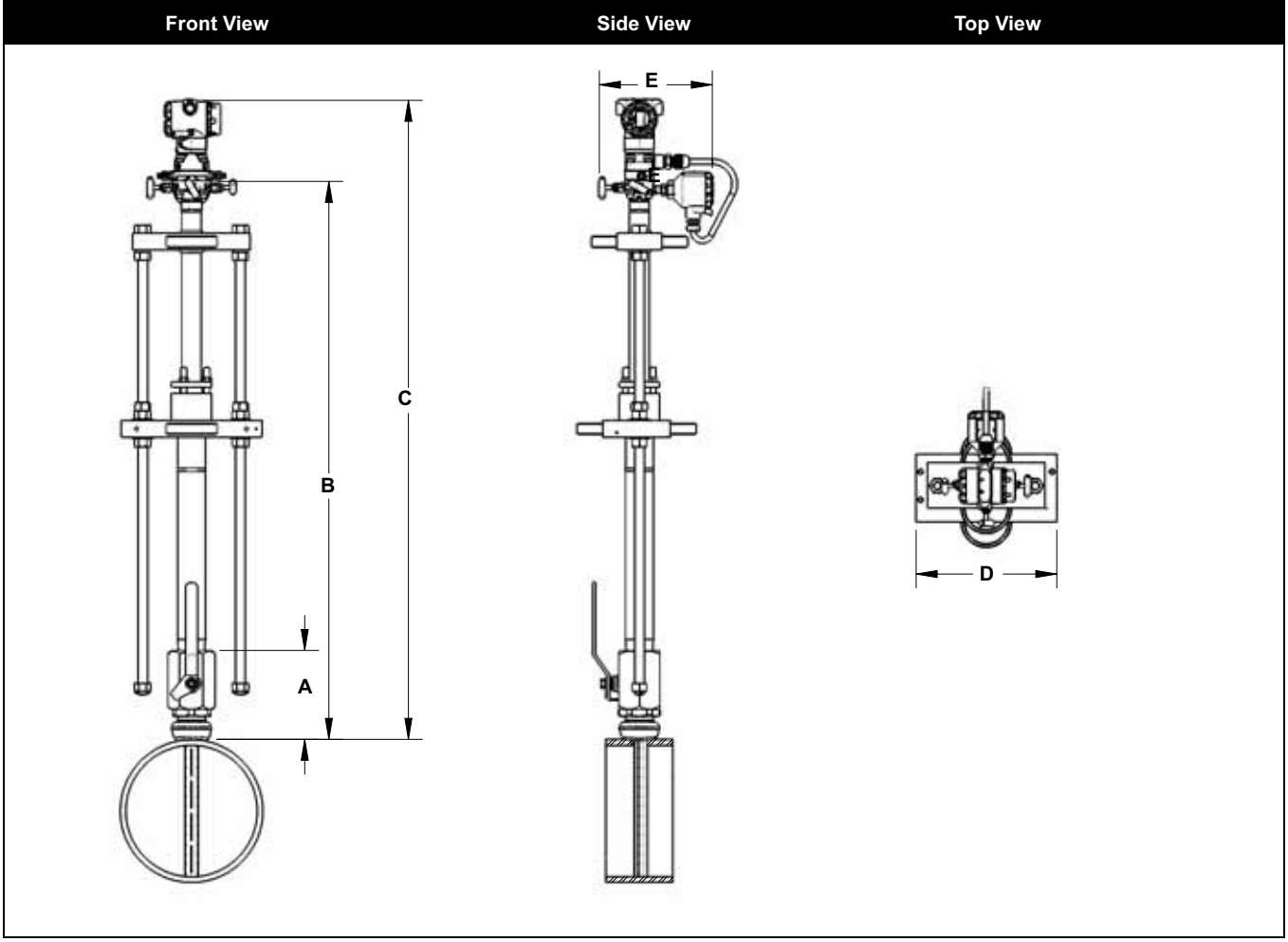
Dimensions are in inches (millimeters)

Note: Customer Supplied.

Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I

Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

Threaded Flo-Tap Annubar Flowmeter(1)



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

TABLE 23. Threaded Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	C (Max)	D (Max)	E (Max)
1	6.76 (171.8)	—	17.40 (442.0)	B + 7.10 (180.3)	10.50 (266.7.0)	11.25 (285.8)
2	8.17 (207.5)	23.70 (602.0)	20.80 (528.3)	B + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)

Sensor Size 3 is not available in a Threaded Flo-Tap.

Dimensions are in inches (millimeters)

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

ORDERING INFORMATION

Rosemount 3095MFA Annubar Flowmeter Ordering Information

Model	DP Flow Flowmeter Type
3095MFA	Annubar Flowmeter

Code	Fluid Type
L	Liquid
G	Gas
S	Steam

Code	Line Size	Code	Line Size
020	2-in. (50 mm)	180	18-in. (450 mm)
025	2 1/2-in. (63,5 mm)	200	20-in. (500 mm)
030	3-in. (80 mm)	240	24-in. (600 mm)
035	3 1/2-in. (89 mm)	300	30-in. (750 mm)
040	4-in. (100 mm)	360	36-in. (900 mm)
050	5-in. (125 mm)	420	42-in. (1066 mm)
060	6-in. (150 mm)	480	48-in. (1210 mm)
070	7-in. (175 mm)	600	60-in. (1520 mm)
080	8-in. (200 mm)	720	72-in. (1820 mm)
100	10-in. (250 mm)	780	78-in. (1950 mm)
120	12-in. (300 mm)	840	84-in. (2100 mm)
140	14-in. (350 mm)	900	90-in. (2250 mm)
160	16-in. (400 mm)	960	96-in. (2400 mm)

Code	Pipe I.D. Range (Refer to Table 11 on page 31)
A	Range A from the Pipe I.D. table
B	Range B from the Pipe I.D. table
C	Range C from the Pipe I.D. table
D	Range D 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

Code	Pipe Material / Assembly Material
C	Carbon steel(1)
S	316 Stainless Steel
G	Chrome-Moly Grade F-11
N	Chrome-Moly Grade F-22
J	Chrome-Moly Grade F-91
0(2)	No Mounting (Customer Supplied)

Code	Piping Orientation
H	Horizontal Piping
D	Vertical Piping with Downwards Flow
U	Vertical Piping with Upwards Flow

Code	Annubar Type
P	Pak-Lok
F	Flanged with opposite side support
L	Flange-Lok
G	Gear-Drive Flo-Tap
M	Manual Flo-Tap

Code	Sensor Material
S	316 Stainless Steel
H	Alloy C-276

Code	Sensor Size
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)

Rosemount 3095MFA Annubar Flowmeter Ordering Information

Code	Mounting Type		
T1	Compression/Threaded Connection		
A1	150# RF ANSI		
A3	300# RF ANSI		
A6	600# RF ANSI		
A9	900# RF ANSI		
AF	1500# RF ANSI		
AT	2500 # RF ANSI		
D1	DN PN16 Flange		
D3	DN PN40 Flange		
D6	DN PN100 Flange		
R1	150# RTJ Flange		
R3	300# RTJ Flange		
R6	600# RTJ Flange		
R9	900# RTJ Flange		
RF	1500# RTJ Flange		
RT	2500# RTJ Flange		
Code	**Opposite Side Support and 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	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite
Code	**Isolation Valve for Flo-Tap Models**		
1	Gate Valve, Carbon Steel		
2	Gate Valve, Stainless Steel		
5	Ball Valve, Carbon Steel		
6	Ball Valve, Stainless Steel		
0[(2)]	Not Applicable or Customer Supplied		
Code	**Temperature Measurement**		
T	Integral RTD – not available with Flanged model greater than class 600		
R	Remote Thermowell and RTD		
0	No Temperature Sensor		
Code	**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		
6	Direct-mount, high temperature 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.)		
Code	**Differential Pressure Ranges**		
1	0 to 25 in H_2O (0 to 62,3 mbar) – not available with Sensor Material code H		
2	0 to 250 in H_2O (0 to 623 mbar)		
3	0 to 1000 in H_2O (0 to 2,5 bar)		
Code	**Static Pressure Ranges**		
B	0–8 to 0–800 psia (0–55,16 to 0–5515,8 kPa)		
C	0–8 to 0–800 psig (0–55,16 to 0–5515,8 kPa)		
D	0–36.2 to 0–3626 psia (0–250 to 0–25000 kPa)		
E	0–36.2 to 0–3626 psig (0–250 to 0–25000 kPa)		

Rosemount 3095MFA Annubar Flowmeter Ordering Information

Code	Output Protocol	
A	4–20 mA with digital signal based on HART protocol	
V	FOUNDATION fieldbus	
Code	**Transmitter Housing Style**	**Conduit Entry Size**
1A	Polyurethane-covered aluminum	1/2-14 NPT
1B	Polyurethane-covered aluminum	M20 x 1.5 (CM20)
1C	Polyurethane-covered aluminum	G 1/2
1J	SST	1/2-14 NPT
1K	SST	M20 x 1.5 (CM20)
1L	SST	G 1/2
Code	**Options**	
Performance Class		
U3(3)	Ultra for Flow: up to 0.95% mass flow rate accuracy, up to 10:1 turndown, 10-year stability, limited 12-year warranty	
PlantWeb Control Functionality		
A01(4)	Advanced Control Function Block Suite	
Pressure Testing		
P1(5)	Hydrostatic Testing	
PX(5)	Extended Hydrostatic Testing	
Special Cleaning		
P2	Cleaning for Special Processes	
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	
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		
Q8(6)	Material Certificate per EN 10204:2004 3.1	
Code Conformance		
J2(7)	ANSI/ASME B31.1	
J3(7)	ANSI/ASME B31.3	
J4(7)	ANSI/ASME B31.8	
Material Conformance		
J5(8)	NACE MR-0175 / ISO 15156	
Country Certification		
J1	Canadian Registration	
Installed in Flanged Pipe Spool Section		
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	
Instrument Connections for Remote Mount Option		
G1	Needle Valves, Carbon Steel	
G2	Needle Valves, Stainless Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G6	OS&Y Gate Valve, Stainless Steel	
G7	OS&Y Gate Valve, Alloy C-276	

Rosemount 3095MFA Annubar Flowmeter Ordering Information

Special Shipment	
Y1	Mounting Hardware Shipped Separately
Special Dimensions	
VM	Variable Mounting
VT	Variable Tip
VS	Variable length Spool Section
V9	Special Dimension
Transmitter Calibration Certification	
Q4	Calibration Data Certificate for Transmitter
Product Certifications	
E5	FM Approvals Explosion-proof
I5	FM Approvals Intrinsic Safety, Non-Incendive
K5	FM Approvals Explosion-proof, Intrinsic Safety, Non-Incendive (combination of E5 and I5)
E6	CSA Explosion-proof
I6	CSA Intrinsically Safe, Division 2
K6	CSA Explosion-proof, Intrinsically Safe, Division 2
I1	ATEX Intrinsic Safety
E1	ATEX Flameproof
N1	ATEX Type n
K1	ATEX Flameproof, Intrinsic Safety, Type n
ND	ATEX Dust
E4	TIIS Flameproof Certification
I7	IECEx Intrinsic Safety
Alternate Transmitter Material of Construction	
L1[9]	Inert Sensor Fill Fluid
Display	
M5	Integral mount LCD display
Terminal Blocks	
T1	Transient Protection
Manifold for Remote Mount Option	
F1	3-Valve Manifold, Carbon Steel
F2	3-Valve Manifold, Stainless Steel
F3	3-Valve Manifold, Alloy C-276
F5	5-Valve Manifold, Carbon Steel
F6	5-Valve Manifold, Stainless Steel
F7	5-Valve Manifold, Alloy C-276

Typical Model Number: 3095MFA L 060 D C H P S 2 T1 0 0 0 3 2 C A 1A

(1) Material specified is A105 carbon steel.

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

(3) Ultra for Flow applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.

(4) Function Blocks include: Arithmetic, Integrator, Analog Output, Signal Characterizer, Control Selector, and Output Selector.

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

(6) Isolation and Instrument valves not included in 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 DP range 1.

Rosemount 485 Annubar Primary

SPECIFICATIONS

Performance

Performance Statement Assumptions
Measured pipe I.D.

Discharge Coefficient Factor
±0.75% of flow rate

Repeatability
±0.1%

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

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

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

Flow Turndown
10:1or better

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

Functional

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)

Remote Mount Transmitter
- 1250 °F (677 °C) – Alloy C-276 Sensor Material
- 850 °F (454 °C) – Stainless Steel Sensor Material

Pressure and Temperature Limits(1)
Direct Mount Transmitter
- Up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Integral temperature measurement is not available with Flanged mounting type greater than class 600

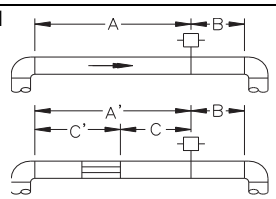
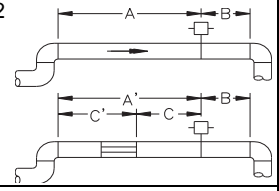
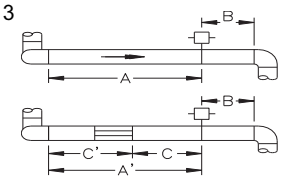
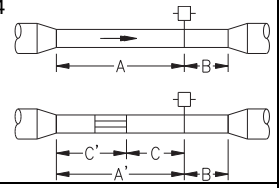
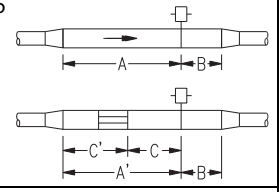
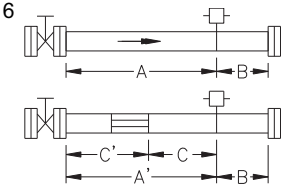
Remote Mount Transmitter
- Up to 2500# ANSI (6000 psig at 100 °F (416 bar at 38 °C)).

(1) Static pressure selection may effect pressure limitations.

The Annubar Flowmeter Series

Installation Considerations

Straight Run Requirements(1)

In Plane / Out of Plane	Upstream Dimensions (Pipe Diameters)					Downstream
	Without Vanes(2)		With Vanes(3)			
	In Plane A	Out of Plane A	A'	C	C'	B
1 	8	10	—	—	—	4
	—	—	8	4	4	4
2 	11	16	—	—	—	4
	—	—	8	4	4	4
3 	23	28	—	—	—	4
	—	—	8	4	4	4
4 	12	12	—	—	—	4
	—	—	8	4	4	4
5 	18	18	—	—	—	4
	—	—	8	4	4	4
6 	30	30	—	—	—	4
	—	—	8	4	4	4

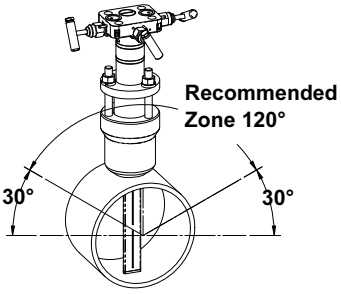
(1) Consult the factory for instructions regarding use in square or rectangular ducts.

(2) "In Plane A" means the bar is in the same plane as the elbow. "Out of Plane A" means the bar is perpendicular to the plane of the upstream elbow.

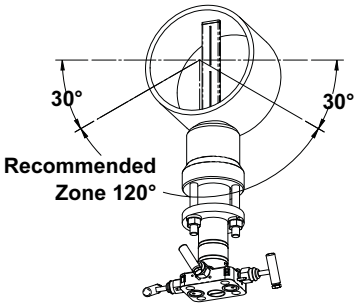
(3) Use straightening vane to reduce the required straight run length.

Flowmeter Orientation (Recommended)

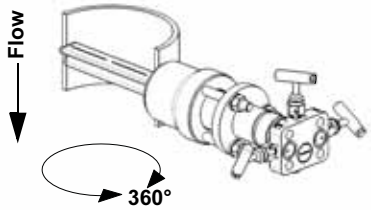
Gas (Horizontal)



Liquid and Steam (Horizontal)

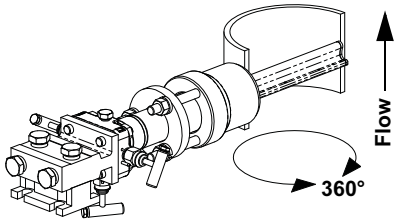


Gas (Vertical)



Note: Can also be mounted for Gas Vertical up applications.

Steam (Vertical)



Drill Hole Size According to Sensor Size

Sensor Size	Diameter
1	3/4-in. (19 mm)
2	1 5/16-in. (34 mm)
3	2 1/2-in. (64 mm)

Physical

Temperature Measurement

Integral RTD

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

Remote RTD

- 100 Ohm platinum RTD, spring loaded with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing)
- Remote RTD material is the same as the specified pipe material

Thermowell

- 1/2-in. x 1/2-in NPT, 316 Stainless Steel with 1/2-in. Carbon Steel weld couplet.

Housing Connections

1/2–14 NPT, G1/2, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 Stainless Steel
- Alloy C-276

Annubar Type

See “Dimensional Drawings” on page 53

Pak-Lok Model (option P)

- Provided with a compression sealing mechanism rated up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Graphite Packing (–300 to 850 °F (–184 to 454 °C))

Flanged with Opposite Side Support Model (option F)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material
- Flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Alloy C-276: (–300 to 1250 °F (–184 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)
- –300 to 850 °F (–184 to 454 °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: –300 to 850 °F (–184 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
  - Ball valves have a 300# limitation
  - For threaded flo-tap models, the isolation valve NPT size is 1 1/4-in. (Sensor Size one) and 2-in. (Sensor Size 2).

Annubar Type Specification Chart

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

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

(2) Remote mount only.

Instrument Connections Temperature Ranges

TABLE 25. Minimum / Maximum Temperature Range

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

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

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

TABLE 26. Flanged Pipe Spool Section Schedule

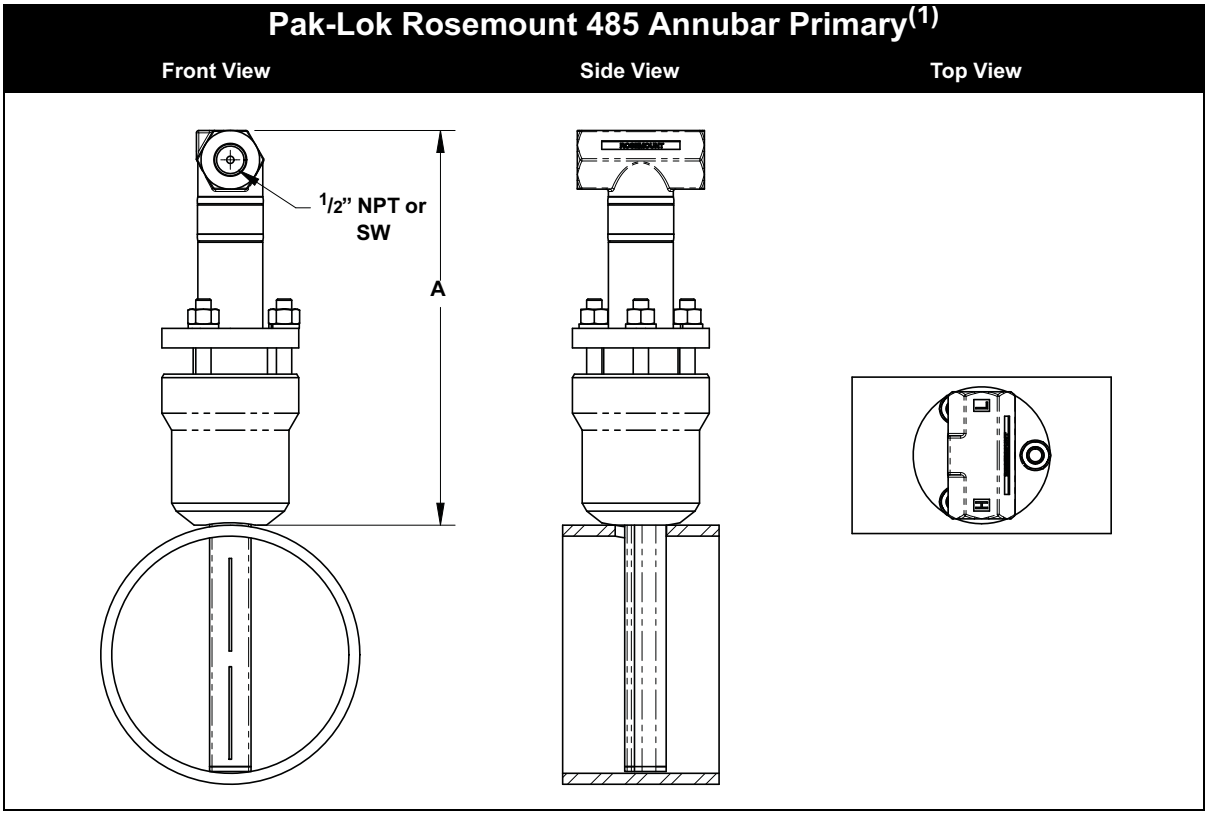
ANSI	Schedule
150# ANSI	40
300# ANSI	40
600# ANSI	80

TABLE 27. 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)

DIMENSIONAL DRAWINGS

Pak-Lok Rosemount 485 Annubar Primary(1)



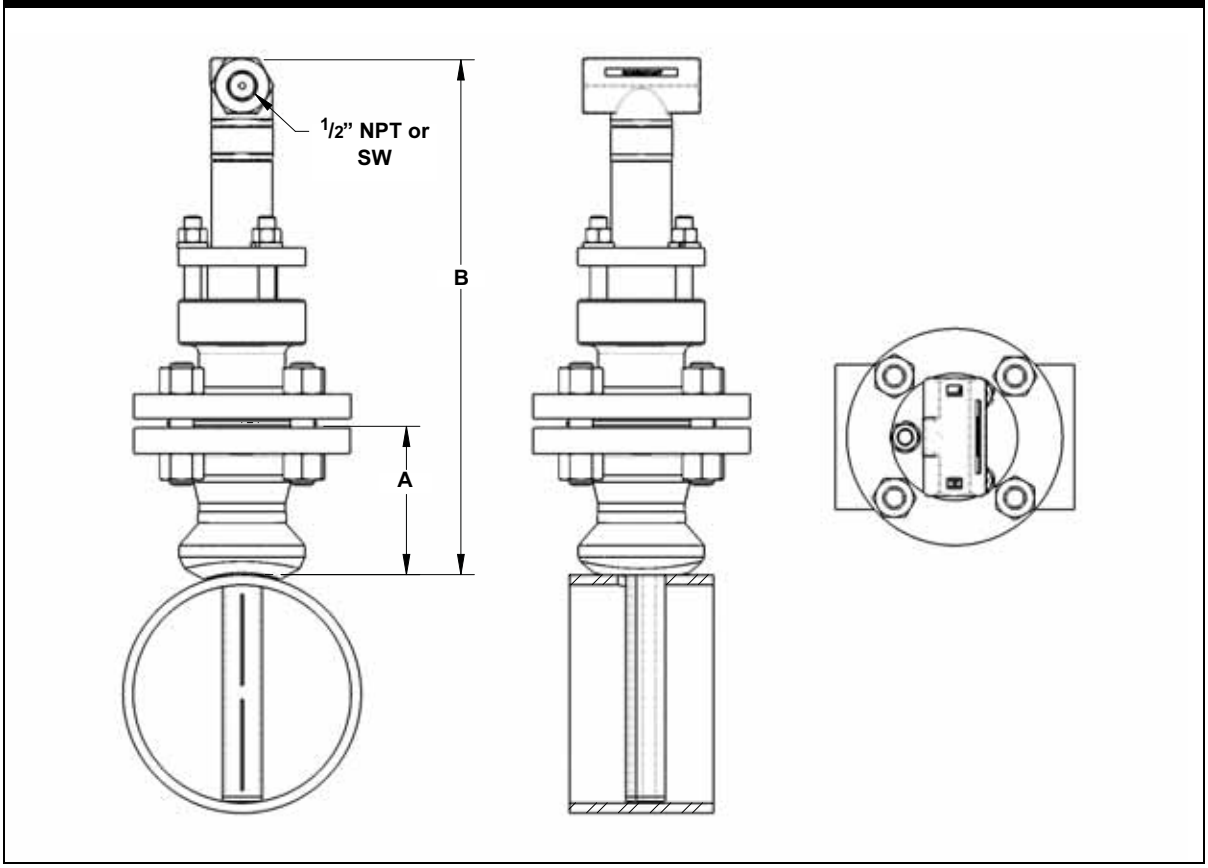
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

TABLE 28. Pak-Lok Rosemount 485 Annubar Primary Dimensional Data

Sensor Size	A (Max)
1	7.50 (190.5)
2	9.25 (235.0)
3	12.00 (304.8)

Dimensions are in inches (millimeters)

Flange-Lok Rosemount 485 Annubar Primary(1)



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

TABLE 29. Flange-Lok 485 Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)
1	DN40/PN100	3.88 (98.6)	12.25 (311.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)
2	2 – 600#	4.76 (120.9)	14.25 (362.0)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)
2	DN50/PN40	3.51 (89.2)	14.25 (362.0)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)
3	DN80/PN16	3.84 (97.5)	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)

Flanged 485 Annubar Primary

Front View | Side View | Top View

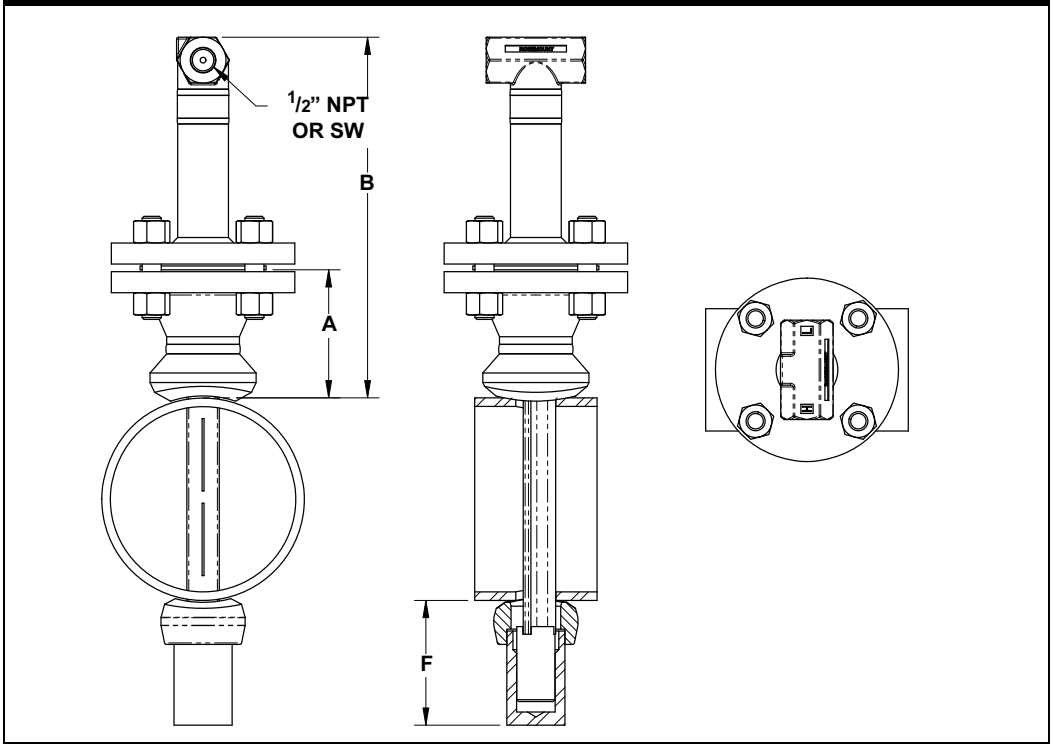


TABLE 30. Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.32 (236.6)	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.32 (236.6)	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.64 (295.5)	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	5.00 (127.0)
2	2 – 600#	4.76 (120.9)	12.00 (304.8)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	5.00 (127.0)
2	DN50/PN40	3.51 (89.2)	12.00 (304.8)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.51 (266.8)	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.51 (266.8)	5.00 (127.0)
2	3 – 2500#	9.87 (250.7)	15.62 (396.7)	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	4.00 (101.6)
3	DN80/PN16	3.84 (97.5)	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)

Table 32 Continued on Next Page

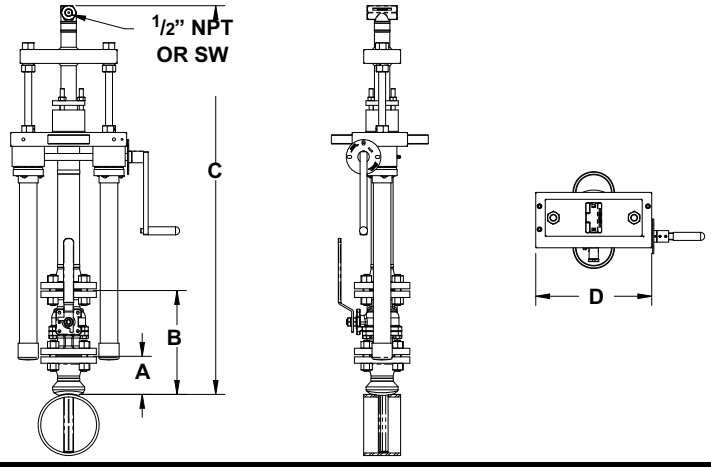
TABLE 30. Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
3	4 – 900#	8.19 (208.0)	13.44 (341.3)	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.32 (439.8)	7.00 (177.8)

Dimensions are in inches (millimeters)

Flanged Flo-Tap 485 Annubar Primary

Gear Drive



Manual

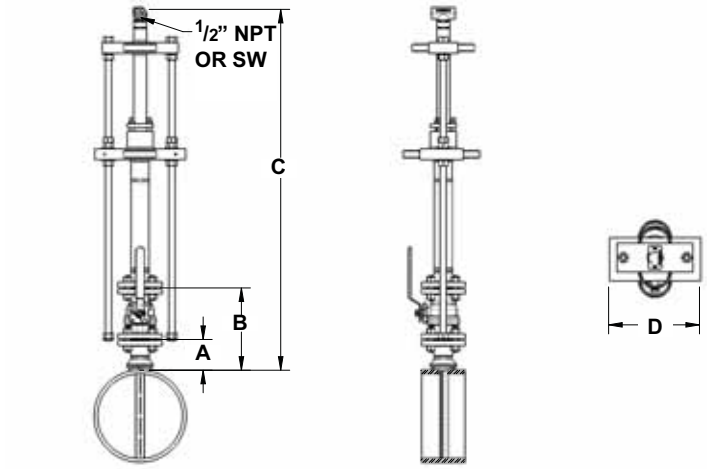


TABLE 31. Flanged Flo-Tap 485 Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C[I] (Max) (Gear Drive)	C[I] (Max) (Manual)	D (Max)
1	1 1/2 – 150#	3.88 (98.5)	10.50 (266.7)	—	17.9 (431.8)	10.50 (266.7)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.9 (431.8)	10.50 (266.7)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.9 (431.8)	10.50 (266.7)
1	DN40/PN16	3.09 (78.5)	10.50 (266.7)	—	17.9 (431.8)	10.50 (266.7)
1	DN40/PN40	3.21 (81.5)	11.75 (298.5)	—	17.9 (431.8)	10.50 (266.7)
1	DN40/PN100	3.88 (98.6)	14.06 (357.2)	—	17.9 (431.8)	10.50 (266.7)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.6 (624.8)	21.4 (543.6)	12.56 (319.0)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.6 (624.8)	21.4 (543.6)	12.56 (319.0)
2	2 – 600#	4.76 (120.9)	16.38 (416.0)	24.6 (624.8)	21.4 (543.6)	12.56 (319.0)
2	DN50/PN16	3.40 (86.4)	11.25 (285.8)	24.6 (624.8)	21.4 (543.6)	12.56 (319.0)
2	DN50/PN40	3.51 (89.2)	13.00 (330.2)	24.6 (624.8)	21.4 (543.6)	12.56 (319.0)
2	DN50/PN100	4.30 (109.2)	16.38 (416.0)	24.6 (624.8)	21.4 (543.6)	12.56 (319.0)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.5 (673.1)	23.3 (591.8)	14.13 (358.9)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.5 (673.1)	23.3 (591.8)	14.13 (358.9)

Table 33 Continued on Next Page

TABLE 31. Flanged Flo-Tap 485 Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)
3	3 – 600#	5.38 (136.7)	19.50 (495.4)	26.5 (673.1)	23.3 (591.8)	14.13 (358.9)
3	DN80/PN16	3.84 (97.5)	12.75 (323.9)	26.5 (673.1)	23.3 (591.8)	14.13 (358.9)
3	DN80/PN40	4.16 (105.7)	16.25 (412.8)	26.5 (673.1)	23.3 (591.8)	14.13 (358.9)
3	DN80/PN100	4.95 (125.7)	19.50 (495.4)	26.5 (673.1)	23.3 (591.8)	14.13 (358.9)

Use the appropriate formula to determine C value:

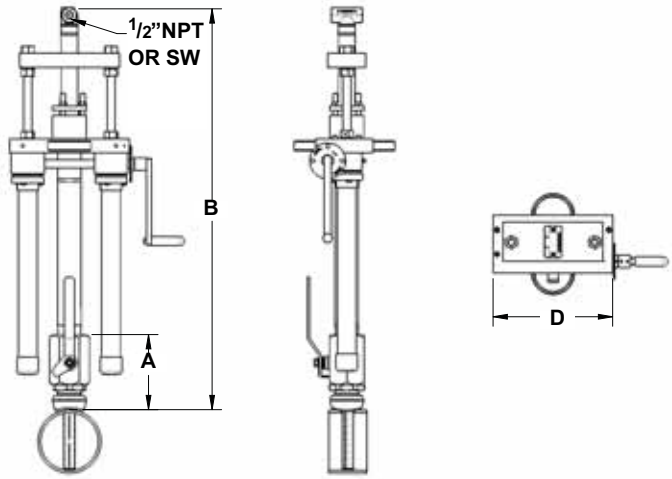
Inserted formula: Pipe I.D. + Wall Thickness + Value B + C^1 (use the Manual Drive or Gear drive values for C^1)

Retracted formula: [2 x (Pipe I.D. + Wall Thickness + Value B)] + C^1 (use the Manual Drive or Gear drive values for C^1)

Dimensions are in inches (millimeters)

Threaded Flo-Tap 485 Annubar Primary

Gear Drive



Manual

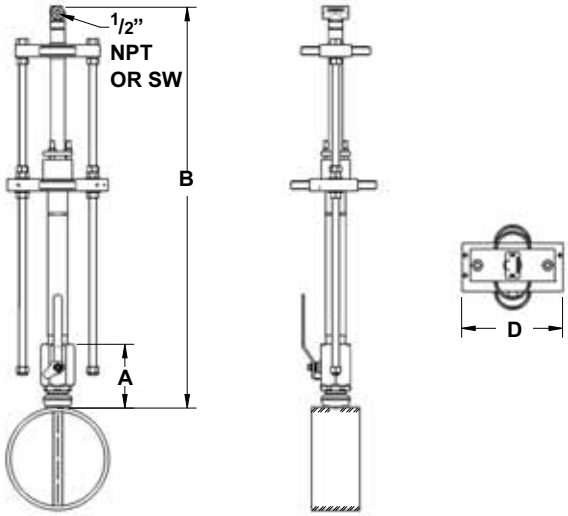


TABLE 32. Threaded Flo-Tap 485 Annubar Primary Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B[I] (Max) (Gear Drive)	B[I] (Max) (Manual)	D (Max)
1	6.76 (171.8)	—	17.40 (442.0)	10.50 (266.7)
2	8.17 (207.5)	23.70 (602.0)	20.80 (528.3)	12.56 (319.0)

Sensor Size 3 is not available in a Threaded Flo-Tap.

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B[I]
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B[I]

ORDERING INFORMATION

Rosemount 485 Annubar Primary Ordering Information

Model	DP Flow Primary Type
485	Annubar Primary Element
Code	**Fluid Type**
L	Liquid
G	Gas
S	Steam

Code	Line Size	Code	Line Size
020	2-in. (50 mm)	180	18-in. (450 mm)
025	2 1/2-in. (63,5 mm)	200	20-in. (500 mm)
030	3-in. (80 mm)	240	24-in. (600 mm)
035	3 1/2-in. (89 mm)	300	30-in. (750 mm)
040	4-in. (100 mm)	360	36-in. (900 mm)
050	5-in. (125 mm)	420	42-in. (1066 mm)
060	6-in. (150 mm)	480	48-in. (1210 mm)
070	7-in. (175 mm)	600	60-in. (1520 mm)
080	8-in. (200 mm)	720	72-in. (1820 mm)
100	10-in. (250 mm)	780	78-in. (1950 mm)
120	12-in. (300 mm)	840	84-in. (2100 mm)
140	14-in. (350 mm)	900	90-in. (2250 mm)
160	16-in. (400 mm)	960	96-in. (2400 mm)

Code	Pipe I.D. Range (Refer to Table 11 on page 31)
A	Range A from the Pipe I.D. table
B	Range B from the Pipe I.D. table
C	Range C from the Pipe I.D. table
D	Range D 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
Code	**Pipe Material / Assembly Material**
C	Carbon steel(1)
S	316 Stainless Steel
G	Chrome-Moly Grade F-11
N	Chrome-Moly Grade F-22
J	Chrome-Moly Grade F-91
0(2)	No mounting (Customer Supplied)
Code	**Piping Orientation**
H	Horizontal Piping
D	Vertical Piping with Downwards Flow
U	Vertical Piping with Upwards Flow
Code	**Annubar Type**
P	Pak-Lok
F	Flanged with opposite side support
L	Flange-Lok
G	Gear-Drive Flo-Tap
M	Manual Flo-Tap
Code	**Sensor Material**
S	316 Stainless Steel
H	Alloy C-276
Code	**Sensor Size**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)

Rosemount 485 Annubar Primary Ordering Information

Code	Mounting Type		
T1	Compression/Threaded Connection		
A1	150# RF ANSI		
A3	300# RF ANSI		
A6	600# RF ANSI		
A9	900# RF ANSI		
AF	1500# RF ANSI		
AT	2500 # RF ANSI		
D1	DN PN16 Flange		
D3	DN PN40 Flange		
D6	DN PN100 Flange		
R1	150# RTJ Flange		
R3	300# RTJ Flange		
R6	600# RTJ Flange		
R9	900# RTJ Flange		
RF	1500# RTJ Flange		
RT	2500# RTJ Flange		
Code	**Opposite Side Support and 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	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite
Code	**Isolation Valve for Flo-Tap Models**		
1	Gate Valve, Carbon Steel		
2	Gate Valve, Stainless Steel		
5	Ball Valve, Carbon Steel		
6	Ball Valve, Stainless Steel		
0[(2)]	Not Applicable or Customer Supplied		
Code	**Temperature Measurement**		
T	Integral RTD – not available with Flanged model greater than class 600		
R	Remote Thermowell and RTD		
0	No Temperature Sensor		
Code	**Electronics 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		
6	Direct-mount, High Temperature 5-valve Manifold– not available with Flanged model greater than class 600		
7	Remote-mount NPT Connections		
8	Remote-mount SW Connections		
Code	**Options**		
Pressure Testing			
P1[(3)]	Hydrostatic Testing with Certificate		
PX[(3)]	Extended Hydrostatic Testing		
Special Cleaning			
P2	Cleaning for Special Processes		
PA	Cleaning per ASTM G93 level D (section 11.4)		
Material Testing			
V1	Dye Penetrant Exam		
Material Examination			
V2	Radiographic Examination		

Rosemount 485 Annubar Primary Ordering Information

Flow Calibration	
W1	Flow Calibration (Average K)
WZ	Special Calibration
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	
Q8(4)	Material Certificate per EN 10204:2004 3.1
Code Conformance	
J2(5)	ANSI/ASME B31.1
J3(5)	ANSI/ASME B31.3
J4(5)	ANSI/ASME B31.8
Material Conformance	
J5(6)	NACE MR-0175 / ISO 15156
Country Certification	
J1	Canadian Registration
J6	European Pressure Directive (PED)
Installed in Flanged Pipe Spool Section	
H3	150# Flanged Connection with Rosemount Standard Length and Schedule
H4	300# Flanged Connection with Rosemount Standard Length and Schedule
H5	600# Flanged Connection with Rosemount Standard Length and Schedule
Instrument Connections for Remote Mount Option	
G1	Needle Valves, Carbon Steel
G2	Needle Valves, Stainless Steel
G3	Needle Valves, Alloy C-276
G5	OS&Y Gate Valve, Carbon Steel
G6	OS&Y Gate Valve, Stainless Steel
G7	OS&Y Gate Valve, Alloy C-276
Special Shipment	
Y1	Mounting Hardware Shipped Separately
Attach To	
H1	Attach to Transmitter
Special Dimensions	
VM	Variable Mounting
VT	Variable Tip
VS	Variable length Spool Section
V9	Special Dimension

Typical Model Number: 485 L 060 D C H P S 2 T1 0 0 0 3

(1) Material specified is A105 carbon steel.

(2) Provide the “A” dimension for Flanged, Flange-Lok, and Threaded Flo-Tap models. Provide the “B” dimension for Flange Flo-Tap models.

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

(4) Isolation and Instrument valves not included in Traceability Certification.

(5) Not available with Transmitter Connection Platform 6.

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

Fluid Data Sheet (FDS)

For custom fluid not in the Rosemount Fluid Database

For technical assistance in filling out this CDS, call an Emerson Process Management representative. Complete this form to define a custom fluid. The H symbol identifies the default value.

NOTE
This form is not required if using the Rosemount Fluid Database.

* = Required Item
★ = Default

Customer Information	
Customer:	Contact Name:
Customer Phone:	Customer Fax:
	Customer PO:

Fluid Properties	
❑ Custom Liquid– Complete Table	❑ Liquid
❑ Custom Gas– Complete Table	❑ Gas
❑ Custom Natural Gas– Complete Table	❑ Natural Gas

For Rosemount Use Only	
S.O.:	LI
CHAMP:	DATE:
	ADMIN:

TABLE 33. Custom Liquid Worksheet

* = Required Item

★ = Default

Mass Liquid Density and Viscosity Information

1. Fill in the following operating temperatures

   a) _____ min

   b) _____ [1/3 (max - min))] + min

   c) _____ [2/3 (max - min))] + min

   d) _____ max

2. **Transfer the values from the above section to the numbered lines below.**
3. Check one Density box, then enter the values for each temperature and the standard density.
4. Check one Viscosity box, then enter values for each temperature. (At least one viscosity value is required).

Density	Viscosity
❑ Density in lbs/CuFt	❑ Viscosity in centipoise
❑ Density in kg/CuM	❑ Viscosity in lbs/ft sec
	❑ Viscosity in pascal sec
Temperature	Temperature
a) _____ min	a) _____ min.
b) _____ [1/3 (max - min))] + min	b) _____ [1/3 (max - min))] + min
c) _____ [2/3 (max - min))] + min	c) _____ [2/3 (max - min))] + min
d) _____ max	d) _____ max

Base density: _____
(at base reference conditions specified)

Volumetric Liquid Density and Viscosity Information

* Density at Flow: _____ Units: ❑ lb/ft^3 ❑ Kg/m^3 ❑ Other:

OR

Specific Gravity at Flow: _____

* Viscosity at Flow: _____ Units: ❑ Centipoise ❑ Other:

TABLE 34. Custom Gas Worksheet

* = Required Item
★ = Default

Mass Gas Compressibility and Viscosity Information

1. Fill in the following operating pressures and operating temperatures

Operating Pressures	Operating Temperatures
1) _____ min	5) _____ min
2) _____ [1/3 (max - min))] + min	6) _____ [1/2 (max - min))] + min
3) _____ [2/3 (max - min))] + min	7) _____ max
4) _____ max	8) _____ [1/3 (max - min))] + min
	9) _____ [2/3 (max - min))] + min

2. **Transfer the values from the above section to the numbered lines below**
3. Check one Density/Compressibility box, then enter the 12 values for each pressure/temperature range.
4. Check one Viscosity box, then enter values for each temperature. (At least one viscosity value is required).
5. Enter values for molecular weight, isentropic exponent, and standard density (or standard compressibility).

Density
❑ Density in lbs/CuFt
❑ Density in kg/CuM
❑ Compressibility

Pressure	Temperature
1) _____	5) _____
2) _____	5) _____
3) _____	5) _____
4) _____	5) _____
1) _____	6) _____
2) _____	6) _____
3) _____	6) _____
4) _____	6) _____
1) _____	7) _____
2) _____	7) _____
3) _____	7) _____
4) _____	7) _____

Viscosity
❑ Viscosity in centipoise
❑ Viscosity in lbs/ft sec
❑ Viscosity in pascal sec

Temperature
5) _____
8) _____
9) _____
7) _____

Molecular Weight: _____

Isentropic Exponent: _____ 1.4 ★

Standard density/compressibility: _____

Volumetric Gas Compressibility and Viscosity Information

* Density at Flow: _____ Units: ❑ lb/ft^3 ❑ Kg/m^3 ❑ Other:

OR

M.W. / Specific Gravity at Flow: _____

Compressibility at Flow: _____

Compressibility at Base: _____

* Viscosity at Flow: _____ Units: ❑ Centipoise ❑ Other: Isentropic Exponent (K):_____ 1.4 ★

TABLE 35. Natural Gas Worksheet

NOTE
The minimum requirement for the Volumetric options is highlighted gray on page 66.

Compressibility Factor Information

Choose desired characterization method and only enter values for that method.

❑ Detail Characterization Method (AGA8 1992)			Mole	Valid Range
CH_4	Methane mole percent	_____	%	0 – 100 percent
N_2	Nitrogen mole percent	_____	%	0 – 100 percent
CO_2	Carbon Dioxide mole percent	_____	%	0 – 100 percent
C_2H_6	Ethane mole percent	_____	%	0 – 100 percent
C_3H_8	Propane mole percent	_____	%	0 – 12 percent
H_2O	Water mole percent	_____	%	0 – Dew point
H_2S	Hydrogen Sulfide mole percent	_____	%	0 – 100 percent
H_2	Hydrogen mole percent	_____	%	0 – 100 percent
CO	Carbon monoxide mole percent	_____	%	0 – 3.0 percent
O_2	Oxygen mole percent	_____	%	0 – 21 percent
C_4H_{10}	i-Butane mole percent	_____	%	0 – 6 percent(1)
C_4H_{10}	n-Butane mole percent	_____	%	0 – 6 percent(1)
C_5H_{12}	i-Pentane mole percent	_____	%	0 – 4 percent(2)
C_5H_{12}	n-Pentane mole percent	_____	%	0 – 4 percent
C_6H_{14}	n-Hexane mole percent	_____	%	0 – Dew Point
C_7H_{18}	n-Heptane mole percent	_____	%	0 – Dew Point
C_8H_{18}	n-Octane mole percent	_____	%	0 – Dew Point
C_9H_{2O}	n-Nonane mole percent	_____	%	0 – Dew Point
$C_{10}H_{22}$	n-Decane mole percent	_____	%	0 – Dew Point
He	Helium mole percent	_____	%	0 – 3.0percent
Ar	Argon mole percent	_____	%	0 – 1.0 percent

❑ Gross Characterization Method, Option Code 1 (AGA8 Gr-Hv-CO_2)			Mole	Valid Range
	Specific Gravity at 14.73 psia and 60 °F	_____		0.554 – 0.87
	Volumetric gross heating value at base conditions	_____	BTU/SCF	477 – 1150 BTU/SCF
	Carbon Dioxide mole percent	_____	%	0 – 30 percent
	Hydrogen mole percent	_____	%	0 – 10 percent
	Carbon Monoxide mole percent	_____	%	0 – 3.0 percent

❑ Gross Characterization Method, Option Code 2 (AGA8 Gr-CO_2-N_2)			Mole	Valid Range
	Specific Gravity at 14.73 psia and 60 °F	_____	%	0.554 – 0.87
	Carbon Dioxide mole percent	_____	%	0 – 30 percent
	Nitrogen mole percent	_____	%	0 – 50 percent
	Hydrogen mole percent	_____	%	0 – 10 percent
	Carbon Monoxide mole percent	_____	%	0 – 3.0 percent

(1) The summaries of i-Butane and n-Butane cannot exceed 6 percent.

(2) The summaries of i-Pentane and n-Pentane cannot exceed 4 percent.

The Annubar Flowmeter Series

Product Data Sheet
00813-0100-4809, Rev GA
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