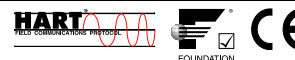
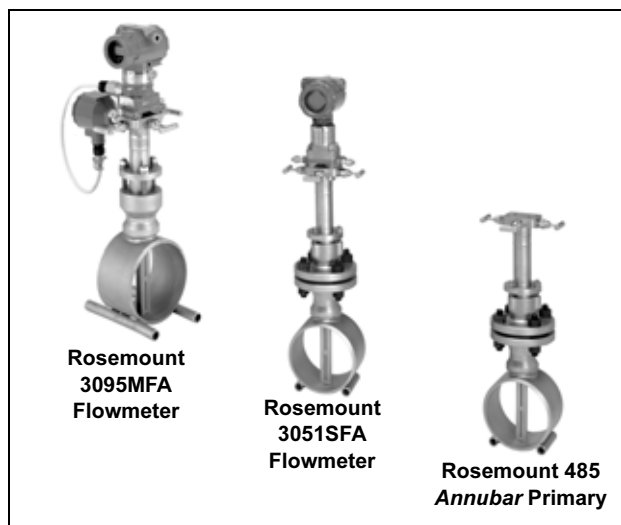


Rosemount Annubar® Flowmeter Series

- 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



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The Annubar Flowmeter Series

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.

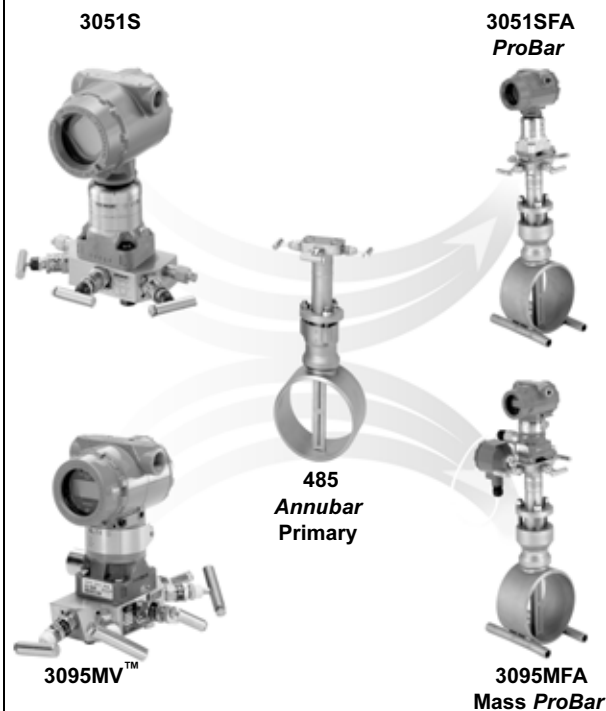
Plant uptime is increased with the maintenance-free design

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 DP Flow Solutions

Annubar Flowmeter Series: Rosemount 3051SFA, 3095MFA, 485, and 285

The state-of-the-art, fifth generation Rosemount 485 *Annubar* combined with the 3051S or 3095 MultiVariable transmitter creates an accurate, repeatable and dependable insertion-type flowmeter. The Rosemount 285 provides a commercial product offering for your general purpose applications.

Compact Orifice Flowmeter Series: Rosemount 3051SFC, 3095MFC, and 405

Compact Orifice Flowmeters can be installed between existing flanges, up to a Class 600 (PN100) rating. In tight fit applications, a conditioning orifice plate version is available, requiring only two diameters of straight run upstream.

Integral Orifice Flowmeter Series: Rosemount 3051SFP, 3095MFP, and 1195

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.

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 is easy to specify and order. The 1595 Conditioning Orifice provides superior performance in tight fit applications.

Annubar Flowmeter Series Selection Guide

Rosemount 3051SFA *ProBar* Flowmeter

See ordering information on page 20.

- Combines the Rosemount 3051S scalable pressure transmitter with the Rosemount 485 *Annubar* Primary Element
- $\pm 0.80\%$ of volumetric flow rate accuracy
- LCD and communication ports can be mounted remotely for easy “at grade” access.
- *FOUNDATION*® fieldbus protocol available
- Ideal fluid type: liquid



Rosemount 3051SFA
ProBar Flowmeter



Rosemount 3095MFA
Mass *ProBar* Flowmeter

Rosemount 3095MFA Mass *ProBar* Flowmeter

See ordering information on page 39.

- Combines the Rosemount 3095 MultiVariable mass flow transmitter with the Rosemount 485 *Annubar* Primary
- 0.90% of mass flow rate accuracy
- Measures differential pressure, static pressure, and process temperature with a single pipe penetration
- Dynamically calculates compensated mass flow
- Ideal fluid types: gas and steam

Rosemount 485 *Annubar* Primary

See ordering information on page 55.

- Innovative slot and T-shape design increases accuracy to $\pm 0.75\%$
- Wide variety of mounting configurations
- Integral manifold head allows direct mounting of DP transmitters
- Flo-Tap design allows installation without system shutdown
- Ideal fluid types: liquid, gas, and steam



Rosemount 485
Annubar Primary

The Annubar Flowmeter Series

Rosemount 3051SFA *ProBar*® Flowmeter

SPECIFICATIONS

Performance

System Reference Accuracy

Percentage (%) of volumetric flow rate

Classic (8:1 flow turndown)	Ultra (8:1 flow turndown)	Ultra for Flow (10:1 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)

Where

d = Probe width (feet)

V = Velocity of fluid (ft/sec)

ρ = Density of fluid (lb_m/ft³)

μ = Viscosity of the fluid (lb_m/ft-sec)

$$R_d = \frac{d \times V \times \rho}{\mu}$$

Output

HART

- 4–20 mA ADC, flow rate output. Digital *HART* protocol superimposed on 4–20 mA signal, available to any host that conforms to the *HART* protocol.

FOUNDATION Fieldbus (output code F)

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

Performance Statement Assumptions

- Measured pipe I.D
- Electronics are 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.

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.

Standard transmitter (4–20 mA): 10.5 to 42.4 V dc with no load

3051S SIS Safety transmitter: 12 to 42 Vdc with no load

3051S HART Diagnostics transmitter: 12 to 42 Vdc with no load

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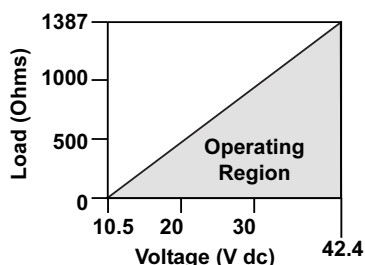
The Annubar Flowmeter Series

Load Limitations

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

Standard Transmitter

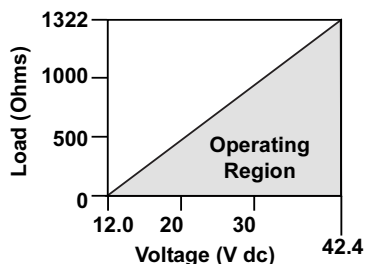
Maximum Loop Resistance = $43.5 \times (\text{Power Supply Voltage} - 10.5)$



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

3051S SIS Safety Transmitter (output code B) 3051S HART Diagnostics Transmitter (option code DA1)

Maximum Loop Resistance = $43.5 \times (\text{Power Supply Voltage} - 12.0)$



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

HART Diagnostics Suite (Option Code DA1)

The 3051S HART Diagnostics Transmitter provides Abnormal Situation Prevention (ASP) indication, device operating hours, variable logging, 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. plugged impulse line detection).

The device operating hours are logged along with the occurrence of diagnostic events 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 Block

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

The Annubar Flowmeter Series

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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	25 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 3095 Engineering Assistant.

FOUNDATION fieldbus Diagnostics Suite (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. plugged impulse line detection).

Process Temperature Limits

Direct Mount Electronics

- 500 °F (260 °C)
- 750 °F (400 °C) when used with a direct mount, high temperature 5-valve manifold (Electronics Connection Platform code 6)

Remote Mount Electronics

- 1250 °F (677 °C) – Hastelloy® Sensor Material
- 850 °F (454 °C) – Stainless Steel Sensor Material

Electronics Temperature Limits

Ambient

- -40 to 185 °F (-40 to 85 °C)
- With Integral Mount LCD Display: -4 to 175 °F (-20 to 80 °C)

Storage

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

Pressure Limits⁽¹⁾

Direct Mount Electronics

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

Static Pressure Limits

- Range 1A: Operates within specification between static line pressures of 0.5 psia to 2000 psig (0.03 to 138 bar)
- Ranges 2A– 3A: Operates within specifications between static line pressures of 0.5 psia and 3626 psig (0.03 bar-A to 250 bar-G)

Burst Pressure Limits

Coplanar or traditional process flange

- 10000 psig (689,5 bar).

Overpressure Limits

Flowmeters withstand the following limits without damage:

- Range 1A: 2000 psig (138 bar)
- Ranges 2A–3A: 3626 psig (250 bar)

TABLE 2. Overpressure Limits⁽¹⁾

Standard	Type	Carbon Steel Rating	Stainless Steel Rating
ANSI/ASME	Class 150	285 (20)	275 (19)
ANSI/ASME	Class 300	740 (51)	720 (50)
ANSI/ASME	Class 600	1480 (102)	1440 (99)
At 100 °F (38 °C), the rating decreases with increasing temperature.			
DIN	PN 10/40	580 (40)	580 (40)
DIN	PN 10/16	232 (16)	232 (16)
DIN	PN 25/40	580 (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 2 seconds (typical) after power is applied to the transmitter

Damping

Analog output response to a step input change is user-selectable from 0 to 60 seconds for one time constant. This software damping is in addition to sensor module response time

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 3).

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

(1) Static pressure selection may effect pressure limitations.

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The Annubar Flowmeter Series

TABLE 3. Alarm Configuration

	High Alarm	Low Alarm
Default	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant ⁽¹⁾	≥ 22.5 mA	≤ 3.6 mA
Custom levels ⁽²⁾ (3)	20.2 - 23.0 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.
- (3) Not available with the 3051S SIS Safety Transmitter.

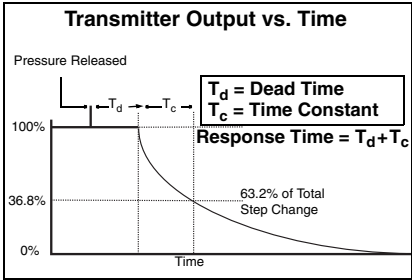
3051S SIS Safety Transmitter Failure Values

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%.

Dynamic Performance

	4 - 20 mA (HART®) ⁽¹⁾	Fieldbus protocol ⁽²⁾	Typical Transmitter Response Time
Total Response Time (Td + Tc)⁽³⁾:			
3051S_C, Ranges 2A - 3A:	100 milliseconds	152 milliseconds	
Range 1A:	255 milliseconds	307 milliseconds	
Process Variable Response Time			
3051S SIS, Ranges 2A - 3A:	220 milliseconds	Not Applicable	
Range 1A:	375 milliseconds	Not Applicable	
Dead Time (Td)⁽⁴⁾			
	45 milliseconds (nominal)	97 milliseconds	
Update Rate			
3051S	22 times per second	22 times per second	
3051S SIS	11 times per second	Not Applicable	



- (1) Dead time and update rate apply to all models and ranges; analog output only
- (2) Transmitter fieldbus output only, segment macro-cycle not included.
- (3) Nominal total response time at 75 °F (24 °C) reference conditions. For option code DA1, add 40 milliseconds (nominal) to 4-20 mA (HART®) total response time values.
- (4) For option code DA1, dead time (Td) is 85 milliseconds (nominal).

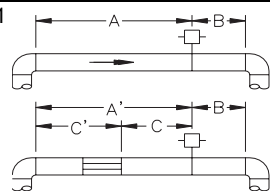
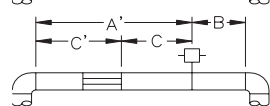
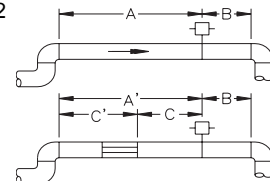
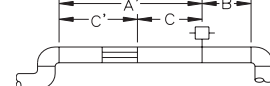
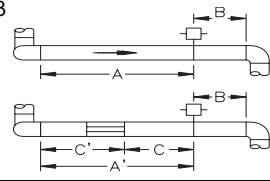
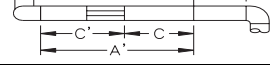
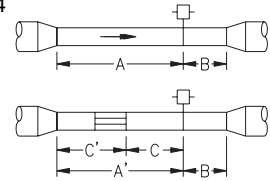
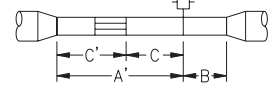
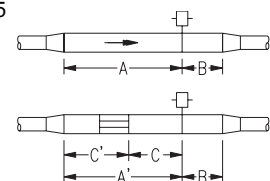
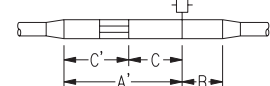
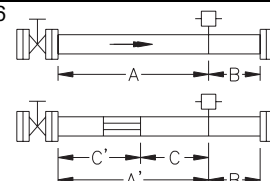
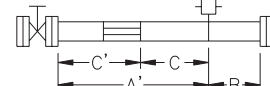
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Straight Run Requirements

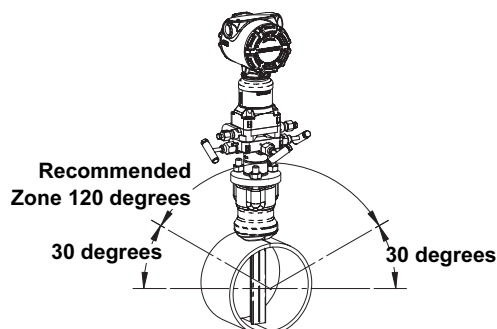
	Upstream Dimensions					Downstream	
	Without Vanes ⁽¹⁾		With Vanes ⁽²⁾				
	In Plane A	Out of Plane A	A'	C	C'		
1		8	10	—	—	—	4
		—	—	8	4	4	4
2		11	16	—	—	—	4
		—	—	8	4	4	4
3		23	28	—	—	—	4
		—	—	8	4	4	4
4		12	12	—	—	—	4
		—	—	8	4	4	4
5		18	18	—	—	—	4
		—	—	8	4	4	4
6		30	30	—	—	—	4
		—	—	8	4	4	4

(1) "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 elbow.

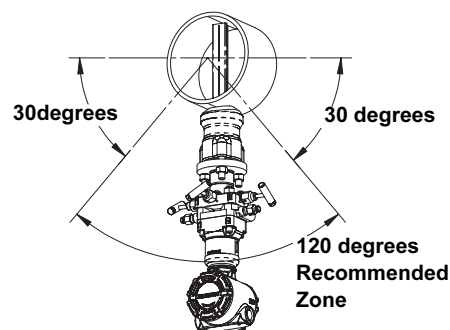
(2) Use straightening vane to reduce the required straight run length.

Flowmeter Orientation

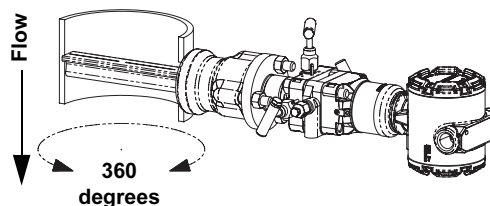
Gas (Horizontal)



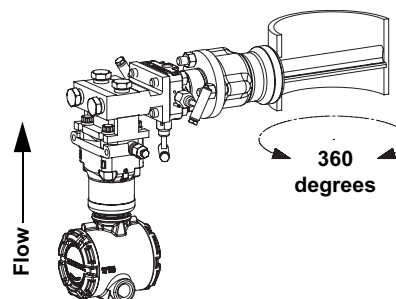
Liquid and Steam (Horizontal)



Gas (Vertical)



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)

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The Annubar Flowmeter Series

Physical

Temperature Measurement

Integral RTD

- 100 Ohm platinum RTD
- 4-wire RTD ($\alpha = 0.00385$)

Remote RTD

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

Thermowell with Remote RTD

- $\frac{1}{2}$ -in. x $\frac{1}{2}$ -in NPT, 316 Stainless Steel with $\frac{1}{2}$ -in. weld couplet to match pipe material

Electronic Connections

$\frac{1}{2}$ –14 NPT, G $\frac{1}{2}$, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 Stainless Steel
- Hastelloy 276

Annubar Type

See “Dimensional Drawings” on page 14

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, bolts and gaskets (constructed from the same material as the pipe material)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Hastelloy: (–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, bolts and gaskets (constructed from the same material as the pipe material)
- –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
 - Teflon® (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 $\frac{1}{4}$ -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 Threaded connection	X			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
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 4. 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, Hastelloy	–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, Hastelloy	–40 to 1250 °F (–40 to 677 °C)

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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

TABLE 5. Flanged Pipe Spool Section Schedule

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

TABLE 6. 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

Integral Manifolds

- 316 SST
- *Hastelloy C-276*

Remote Manifolds

- 316 SST
- *Hastelloy C-276*

Transmitter Vent Valves and Process Flanges

- 316 SST
- *Hastelloy C-276*

Process Isolating Diaphragms

- 316L SST
- *Hastelloy C-276*

O-rings

- Glass-filled TFE

Integral Manifold O-Rings

- Teflon (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

Electronic Housing

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

Paint

- Polyurethane

Bolts

- CS

PRODUCT CERTIFICATIONS

Approved Manufacturing Locations

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

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-20, 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) (89/336/EEC)

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

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).

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)

- 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  II 1G
EEx ia IIC T5 (-60°C ≤ T_a ≤ 40°C)
T4 (-60°C ≤ T_a ≤ 70°C)
T4 (-60°C ≤ T_a ≤ 40°C) (FISCO)
CE 1180


TABLE 7. Input Parameters

Loop / Power	Groups
U _i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / SIS
U _i = 17.5 V	FISCO
I _i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / SIS
I _i = 380 mA	FISCO
P _i = 1.0 W	HART / Remote Display / SIS
P _i = 1.3 W	FOUNDATION fieldbus
P _i = 5.32 W	FISCO
C _i = 30 nF	SuperModule™ Platform
C _i = 11.4 nF	HART / SIS
C _i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L _i = 0	HART / FOUNDATION fieldbus/ SIS / FISCO
L _i = 60 µH	Remote Display

Special conditions for safe use (x)


- The apparatus, excluding the Types 3051 S-T and 3051 S-C (In-line and *Coplanar SuperModules* 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.
- The terminal pins of the Types 3051 S-T and 3051 S-C must be protected to IP20 minimum.

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N1 ATEX Type n
 Certificate No.: BAS01ATEX3304X  II 3 G
 EEx nL IIC T5 ($T_a = -40\text{ }^{\circ}\text{C TO } 70\text{ }^{\circ}\text{C}$)
 $U_i = 45\text{ Vdc max}$
 IP66
CE


Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500V insulation test required by Clause 9.1 of EN 50021: 1999. This must be taken into account when installing the apparatus.

ND ATEX Dust
 Certificate No.: BAS01ATEX1374X  II 1 D
 $T_{105^{\circ}\text{C}} (-20\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq 85\text{ }^{\circ}\text{C})$
 $V_{\text{max}} = 42.4\text{ volts max}$
 $A = 24\text{ mA}$
 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.

E1 ATEX Flameproof
 Certificate No.: KEMA00ATEX2143X  II 1/2 G
 EEx d IIC T6 ($-50\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq 65\text{ }^{\circ}\text{C}$)
 EEx d IIC T5 ($-50\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq 80\text{ }^{\circ}\text{C}$)
 $V_{\text{max}} = 42.4\text{ V}$
CE 1180

Special conditions for safe use (x)

This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime. The Model 3051S pressure transmitter must include a Series 300S housing integrally mounted to a Series Model 3051S Sensor module as per Rosemount drawing 03151-1023.

Japanese Certifications

E4 JIS 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 Hastelloy with Junction Box Housing
TC15687	In-Line SST with PlantWeb Housing
TC15688	In-Line Hastelloy with Plantweb Housing
TC15689	In-Line SST with Plantweb Housing and LCD Display
TC15690	In-Line Hastelloy with PlantWeb Housing and LCD Display

Australian Certifications

E7 SAA Explosion-proof and DIP
 Certification No.: AUS Ex 3798X
 Ex d IIC T6 ($T_a = 60^{\circ}\text{C}$) IP66
 DIP A21 TA T6 ($T_a = 60^{\circ}\text{C}$) IP66

Special conditions for safe use (x)

1. It is a condition of manufacture that each transmitter module shall be pressure tested in accordance with clause 4.3 of AS 2380.2 at minimum pressure of 1450 kPa. As the model 300S housing passed tests at 4 times the reference pressures (400 kPa for single and 3800 kPa for dual compartment housing) and are not of welded construction, they may be exempted from the routing pressure test of clause 4.3 of AS 2380.2.
2. It is a condition of manufacture that each transmitter module and housing combination shall be subjected to a routine high voltage test in accordance with clause 6.2 of AS 2380.1, with the following variation. The test voltage applied to each single or dual compartment housing shall not be less than 500 V, 47 to 62 Hz, for a period of not less than one minute, with a breakdown current of less than 5 mA.
3. It is a condition of safe use that each housing shall be connected to external circuits via suitable conduit or Standards Australia certified cable glands. Where only one entry is used for connection to external circuits, the unused entry shall be closed by means of the blanking plug supplied by the equipment manufacturer or by a suitable Standards Australia certified blanking plug.
4. It is a condition of safe use that a dielectric strength test shall be applied whenever the terminal block is changed or replaced in either the dual compartment or single compartment housings. The breakdown current shall be less than 5 mA, when 500 V, 47 to 62 Hz, is applied for one minute. Note: if tested with an optional T1 transient protector terminal block fitted, the protection will operate and hence there will be no current indicated.
5. It is a condition of safe use that each transmitter module shall be used with a Model 300S housing, in order to comply with flameproof requirements.

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6. It is a condition of safe use that each model 300S housing fitted with a transmitter module shall be marked with the same certification marking code information. Should the housing be replaced after initial supply to another model 300S housing, the replacement housing shall have the same certification marking code information as the housing it replaces.

IECEX Certifications

I7/IG IECEx Intrinsic Safety

Certificate No.: IECExBAS04.0017X

Ex ia IIC T5 ($T_a = -60\text{ °C}$ to 40 °C) -HART/SIS/Remote Meter

Ex ia IIC T4 ($T_a = -60\text{ °C}$ to 70 °C) -HART/SIS/Remote Meter

Ex ia IIC T4 ($T_a = -60\text{ °C}$ to 70 °C) -FOUNDATION Fieldbus

Ex ia IIC T4 ($T_a = -60\text{ °C}$ to 40 °C) -FISCO

IP66

TABLE 8. Input Parameters

Loop / Power	Groups
$U_i = 30\text{ V}$	HART / FOUNDATION fieldbus/ Remote Display / SIS
$U_i = 17.5\text{ V}$	FISCO
$I_i = 300\text{ mA}$	HART / FOUNDATION fieldbus/ Remote Display / SIS
$I_i = 380\text{ mA}$	FISCO
$P_i = 1.0\text{ W}$	HART / Remote Display / SIS
$P_i = 1.3\text{ W}$	FOUNDATION fieldbus
$P_i = 5.32\text{ W}$	FISCO
$C_i = 30\text{ nF}$	<i>SuperModule</i> ™ Platform
$C_i = 11.4\text{ nF}$	HART / SIS
$C_i = 0$	FOUNDATION fieldbus / Remote Display / FISCO
$L_i = 0$	HART / FOUNDATION fieldbus/ SIS / FISCO

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 T5 ($T_a = -40\text{ °C}$ to 70 °C)

$U_i = 45\text{ Vdc MAX}$

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 79-15: 1987.

Combinations of Certifications

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

K1 Combination of E1, I1, N1, and ND

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

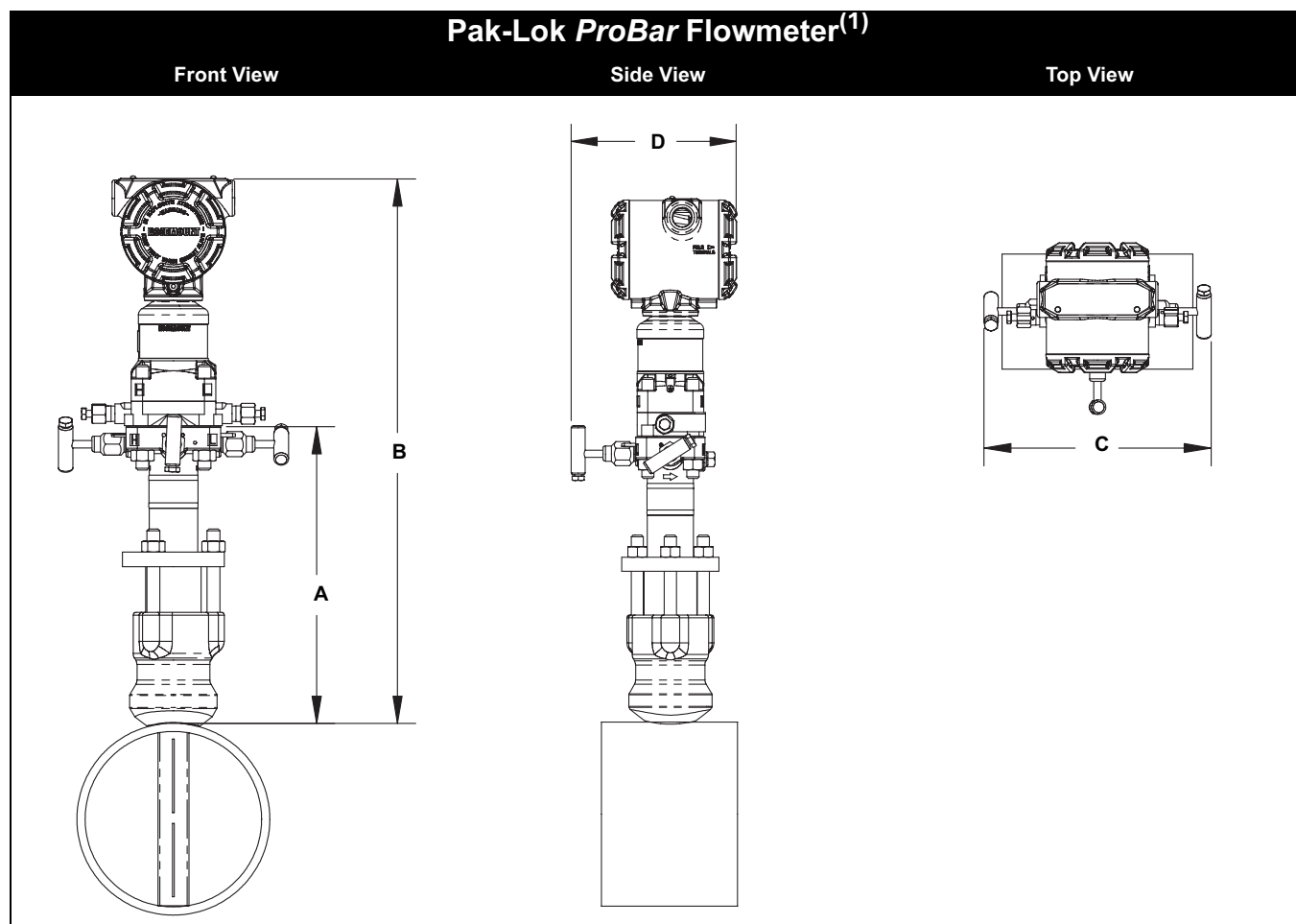
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DIMENSIONAL DRAWINGS

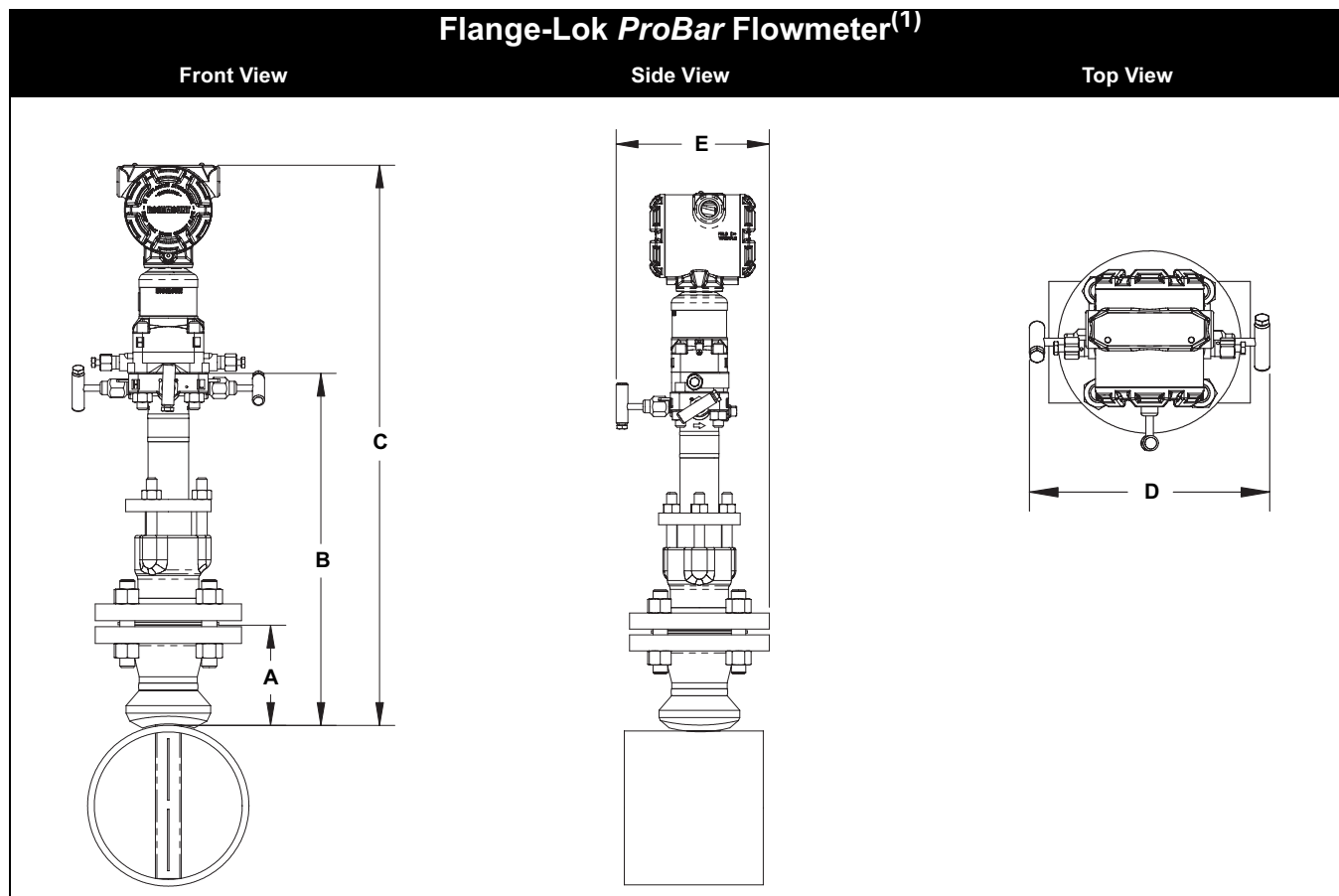


(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

TABLE 9. Pak-Lok ProBar 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)	20.03 (508.8)	9.00 (228.6)	6.90 (175.3)

Dimensions are in inches (millimeters)



(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 10. Flange-Lok ProBar 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	1½ – 150#	3.88 (98.6)	12.25 (311.2)	20.80 (527.8)	9.00 (228.6)	11.25 (285.8)
1	1½ – 300#	4.13 (104.9)	12.25 (311.2)	20.80 (527.8)	9.00 (228.6)	11.25 (285.8)
1	1½ – 600#	4.44 (112.8)	12.25 (311.2)	20.80 (527.8)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	20.80 (527.8)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	20.80 (527.8)	9.00 (228.6)	11.25 (285.8)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	20.80 (527.8)	9.00 (228.6)	11.25 (285.8)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	11.25 (285.8)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	11.25 (285.8)
2	2 – 600#	4.76 (120.9)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN40	3.51 (89.2)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	11.25 (285.8)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	11.25 (285.8)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	11.25 (285.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	11.25 (285.8)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN16	3.84 (97.5)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	11.25 (285.8)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	11.25 (285.8)

Dimensions are in inches (millimeters)

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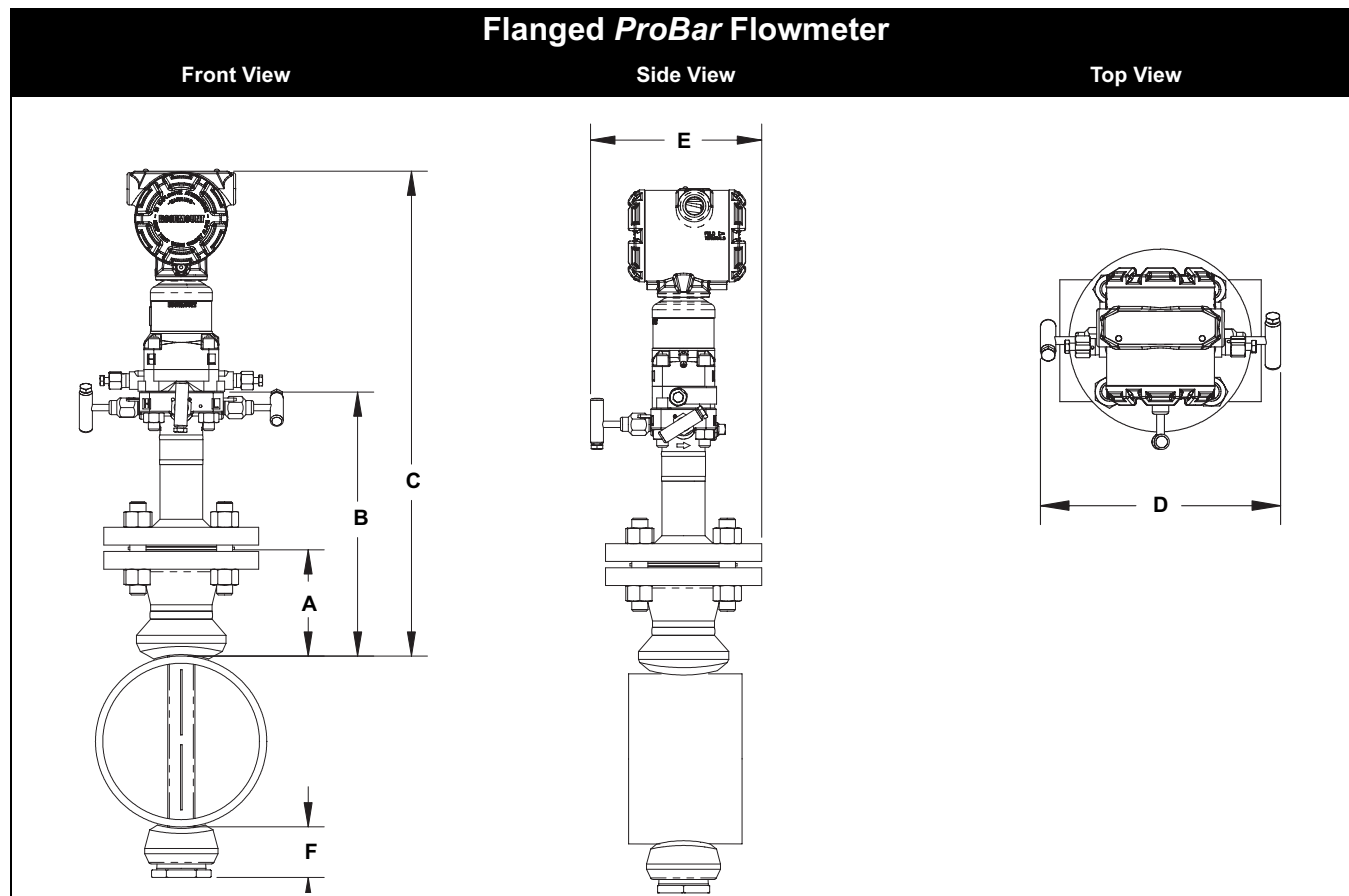


TABLE 11. Flanged *ProBar* Flowmeter Dimensional Data

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	1½ – 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	1½ – 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	1½ – 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	1½ – 900#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1½ – 1500#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1½ – 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 11 Continued on Next Page

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TABLE 11. Flanged *ProBar* Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A \pm 0.125 (3.2)	B \pm 0.25 (6.4)	C \pm 0.25 (6.4)	D (Max)	E (Max)	F (Max)
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)

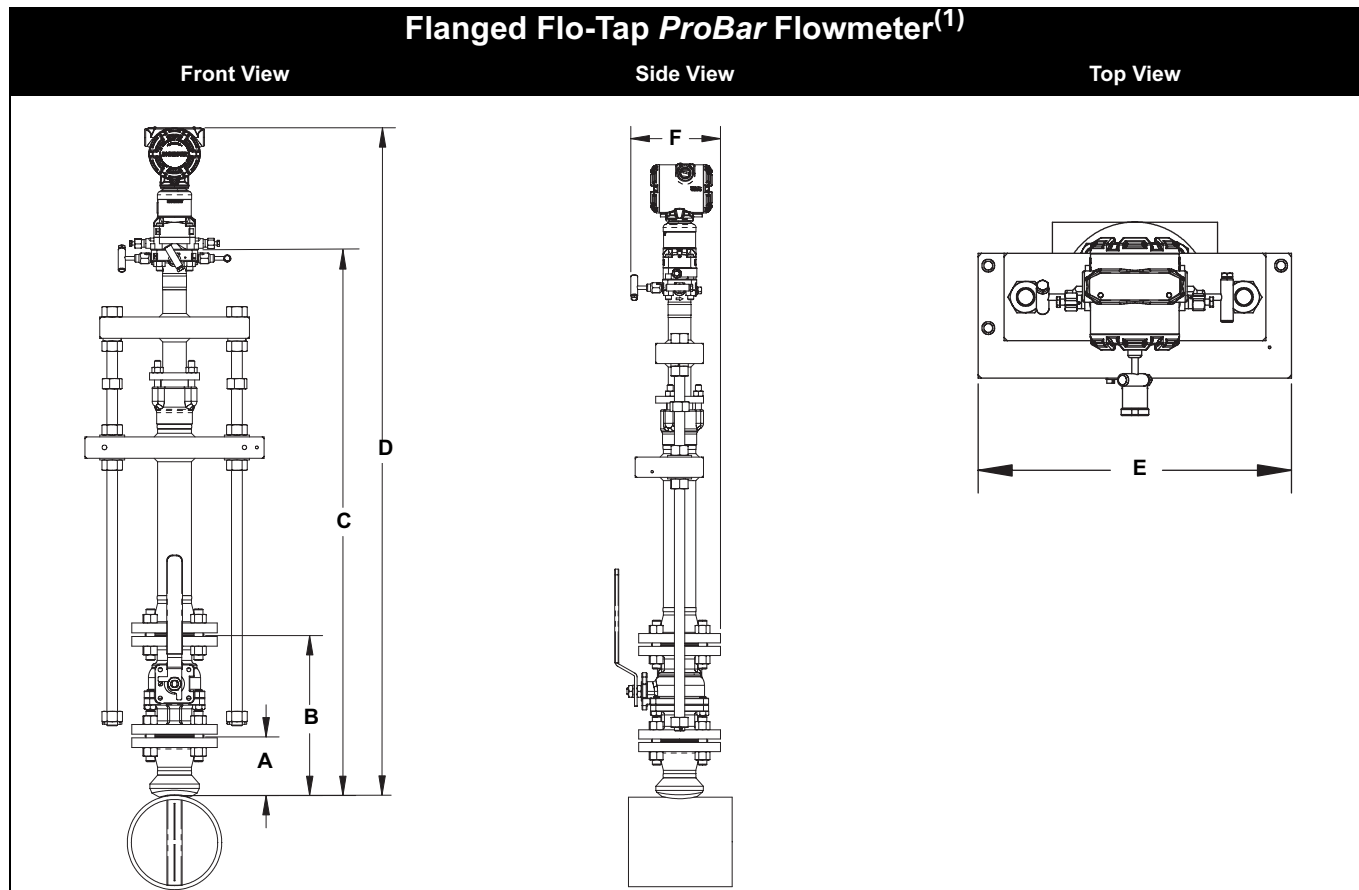
Dimensions are in inches (millimeters)

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

TABLE 12. Flanged Flo-Tap *ProBar* Flowmeter Dimensional Data

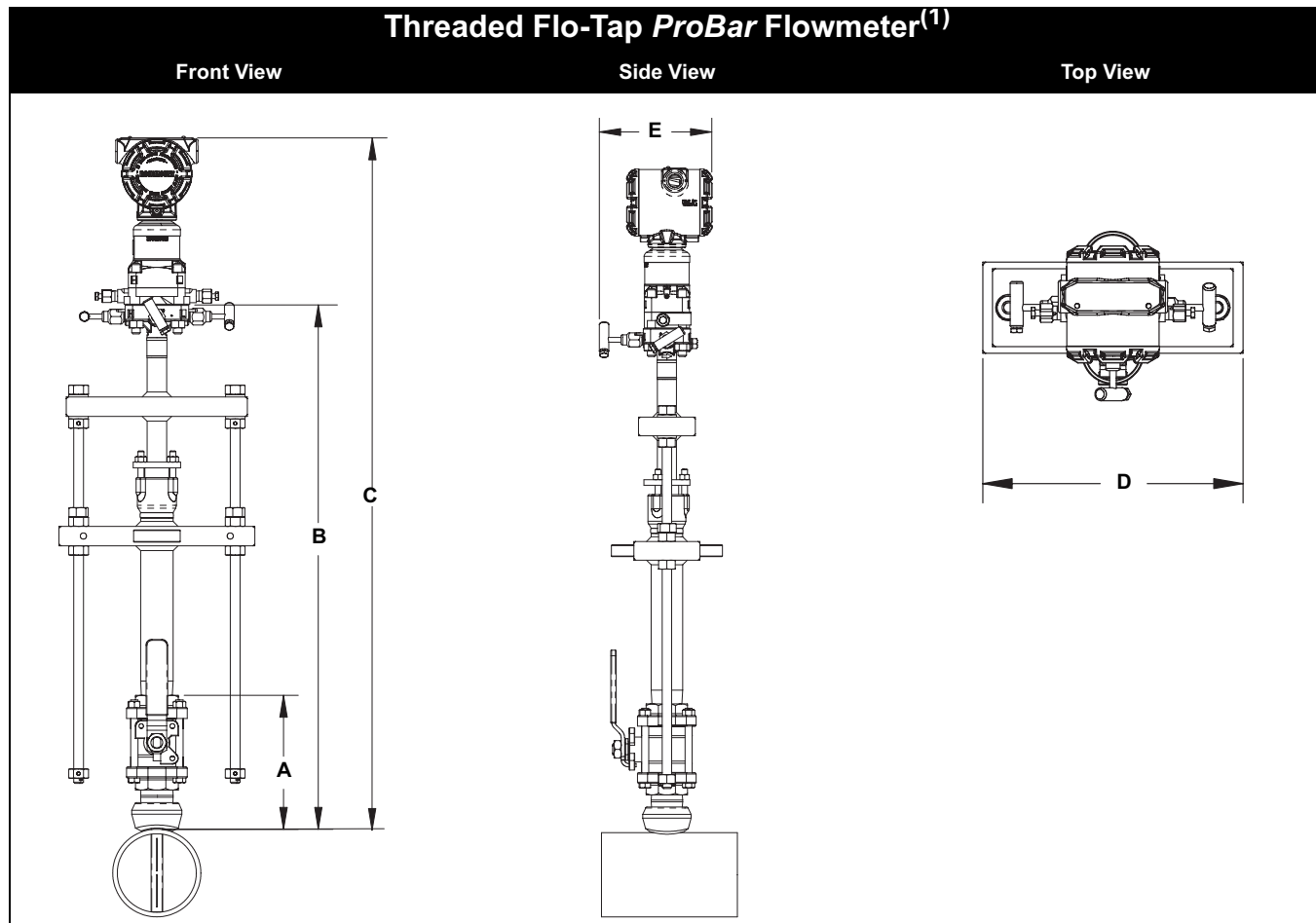
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ¹ (Max) (Gear Drive)	C ¹ (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1½ – 150#	3.88 (98.5)	10.50 (266.7)	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	11.25 (285.8)
1	1½ – 300#	4.13 (104.9)	11.75 (298.5)	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	11.25 (285.8)
1	1½ – 600#	4.44 (112.8)	14.06 (357.2)	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN16	3.09 (78.5)	See Note.	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN40	3.21 (81.5)	See Note.	—	17.9 (454.7)	C + 8.53 (216.7)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN100	3.88 (98.6)	See Note.	—	17.9 (454.7)	C + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + 8.53 (216.7)	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 + C¹

Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C¹



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

TABLE 13. Threaded Flo-Tap ProBar 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

The Annubar Flowmeter Series

ORDERING INFORMATION

Rosemount 3051SFA ProBar Flowmeter Ordering Information

Model	Product Description		
3051SFA	ProBar Flowmeter		
Code	Measurement Type		
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 the “Pipe I.D. Range Code—measured in inches (millimeters)” on page 26)		
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	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 ⁽¹⁾	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	Hastelloy C-276		

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Rosemount 3051SFA ProBar Flowmeter Ordering Information

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 ⁽²⁾	900# RF ANSI
AF ⁽²⁾	1500# RF ANSI
AT ⁽²⁾	2500 # RF ANSI
D1	DN PN16 Flange
D3	DN PN40 Flange
D6	DN PN100 Flange
R9 ⁽²⁾	900# RTJ Flange
RF ⁽²⁾	1500# RTJ Flange
RT ⁽²⁾	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	
	<i>Packing Gland Material</i>
J	Stainless Steel Packing Gland / Cage Nipple
K	Stainless Steel Packing Gland / Cage Nipple
L	Stainless Steel Packing Gland / Cage Nipple
N	Stainless Steel Packing Gland / Cage Nipple
R	Hastelloy Packing Gland / Cage Nipple
	<i>Rod Material</i>
J	Carbon Steel
K	Stainless Steel
L	Carbon Steel
N	Stainless Steel
R	Stainless Steel
	<i>Packing Material</i>
J	Teflon
K	Teflon
L	Graphite
N	Graphite
R	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 ⁽¹⁾	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	Differential Pressure Ranges
1A	0 to 25 in H ₂ O (0 to 62.2 mbar)
2A	0 to 250 in H ₂ O (0 to 623 mbar)
3A	0 to 1000 in H ₂ O (0 to 2.5 bar)

The Annubar Flowmeter Series

Rosemount 3051SFA ProBar Flowmeter Ordering Information

Code	Output Protocol		
A	4–20 mA with digital signal based on <i>HART</i> protocol		
B ⁽³⁾	4–20 mA Safety Certified with digital signal based on <i>HART</i> protocol		
F ⁽⁴⁾	<i>FOUNDATION</i> fieldbus protocol		
Code	Electronics Housing Style	Material	Conduit Entry Size
1A	<i>PlantWeb</i> Housing	Aluminum	1/2-14 NPT
1B	<i>PlantWeb</i> Housing	Aluminum	M20 x 1.5 (CM20)
1C	<i>PlantWeb</i> Housing	Aluminum	G ^{1/2}
1J	<i>PlantWeb</i> Housing	316L SST	1/2-14 NPT
1K	<i>PlantWeb</i> Housing	316L SST	M20 x 1.5 (CM20)
1L	<i>PlantWeb</i> Housing	316L SST	G ^{1/2}
2A	Junction Box Housing	Aluminum	1/2-14 NPT
2B	Junction Box Housing	Aluminum	M20 x 1.5 (CM20)
2C	Junction Box Housing	Aluminum	G ^{1/2}
2E	Junction Box housing with output for remote display and interface	Aluminum	1/2-14 NPT
2F	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5 (CM20)
2G	Junction Box housing with output for remote display and interface	Aluminum	G ^{1/2}
2J	Junction Box Housing	316L SST	1/2-14 NPT
2M	Junction Box housing with output for remote display and interface	316L SST	1/2-14 NPT
7J ⁽⁵⁾	Quick Connect (A size Mini, 4-pin male termination)	316L SST	
Code	Electronics Performance Class		
3 ⁽⁶⁾	Ultra for Flow: up to 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty		
1 ⁽⁶⁾	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		
Code	Options		
Pressure Testing			
P1 ⁽⁷⁾	Hydrostatic Testing with Certificate		
PX ⁽⁷⁾	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 ⁽⁸⁾	Material Certificate per ISO 10474 3.1.B and EN 10204 3.1.B		

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Rosemount 3051SFA ProBar Flowmeter Ordering Information

Code Conformance

J1	Canadian Registration
J2 ⁽⁹⁾	ANSI B31.1
J3 ⁽⁹⁾	ANSI B31.3
J4 ⁽⁹⁾	ANSI B31.8
J5 ⁽¹⁰⁾	NACE MR-0175 / ISO 15156
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, <i>Hastelloy</i>
G5	OS&Y Gate Valve, Carbon Steel
G6	OS&Y Gate Valve, Stainless Steel
G7	OS&Y Gate Valve, <i>Hastelloy</i>

Special Shipment

Y1	Mounting Hardware Shipped Separately
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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
QP	Calibration Data Certificate and Tamper Evident Seal

Safety Certification

QS	Certificate of FMEDA data
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Product Certifications

E1	ATEX Flameproof
I1	ATEX Intrinsically Safe
N1	ATEX Type n
IA ⁽¹¹⁾	ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only
K1	ATEX Flameproof, Intrinsically Safe, Type n, and Dust (combination of E1, I1, N1, and ND)
ND	ATEX Dust
E5	FM Explosion-proof
I5	FM Intrinsically Safe, Non-incendive
IE ⁽¹¹⁾	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only
K5	FM Explosion-proof, Intrinsically Safe, Non-incendive (combination of E5 and I5)
E6	CSA Explosion-proof, Division 2
I6	CSA Intrinsically Safe
IF ⁽¹¹⁾	CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only
K6	CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)
E7 ⁽¹¹⁾	SAA Flameproof, Dust Ignition-proof
I7	IECEx Intrinsically Safe
IG ⁽¹¹⁾	IECEx FISCO Intrinsically Safe
N7	IECEx Type n
K7	SAA Flameproof, Dust Ignition-proof, IECEx Intrinsically Safe, and Type n (combination of E7, I7, and N7)
KA	ATEX and CSA Flameproof, Intrinsically Safe (combination of E1, I1, E6, and I6) <i>Note: Only available on Housing Style codes IA, IJ, 2A, 2J, 2E, or 2M.</i>
KB	FM and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6) <i>Note: Only available on Housing Style codes IA, IJ, 2A, 2J, 2E, or 2M.</i>
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Non-incendive (combination of E5, E1, I5, and I1) <i>Note: Only available on Housing Style codes IA, IJ, 2A, 2J, 2E, or 2M.</i>
KD	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1) <i>Note: Only available on Housing Style codes IA, IJ, 2A, 2J, 2E, or 2M.</i>

The Annubar Flowmeter Series

Rosemount 3051SFA ProBar Flowmeter Ordering Information

Alternate Transmitter Materials of Construction

L1	Inert Sensor Fill Fluid
L2	Graphite-Filled Teflon® (PTFE) O-Ring
LA	Inert Sensor Fill Fluid and Graphite-Filled Teflon (PTFE) O-ring

Display⁽¹²⁾

M5	PlantWeb LCD display
M7 ⁽⁶⁾⁽¹³⁾	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket
M8 ⁽⁶⁾⁽¹³⁾	Remote mount LCD display and interface, PlantWeb housing, 50 foot cable, SST bracket
M9 ⁽⁶⁾⁽¹³⁾	Remote mount LCD display and interface, PlantWeb housing, 100 foot cable, SST bracket

Terminal Blocks

T1 ⁽¹²⁾	Transient terminal block
T2 ⁽¹⁴⁾	Terminal block with WAGO® spring clamp terminals
T3 ⁽¹⁴⁾	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, Hastelloy C
F5	5-Valve Manifold, Carbon Steel
F6	5-Valve Manifold, Stainless Steel
F7	5-Valve Manifold, Hastelloy C

PlantWeb Control Functionality

A01 ⁽¹⁵⁾	FOUNDATION fieldbus Advanced Control Function Block Suite
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PlantWeb Diagnostic Functionality

D01 ⁽¹⁵⁾	FOUNDATION fieldbus Diagnostics Suite
DA1 ⁽¹⁶⁾	HART Diagnostic Suite

PlantWeb Enhanced Measurement Functionality

H01 ⁽¹⁵⁾⁽¹⁷⁾	Fully Compensated Mass Flow Block
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Special Configuration (Software)

C4 ⁽¹⁸⁾	NAMUR alarm and saturation signal levels, high alarm
C5 ⁽¹⁸⁾	NAMUR alarm and saturation signal levels, low alarm
C6 ⁽⁶⁾⁽¹⁸⁾	Custom alarm and saturation signal levels, high alarm <i>Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see page 59.</i>
C7 ⁽⁶⁾⁽¹⁸⁾	Custom alarm and saturation signal levels, low alarm <i>Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see page 59.</i>
C8 ⁽¹⁸⁾	Low alarm (standard Rosemount alarm and saturation signal levels)

Special Configuration (Hardware)

D1 ⁽¹⁸⁾	Hardware Adjustment (zero, span, security)
D4	External Ground Screw
DA ⁽¹⁸⁾	Hardware Adjustment (zero, span, security) and External Ground Screw

Conduit Electrical Connector

GE ⁽¹⁹⁾	M12, 4-pin, Male Connector (eurofast®)
GM ⁽¹⁹⁾	A size Mini, 4-pin, Male Connector (minifast®)

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

- (1) Provide the "A" dimension for Flanged, Flange-Lok, and Threaded Flo-Tap models. Provide the "B" dimension for Flange Flo-Tap models.
- (2) Available in remote mount applications only.
- (3) Requires PlantWeb housing and Hardware Adjustments option code D1.
- (4) Requires PlantWeb housing.
- (5) Available with output code A only. Available approvals are FM Intrinsically Safe, Non-incendive (option code I5) or ATEX Intrinsically Safe (option code I1). Contact an Emerson Process Management representative for additional information.
- (6) Not available with output protocol code B.
- (7) Applies to assembled flowmeter only, mounting not tested.
- (8) Isolation and Instrument valves not included in Traceability Certification.

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(9) *Not available with Electronics Connection Platform 6.*

(10) *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.*

(11) *Consult factory for availability.*

(12) *Not available with Housing code 7J.*

(13) *Not available with Output Protocol code F or option code DA1.*

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

(15) *Requires PlantWeb housing and output code F.*

(16) *Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard. Contact an Emerson Process Management representative regarding availability.*

(17) *Requires Rosemount 3095 Engineering Assistant to configure.*

(18) *Not available with Output Protocol code F.*

(19) *Not available with Housing code 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Non-incendive approval (option code I5) or FM FISCO Intrinsically Safe approval (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain NEMA 4X rating.*

The Annubar Flowmeter Series

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

See "Rosemount 3051SFA ProBar Flowmeter Ordering Information" on page 20

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 (CDS)" on page 59. The Emerson process Management Sizing program will determine this code, based on the application piping.

	Line Size		Option Code	Pipe Wall Thickness		I.D. Range Code
	Nominal	Max. O.D.		Inner Diameter (I.D.) Range	ANSI Pipes Non-ANSI Pipes	
Sensor Size 1	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)	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
	2½-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)	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)	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
	3½-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)	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
				3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	E
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.826 to 4.026-in. (97.18 to 102.26 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	B
				4.027 to 4.237-in. (102.29 to 107.62 mm)	0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.238 to 4.437-in. (107.65 to 112.70 mm)	0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.438 to 4.571-in. (112.73 to 116.10 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	4.572 to 4.812-in. (116.13 to 122.22 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	A
				4.813 to 5.047-in. (122.25 to 128.19 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	B
				5.048 to 5.249-in. (128.22 to 133.32 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	C
				5.250 to 5.472-in. (133.35 to 139.99 mm)	0.134 to 0.380-in. (3.4 to 9.7 mm)	D
	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.473 to 5.760-in. (139.01 to 146.30 mm)	0.134 to 0.413-in. (3.4 to 10.5 mm)	A
				5.761 to 6.065-in. (146.33 to 154.05 mm)	0.134 to 0.3919-in. (3.4 to 9.9 mm)	B
				6.066 to 6.383-in. (154.08 to 162.13 mm)	0.134 to 0.327-in. (3.4 to 8.3 mm)	C
					0.134 to 0.31-in. (3.4 to 7.9 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 0.297-in. (3.4 to 7.5 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)	0.134 to 1.067-in. (3.4 to 27.1 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)	0.134 to 1.05-in. (3.4 to 26.7 mm)	D
	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 1.037-in. (3.4 to 26.3 mm)	A
				6.625 to 7.023-in. (168.28 to 178.38 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				7.024 to 7.392-in. (178.41 to 187.76 mm)	0.134 to 0.216-in. (3.4 to 5.5 mm)	C
					0.134 to 0.246-in. (3.4 to 6.2 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 1.354-in. (3.4 to 34.4 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)	0.134 to 0.956-in. (3.4 to 24.3 mm)	D
					0.134 to 0.986-in. (3.4 to 25.0 mm)	E
	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)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)	0.250 to 0.374-in. (6.4 to 9.5 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)	0.250 to 0.312-in. (6.4 to 7.9 mm)	E
	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 0.364-in. (6.4 to 9.2 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)	0.250 to 1.114-in. (6.4 to 28.3 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)	0.250 to 1.052-in. (6.4 to 26.7 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 1.104-in. (6.4 to 28.0 mm)	A
				9.173 to 9.561-in. (232.99 to 242.85 mm)	0.250 to 1.065-in. (6.4 to 27.1 mm)	B
				9.562 to 10.020-in. (242.87 to 254.51 mm)	0.250 to 1.082-in. (6.4 to 27.5 mm)	C
				10.021 to 10.546-in. (254.53 to 267.87 mm)	0.250 to 1.012-in. (6.4 to 25.7 mm)	D
	12-in. (300 mm)	13.0375-in. (331.15 mm)	120	10.547 to 10.999-in. (267.89 to 279.37 mm)	0.250 to 0.945-in. (6.4 to 24.0 mm)	E
				11.000 to 11.373-in. (279.40 to 288.87 mm)	0.250 to 1.018-in. (6.4 to 25.9 mm)	A
				11.374 to 11.938-in. (288.90 to 303.23 mm)	0.250 to 1.097-in. (6.4 to 27.9 mm)	B
				11.939 to 12.250-in. (303.25 to 311.15 mm)	0.250 to 0.906-in. (6.4 to 23.0 mm)	C
					0.250 to 1.159-in. (6.4 to 29.4 mm)	D

Rosemount 3095MFA Mass *ProBar* Flowmeter

SPECIFICATIONS

Performance

System Reference Accuracy

±0.90% (8: 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 14. 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)

Where

d = Probe width (feet)

v = Velocity of fluid (ft/sec)

ρ = Density of fluid (lbm/ft³)

μ = Viscosity of the fluid (lbm/ft-sec)

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

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

Turndown

8:1 flow turndown

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.

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 Electronics

- 500 °F (260 °C)
- 750 °F (400 °C) when used with a direct mount, high temperature 5-valve manifold (Electronics Connection Platform code 6)

Remote Mount Electronics

- 1250 °F (677 °C) – *Hastelloy* Sensor Material
- 850 °F (454 °C) – Stainless Steel Sensor Material

Electronics Temperature Limits

Ambient

- –40 to 185 °F (–40 to 85 °C)
- With Integral Mount LCD Display: –4 to 175 °F (–20 to 80 °C)

Storage

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

Pressure and Temperature Limits⁽¹⁾

Direct Mount Electronics

- 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 Electronics

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

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.

(1) Static pressure selection may effect pressure limitations.

The Annubar Flowmeter Series

Product Data Sheet

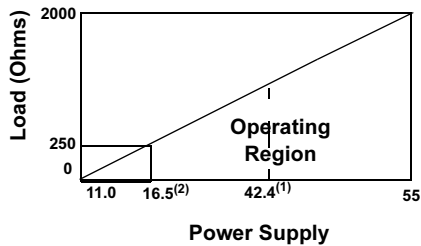
00813-0100-4809, Rev EA

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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.

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 Block

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

Output Splitter Block

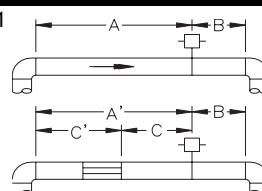
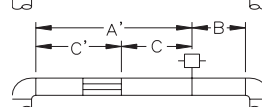
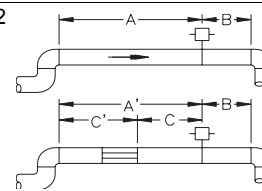
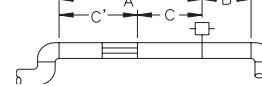
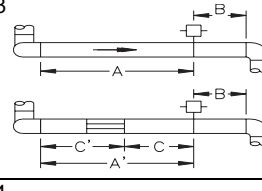
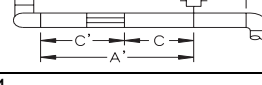
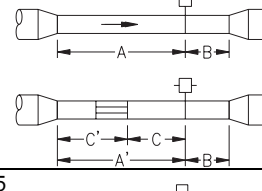
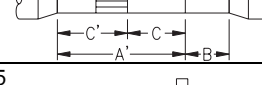
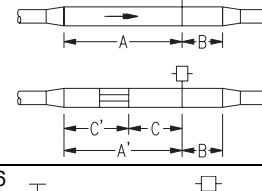
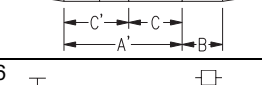
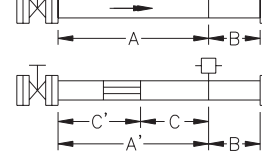
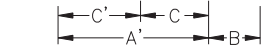
- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

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

Installation Considerations.

Straight Run Requirements

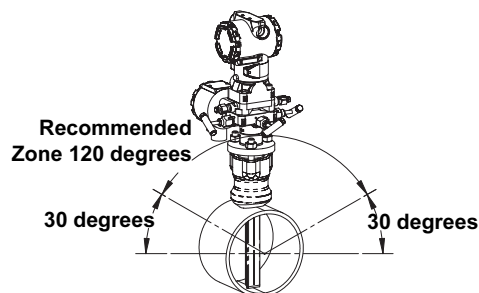
	Upstream Dimensions					Downstream	
	Without Vanes ⁽¹⁾		With Vanes ⁽²⁾				
	In Plane A	Out of Plane A	A'	C	C'		
1		8	10	—	—	—	4
		—	—	8	4	4	4
2		11	16	—	—	—	4
		—	—	8	4	4	4
3		23	28	—	—	—	4
		—	—	8	4	4	4
4		12	12	—	—	—	4
		—	—	8	4	4	4
5		18	18	—	—	—	4
		—	—	8	4	4	4
6		30	30	—	—	—	4
		—	—	8	4	4	4

(1) "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 elbow.

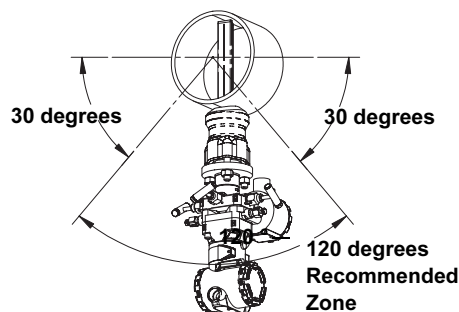
(2) Use straightening vane to reduce the required straight run length.

Flowmeter Orientation

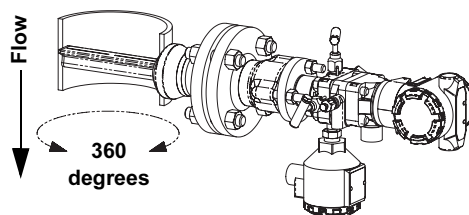
Gas (Horizontal)



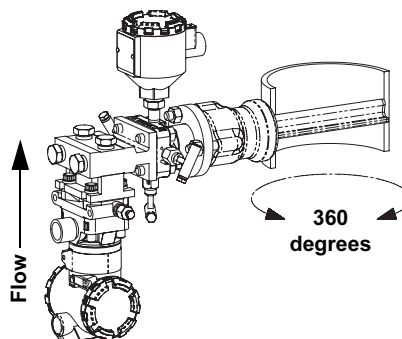
Liquid and Steam (Horizontal)



Gas (Vertical)



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)

The Annubar Flowmeter Series

Product Data Sheet

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Physical

Temperature Measurement

Integral RTD

- 100 Ohm platinum RTD
- 4-wire RTD ($\alpha = 0.00385$)

Remote RTD

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

Thermowell

- $\frac{1}{2}$ -in. x $\frac{1}{2}$ -in NPT, 316 Stainless Steel with $\frac{1}{2}$ -in. Weld coupling material to match process pipe.

Electronic Connections

$\frac{1}{2}$ -14 NPT, G $\frac{1}{2}$, and M20 \times 1.5 (CM20) conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 Stainless Steel
- Hastelloy 276

Annubar Type

See "Dimensional Drawings" on page 33

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, bolts and gaskets (constructed from the same material as the pipe material)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Hastelloy: (–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, bolts and gaskets (constructed from the same material as the pipe material)
- –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
 - Teflon® (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 $\frac{1}{4}$ -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 Threaded connection	X			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
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 15. 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, Hastelloy	–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, Hastelloy	–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

TABLE 16. Flanged Pipe Spool Section Schedule

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

TABLE 17. 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)

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  II 1 G
EEx ia IIC T5 ($T_{amb} = -45^{\circ}\text{C}$ to 40°C)
EEx ia IIC T4 ($T_{amb} = -45^{\circ}\text{C}$ to 70°C)
CE 1180

TABLE 18. Connection Parameters (Power/Signal Terminals)

$U_i = 30\text{V}$
$I_i = 200\text{ mA}$
$P_i = 1.0\text{ W}$
$C_i = 0.012\text{ }\mu\text{F}$
$L_i = 0$

TABLE 19. Temperature Sensor Connection Parameters


$U_o = 30\text{V}$
$I_o = 19\text{ mA}$
$P_o = 140\text{ mW}$
$C_i = 0.002\text{ }\mu\text{F}$
$L_i = 0$

TABLE 20. Temp Sensor Terminals Connection Parameters

$C_o = 0.066\text{ }\mu\text{F}$	Gas Group IIC
$C_o = 0.560\text{ }\mu\text{F}$	Gas Group IIB
$C_o = 1.82\text{ }\mu\text{F}$	Gas Group IIA
$L_o = 96\text{ mH}$	Gas Group IIC
$L_o = 365\text{ mH}$	Gas Group IIB
$L_o = 696\text{ mH}$	Gas Group IIA
$L_o/R_o = 247\text{ }\mu\text{H}/\text{ohm}$	Gas Group IIC
$L_o/R_o = 633\text{ }\mu\text{H}/\text{ohm}$	Gas Group IIB
$L_o/R_o = 633\text{ }\mu\text{H}/\text{ohm}$	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  II 3 G
EEx nL IIC T5 ($T_{amb} = -45^{\circ}\text{C}$ to 40°C)
EEx nL IIC T4 ($T_{amb} = -45^{\circ}\text{C}$ to 70°C)
 $U_i = 55\text{V}$
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  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  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

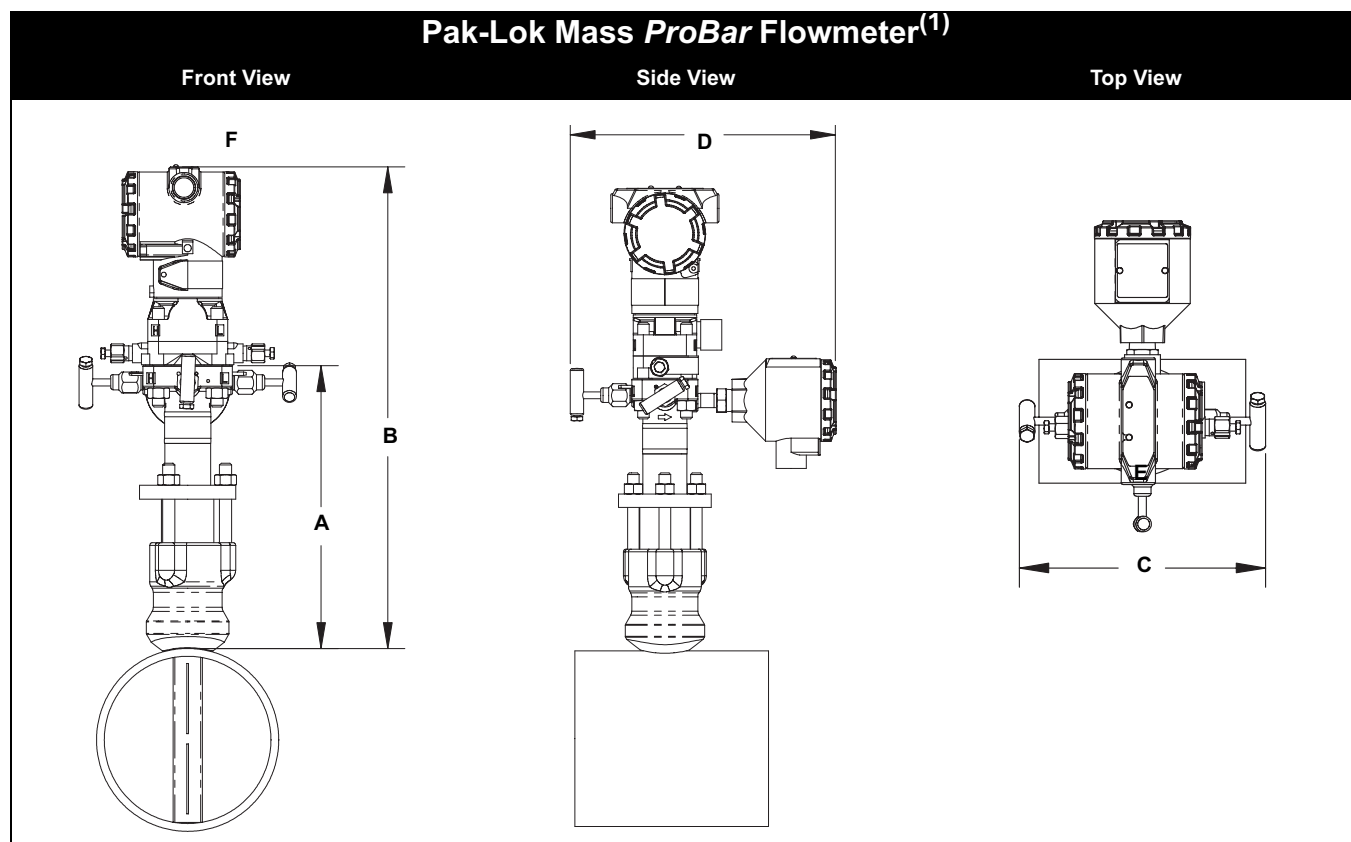
European Certifications

IA ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

Australian Certifications

IG IECEx FISCO Intrinsic Safety

DIMENSIONAL DRAWINGS



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

TABLE 21. Pak-Lok Mass *ProBar* 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)

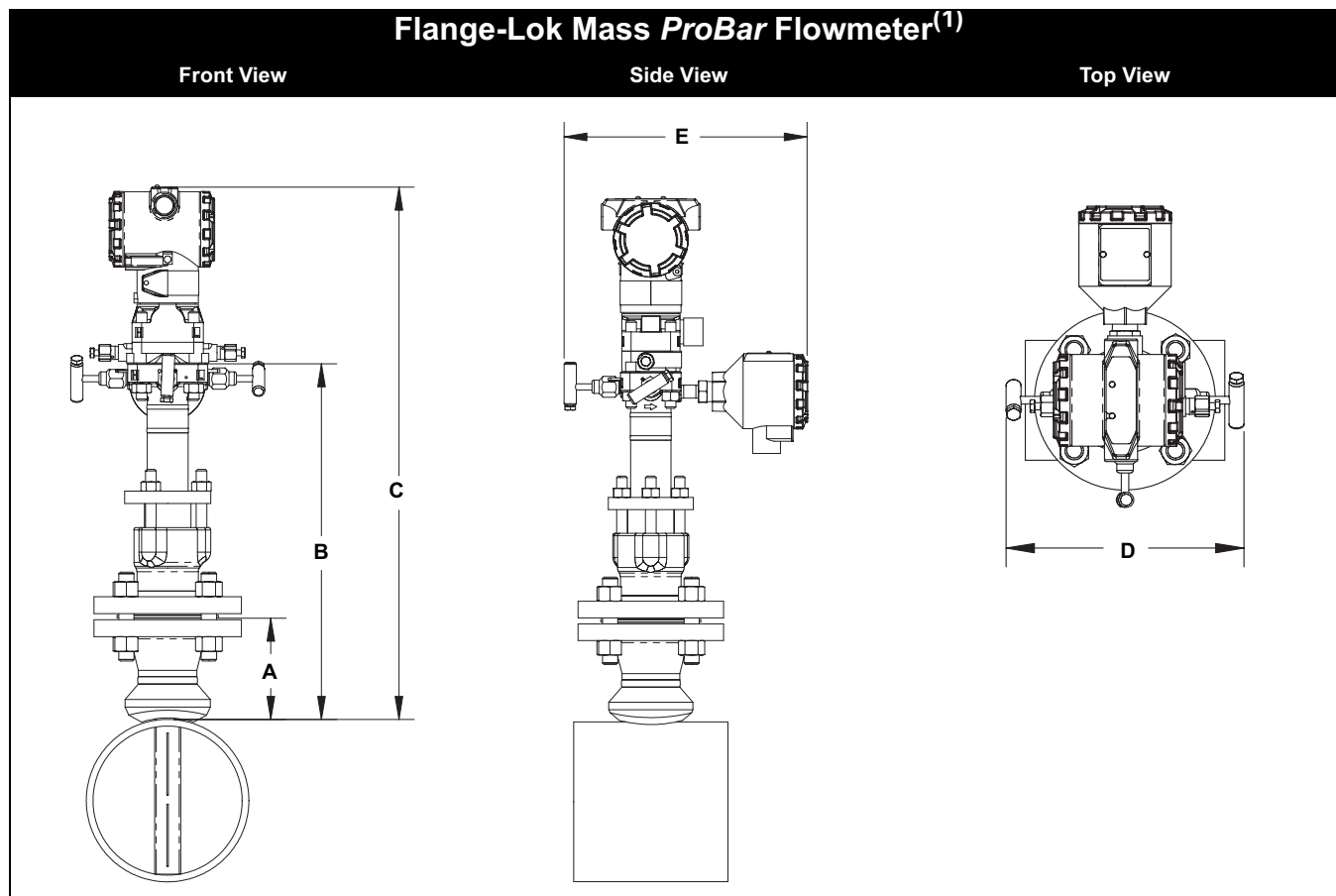
Dimensions are in inches (millimeters)

The Annubar Flowmeter Series

Product Data Sheet

00813-0100-4809, Rev EA

June 2006



(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 22. Flange-Lok Mass *ProBar* 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	1½ – 150#	3.88 (98.6)	12.25 (311.2)	19.32 (490.7)	9.00 (228.6)	11.25 (285.8)
1	1½ – 300#	4.13 (104.9)	12.25 (311.2)	19.32 (490.7)	9.00 (228.6)	11.25 (285.8)
1	1½ – 600#	4.44 (112.8)	12.25 (311.2)	19.32 (490.7)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	19.32 (490.7)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	19.32 (490.7)	9.00 (228.6)	11.25 (285.8)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	19.32 (490.7)	9.00 (228.6)	11.25 (285.8)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	21.32 (541.5)	9.00 (228.6)	11.25 (285.8)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	21.32 (541.5)	9.00 (228.6)	11.25 (285.8)
2	2 – 600#	4.76 (120.9)	14.25 (362.0)	21.32 (541.5)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	21.32 (541.5)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN40	3.51 (89.2)	14.25 (362.0)	21.32 (541.5)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN100	4.30 (109.2)	14.25 (362.0)	21.32 (541.5)	9.00 (228.6)	11.25 (285.8)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	24.57 (624.1)	9.00 (228.6)	11.25 (285.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	24.57 (624.1)	9.00 (228.6)	11.25 (285.8)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	24.57 (624.1)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN16	3.84 (97.5)	17.50 (444.5)	24.57 (624.1)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	24.57 (624.1)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN100	4.95 (125.7)	17.50 (444.5)	24.57 (624.1)	9.00 (228.6)	11.25 (285.8)

Dimensions are in inches (millimeters)

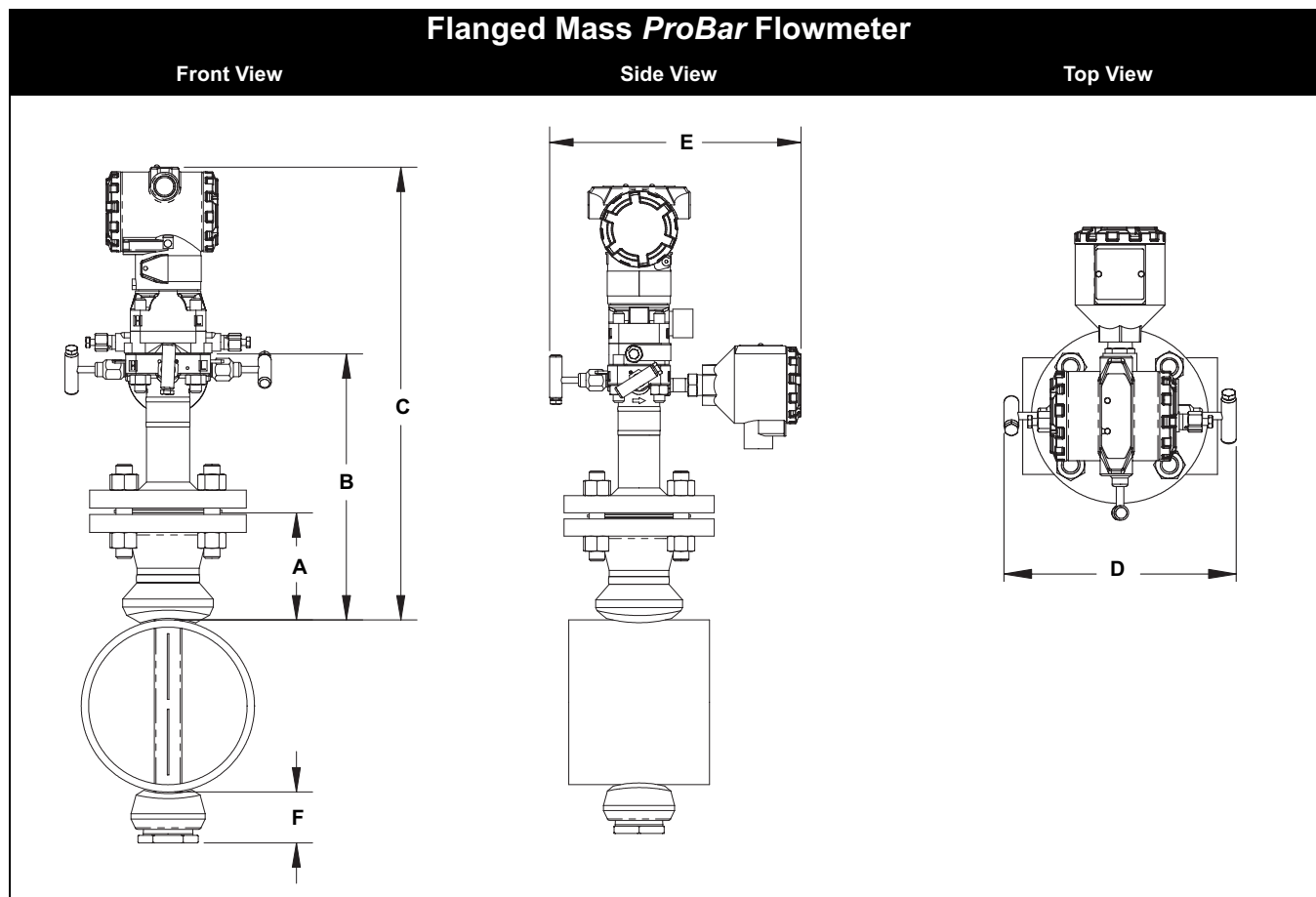


TABLE 23. Flanged Mass *ProBar* Flowmeter Dimensional Data

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	1½ – 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	1½ – 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	1½ – 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	1½ – 900#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1½ – 1500#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1½ – 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)	6.80 (172.7)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 600#	4.76 (120.9)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN40	3.51 (89.2)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	19.10 (485.1)	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)	20.60 (523.2)	9.00 (228.6)	7.55 (191.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)

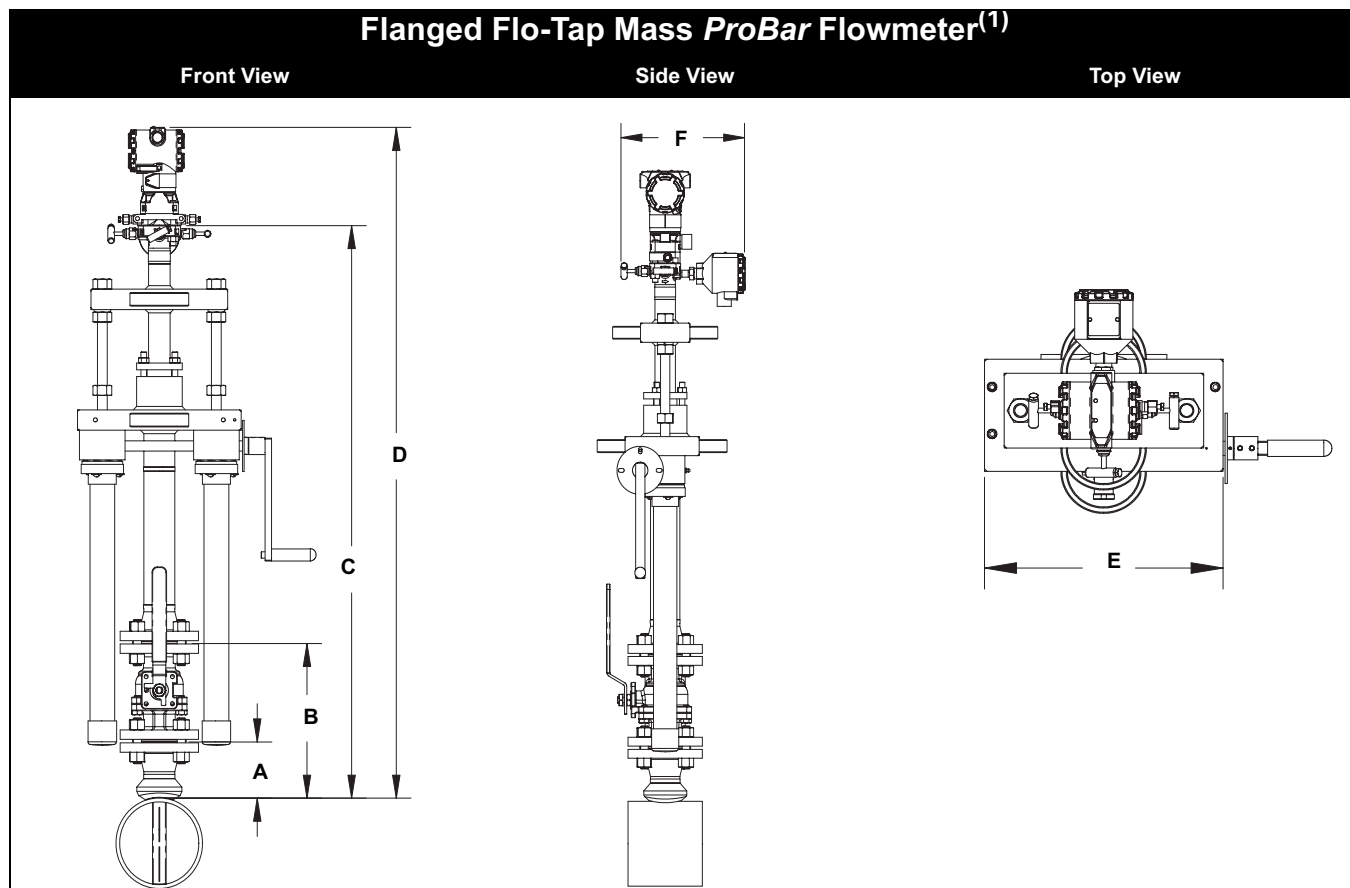
Table 23 Continued on Next Page

The Annubar Flowmeter Series

TABLE 23. Flanged Mass *ProBar* Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A \pm 0.125 (3.2)	B \pm 0.25 (6.4)	C \pm 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.84 (97.5)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.44 (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)



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

TABLE 24. Flanged Flo-Tap Mass *ProBar* Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ¹ (Max) (Gear Drive)	C ¹ (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1½ – 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	1½ – 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	1½ – 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 + C¹

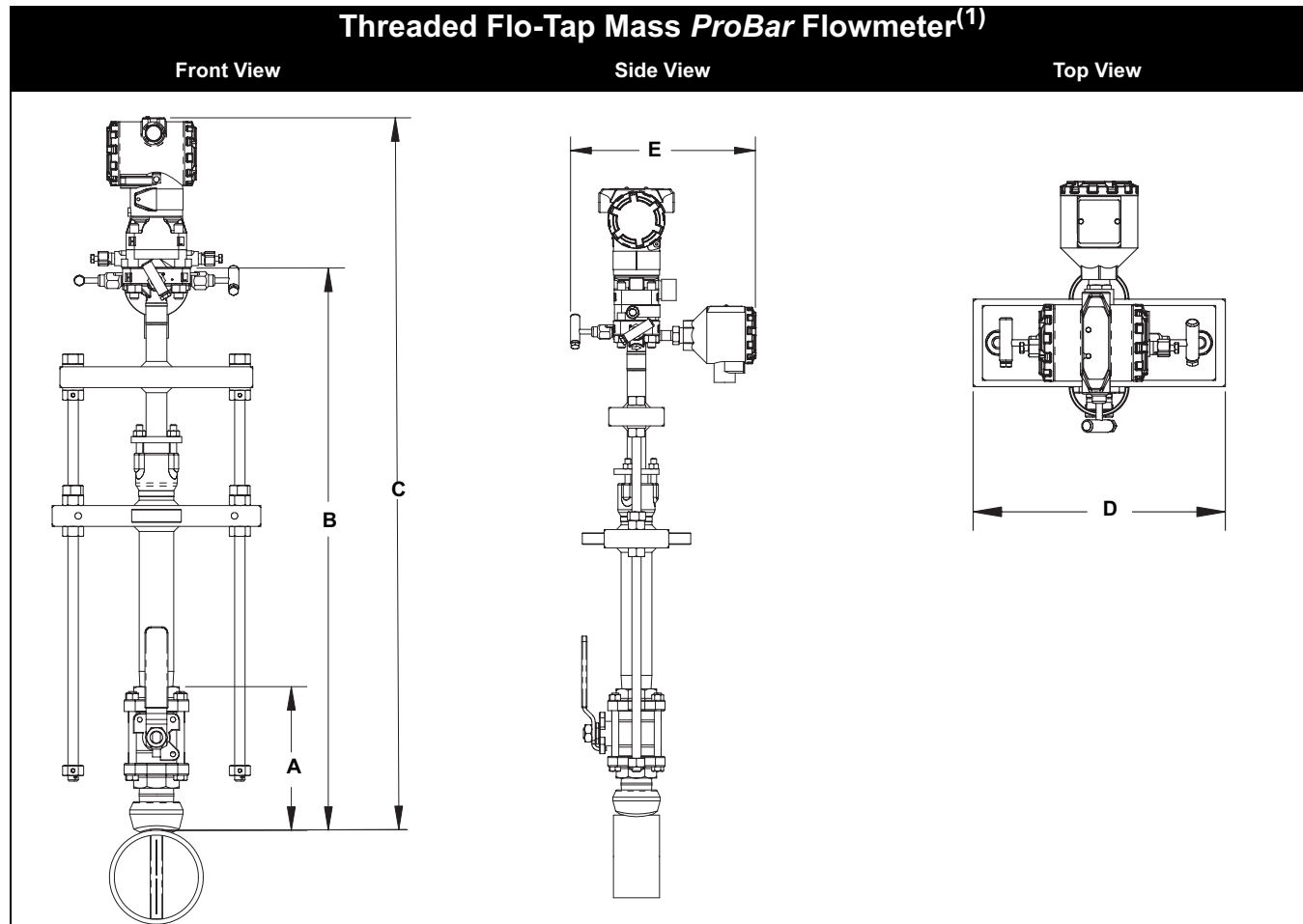
Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C¹

The Annubar Flowmeter Series

Product Data Sheet

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

TABLE 25. Threaded Flo-Tap Mass *ProBar* 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

Product Data Sheet

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June 2006

The Annubar Flowmeter Series

ORDERING INFORMATION

Rosemount 3095MFA Mass *ProBar* Flowmeter Ordering Information

Model	DP Flow Flowmeter Type		
3095MFA	Mass <i>ProBar</i> 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	2½-in. (63.5 mm)	200	20-in. (500 mm)
030	3-in. (80 mm)	240	24-in. (600 mm)
035	3½-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 the “Pipe I.D. Range Code—measured in inches (millimeters)” on page 43)		
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 / Assembly Material		
C	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 ⁽¹⁾	No Mounting (Customer Supplied)		
Code	Piping Orientation		
H	Horizontal Piping		
D	Vertical Piping with Downwards Flow		
U	Vertical Piping with Upwards Flow		
Code	<i>Annubar</i> 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	<i>Hastelloy</i> C-276		

The Annubar Flowmeter Series

Rosemount 3095MFA Mass *ProBar* Flowmeter Ordering Information

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/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
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	
	<i>Packing Gland Material</i> <i>Rod Material</i> <i>Packing Material</i>
J	Stainless Steel Packing Gland / Cage Nipple Carbon Steel Teflon
K	Stainless Steel Packing Gland / Cage Nipple Stainless Steel Teflon
L	Stainless Steel Packing Gland / Cage Nipple Carbon Steel Graphite
N	Stainless Steel Packing Gland / Cage Nipple Stainless Steel Graphite
R	Hastelloy 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 ⁽¹⁾	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	Differential Pressure Ranges
1	0 to 25 in H ₂ O (0 to 62.2 mbar) – not available with Sensor Material code H
2	0 to 250 in H ₂ O (0 to 623 mbar)
3	0 to 1000 in H ₂ O (0 to 2.5 bar)

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00813-0100-4809, Rev EA

June 2006

The Annubar Flowmeter Series

Rosemount 3095MFA Mass *ProBar* Flowmeter Ordering Information

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)	
Code	Output Protocol	
A	4–20 mA with digital signal based on <i>HART</i> protocol	
V	<i>FOUNDATION</i> fieldbus protocol	
Code	Transmitter Housing Material	Conduit Entry Size
1A	Polyurethane-covered aluminum	1/2-14 NPT
1B	Polyurethane-covered aluminum	M20 x 1.5 (CM20)
1C	Polyurethane-covered aluminum	PG 13.5
1J	SST	1/2-14 NPT
1K	SST	M20 x 1.5 (CM20)
1L	SST	PG 13.5
Code	Options	
Performance Class		
U3 ⁽²⁾	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 ⁽³⁾	Advanced Control Function Block Suite	
Pressure Testing		
P1 ⁽⁴⁾	Hydrostatic Testing with Certificate	
PX ⁽⁴⁾	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 ⁽⁵⁾	Material Certificate per ISO 10474 3.1.B and EN 10204 3.1.B	
Code Conformance		
J1	Canadian Registration	
J2 ⁽⁶⁾	ANSI B31.1	
J3 ⁽⁶⁾	ANSI B31.3	
J4 ⁽⁶⁾	ANSI B31.8	
J5 ⁽⁷⁾	NACE MR-0175 / ISO 15156	
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	

The Annubar Flowmeter Series

Rosemount 3095MFA Mass *ProBar* Flowmeter Ordering Information

Instrument Connections for Remote Mount Option

G1	Needle Valves, Carbon Steel
G2	Needle Valves, Stainless Steel
G3	Needle Valves, <i>Hastelloy</i>
G5	OS&Y Gate Valve, Carbon Steel
G6	OS&Y Gate Valve, Stainless Steel
G7	OS&Y Gate Valve, <i>Hastelloy</i>

Special Shipment

Y1	Mounting Hardware Shipped Separately
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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
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Product Certifications

E5	FM Approvals Explosion-proof
I5	FM Approvals Intrinsic Safety and Non-Incendive
K5	FM Approvals Explosion-proof, Intrinsic Safety, and Non-Incendive (combination of E5 and I5)
E6	CSA Explosion-proof
I6	CSA Intrinsically Safe
K6	CSA Explosion-proof, Intrinsic Safety, and Non-Incendive (combination of E6 and I6)
I1	ATEX Intrinsic Safety
E1	ATEX Flameproof
N1	ATEX Type n
ND	ATEX Dust
K1	ATEX Flameproof, Intrinsic Safety, Type n, and Dust (combination of E1, I1, N1, and ND)
IE ⁽⁸⁾	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only
IF ⁽⁸⁾	CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only
IA ⁽⁸⁾	ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only
IG ⁽⁸⁾	IECEx FISCO Intrinsically Safe

Alternate Transmitter Materials of Construction

L1	Inert Sensor Fill Fluid
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Display

M5	Integral mount LCD display
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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, <i>Hastelloy C</i>
F5	5-Valve Manifold, Carbon Steel
F6	5-Valve Manifold, Stainless Steel
F7	5-Valve Manifold, <i>Hastelloy C</i>

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

- (1) Provide the "A" dimension for Flanged, Flange-Lok, and Threaded Flo-Tap models. Provide the "B" dimension for Flange Flo-Tap models.
- (2) Ultra for Flow applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.
- (3) Function Blocks include: Arithmetic, Integrator, Analog Output, Signal Characterizer, Control Selector, and Output Selector.
- (4) Applies to assembled flowmeter only, mounting not tested.
- (5) Isolation and Instrument valves not included in Traceability Certification.
- (6) Not available with Electronics Connection Platform 6.
- (7) Materials of Construction comply with recommendations per 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.
- (8) Consult factory for availability.

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

See "Rosemount 3095MFA Mass ProBar Flowmeter Ordering Information" on page 39

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 (CDS)" on page 59. The Emerson process Management sizing program will determine this code, based on the application piping.

Line Size				Pipe Wall Thickness		I.D. Range Code
Nominal	Max. O.D.	Option Code	Inner Diameter (I.D.) Range	ANSI Pipes	Non-ANSI Pipes	
2-in. (50 mm)	2.625-in. (66.68 mm)	020	1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
			1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
			1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
			2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
2½-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
3½-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
			3.735 to 3.825-in. (94.87 to 97.16 mm)		0.120 to 0.510-in. (3.0 to 13.0 mm)	E
4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.826 to 4.026-in. (97.18 to 102.26 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.400-in. (3.0 to 10.2 mm)	B
			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
			4.438 to 4.571-in. (112.73 to 116.10 mm)		0.134 to 0.481-in. (3.4 to 12.2 mm)	A
5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.572 to 4.812-in. (116.13 to 122.22 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
			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
			5.250 to 5.472-in. (133.35 to 138.99 mm)		0.134 to 0.3919-in. (3.4 to 9.9 mm)	A
Sensor Size 1 6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.473 to 5.760-in. (139.01 to 146.30 mm)	0.134 to 0.614-in. (3.4 to 15.6 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
			6.384 to 6.624-in. (162.15 to 168.25 mm)		0.134 to 1.132-in. (3.4 to 28.7 mm)	A
Sensor Size 2 6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.473 to 5.760-in. (139.01 to 146.30 mm)	0.134 to 1.354-in. (3.4 to 34.4 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
			6.384 to 6.624-in. (162.15 to 168.25 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
Sensor Size 1 7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.625 to 7.023-in. (168.28 to 178.38 mm)	0.134 to 0.614-in. (3.4 to 15.6 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
			7.393 to 7.624-in. (187.78 to 193.65 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
Sensor Size 2 7-in. (180 mm)	7.93-in. (201.42 mm)	070	7.982 to 8.400-in. (202.74 to 213.36 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 0.956-in. (3.4 to 24.3 mm)	C
			8.401 to 8.766-in. (213.39 to 222.66 mm)		0.134 to 0.986-in. (3.4 to 25.0 mm)	D
			8.767 to 9.172-in. (222.68 to 232.97 mm)		0.250 to 0.499-in. (6.4 to 12.6 mm)	B
			9.173 to 9.561-in. (232.99 to 242.85 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
Sensor Size 1 8-in. (200 mm)	9.688-in. (246.08 mm)	080	9.562 to 10.020-in. (242.87 to 254.51 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.312-in. (6.4 to 7.9 mm)	D
			10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
			10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 1.239-in. (6.4 to 31.4 mm)	B
			11.000 to 11.373-in. (279.40 to 288.87 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
Sensor Size 2 8-in. (200 mm)	9.688-in. (246.08 mm)	080	11.374 to 11.938-in. (288.90 to 303.23 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.052-in. (6.4 to 26.7 mm)	D
			11.939 to 12.250-in. (303.25 to 311.15 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
			12.251 to 12.624-in. (311.18 to 320.68 mm)		0.250 to 1.065-in. (6.4 to 27.1 mm)	A
			12.625 to 13.020-in. (320.70 to 330.80 mm)		0.250 to 1.082-in. (6.4 to 27.5 mm)	B
10-in. (250 mm)	11.75-in. (298.45 mm)	100	12.021 to 10.546-in. (254.53 to 267.87 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.012-in. (6.4 to 25.7 mm)	C
			10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 0.945-in. (6.4 to 24.0 mm)	D
			10.999 to 11.373-in. (279.40 to 288.87 mm)		0.250 to 1.018-in. (6.4 to 25.9 mm)	E
			11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 1.097-in. (6.4 to 27.9 mm)	B
12-in. (300 mm)	13.0375-in. (331.15 mm)	120	11.939 to 12.250-in. (303.25 to 311.15 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 0.906-in. (6.4 to 23.0 mm)	C
					0.250 to 1.159-in. (6.4 to 29.4 mm)	D

The Annubar Flowmeter Series

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 26. 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)

Where

d = Probe width (feet)

$R_d = \frac{d \times v \times \rho}{\mu}$ v = Velocity of fluid (ft/sec)

ρ = Density of fluid (lbm/ft³)

μ = Viscosity of the fluid (lbm/ft-sec)

Sizing

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

Flow Turndown

10:1 or better

Annubar Sensor Surface Finish

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

Functional

Service

- Liquid
- Gas
- Steam

Process Temperature Limits

Direct Mount Electronics

- 500 °F (260 °C)
- 750 °F (400 °C) when used with a direct mount, high temperature 5-valve manifold (Electronics Connection Platform code 6)

Remote Mount Electronics

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

Pressure and Temperature Limits⁽¹⁾

Direct Mount Electronics

- 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

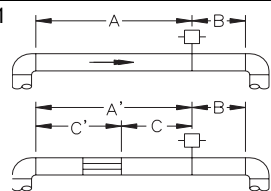
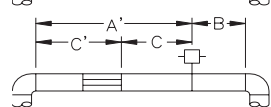
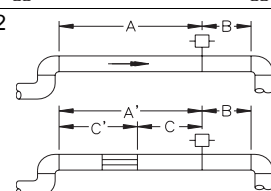
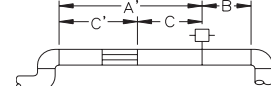
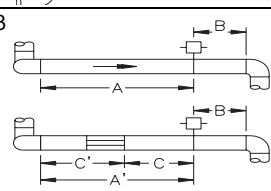

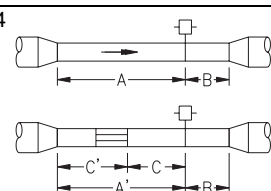

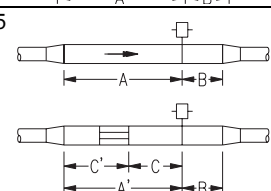
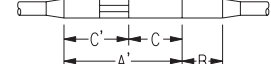
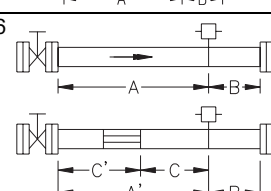
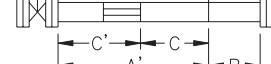
Remote Mount Electronics

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

(1) Static pressure selection may effect pressure limitations.

Installation Considerations

Straight Run Requirements⁽¹⁾

		Upstream Dimensions					Downstream
		Without Vanes ⁽²⁾		With Vanes ⁽³⁾			
		In Plane A	Out of Plane A	A'	C	C'	
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

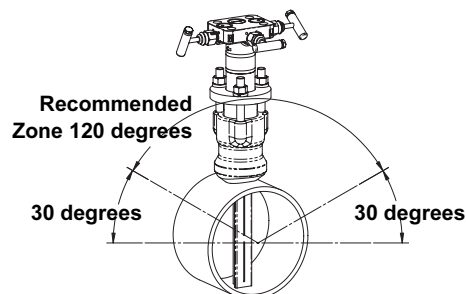
(1) Consult the factory for instructions regarding use in square or rectangular ducts.

(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 elbow.

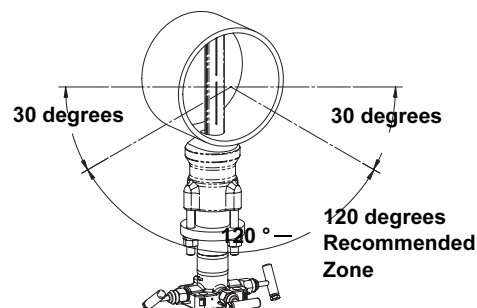
(3) Use straightening vane to reduce the required straight run length.

Flowmeter Orientation

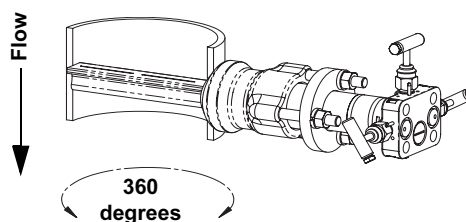
Gas (Horizontal)



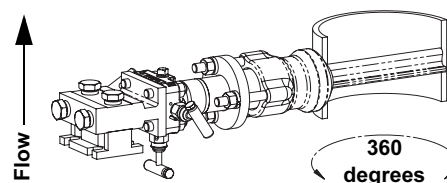
Liquid and Steam (Horizontal)



Gas (Vertical)



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)

The Annubar Flowmeter Series

Product Data Sheet

00813-0100-4809, Rev EA

June 2006

Physical

Temperature Measurement

Integral RTD

- 100 Ohm platinum RTD
- 4-wire RTD ($\alpha = 0.00385$)

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.

Electronic Connections

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

Annubar Sensor Material

- 316 Stainless Steel
- Hastelloy 276

Annubar Type

See "Dimensional Drawings" on page 48

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, bolts and gaskets (constructed from the same material as the pipe material)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Hastelloy: (–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, bolts and gaskets (constructed from the same material as the pipe material)
- –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
 - Teflon® (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 Threaded connection	X			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
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 27. 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, Hastelloy	–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, Hastelloy	–40 to 1250 °F (–40 to 677 °C)

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The Annubar Flowmeter Series

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.

TABLE 28. Flanged Pipe Spool Section Schedule

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

TABLE 29. 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)

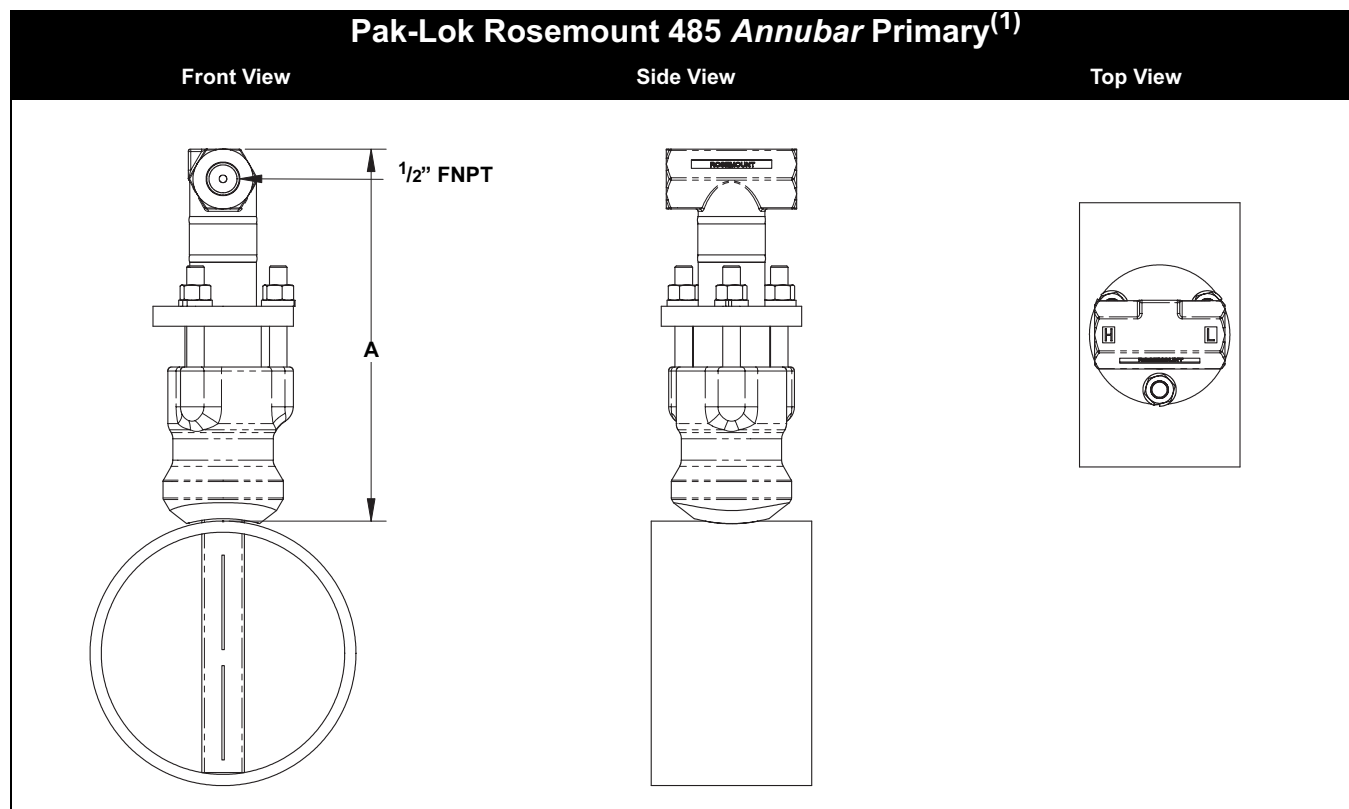
The Annubar Flowmeter Series

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DIMENSIONAL DRAWINGS

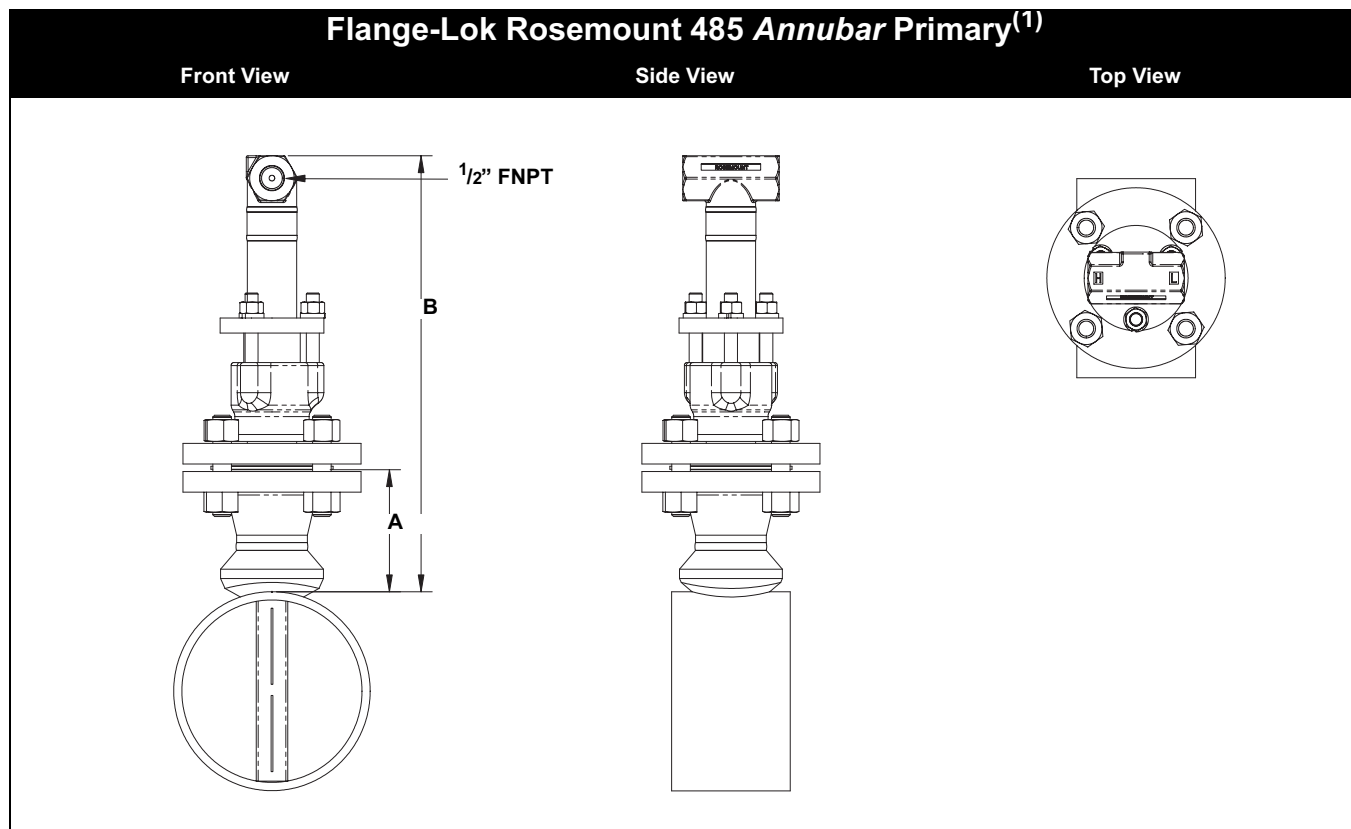


(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

TABLE 30. 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)



(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 31. 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)

The Annubar Flowmeter Series

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Flanged 485 Annubar Primary

Front View

Side View

Top View

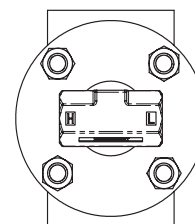
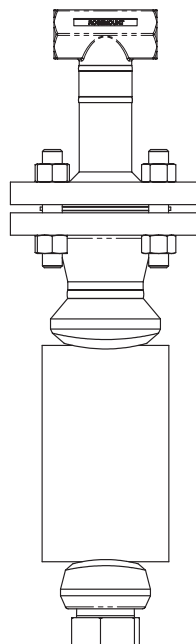
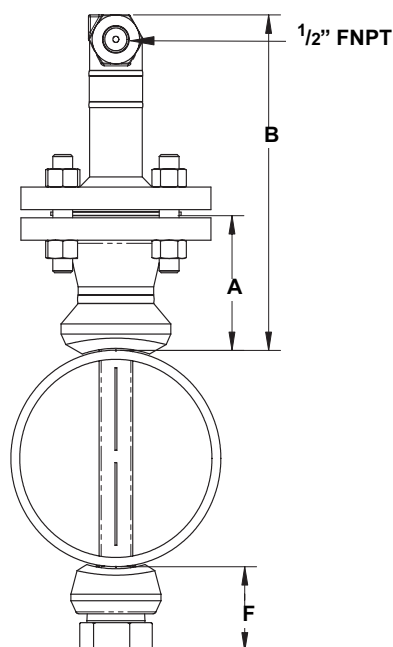


TABLE 32. Flanged Mass *ProBar* Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
1	1½ – 150#	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1½ – 300#	4.13 (104.9)	11.00 (279.4)	3.50 (88.9)
1	1½ – 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	1½ – 900#	4.94 (125.5)	9.32 (236.6)	3.50 (88.9)
1	1½ – 1500#	4.94 (125.5)	9.32 (236.6)	3.50 (88.9)
1	1½ – 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

The Annubar Flowmeter Series

TABLE 32. Flanged Mass *ProBar* Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A \pm 0.125 (3.2)	B \pm 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)

The Annubar Flowmeter Series

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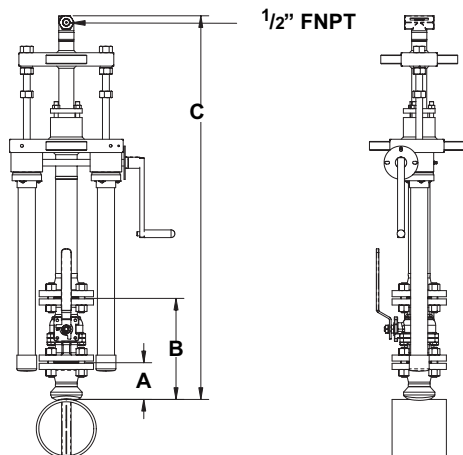
Flanged Flo-Tap 485 Annubar Primary

Front View

Side View

Top View

Gear Drive



Front View

Side View

Top View

Manual

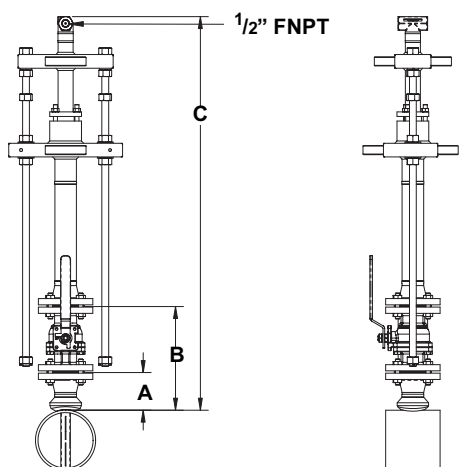


TABLE 33. Flanged Flo-Tap 485 Annubar Primary Dimensional Data

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

Table 33 Continued on Next Page

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The Annubar Flowmeter Series

TABLE 33. 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 ¹ (Max) (Gear Drive)	C ¹ (Max) (Manual)
3	3 – 600#	5.38 (136.7)	19.50 (495.4)	26.5 (673.1)	23.3 (591.8)
3	DN80/PN16	3.84 (97.5)	12.75 (323.9)	26.5 (673.1)	23.3 (591.8)
3	DN80/PN40	4.16 (105.7)	16.25 (412.8)	26.5 (673.1)	23.3 (591.8)
3	DN80/PN100	4.95 (125.7)	19.50 (495.4)	26.5 (673.1)	23.3 (591.8)

Use the appropriate formula to determine C value:

Inserted formula: Pipe I.D. + Wall Thickness + Value B + C¹ (use the Manual Drive or Gear drive values for C¹)

Retracted formula: [2 x (Pipe I.D. + Wall Thickness + Value B)] + C¹ (use the Manual Drive or Gear drive values for C¹)

Dimensions are in inches (millimeters)

The Annubar Flowmeter Series

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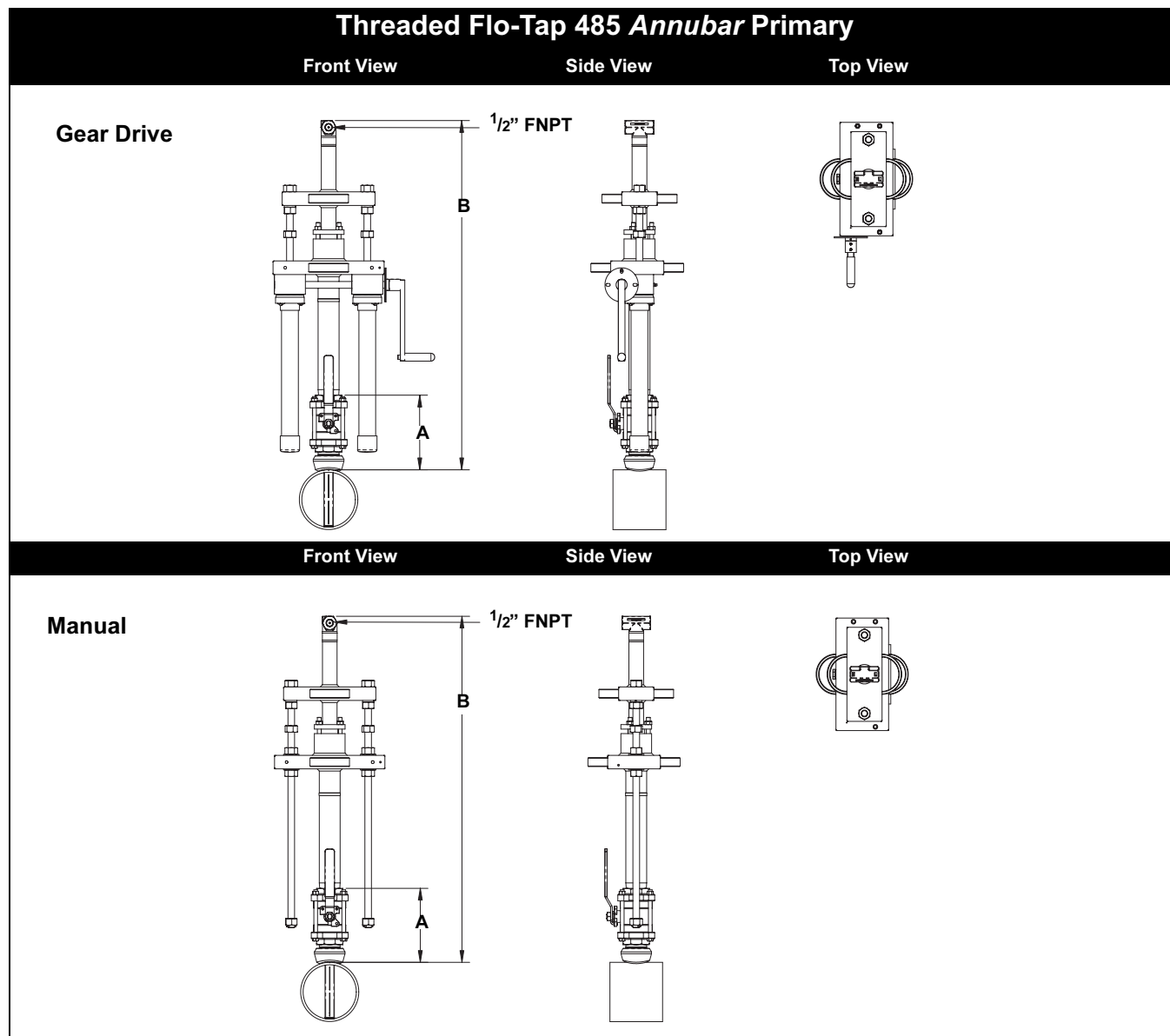


TABLE 34. Threaded Flo-Tap 485 Annubar Primary Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B ^I (Max) (Gear Drive)	B ^I (Max) (Manual)
1	6.76 (171.8)	—	17.40 (442.0)
2	8.17 (207.5)	23.70 (602.0)	20.80 (528.3)

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

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The Annubar Flowmeter Series

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 the “Pipe I.D. Range Code–measured in inches (millimeters)” on page 58)		
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 / Assembly Material		
C	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 ⁽¹⁾	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	Hastelloy C-276		

The Annubar Flowmeter Series

Rosemount 485 Annubar Primary Ordering Information

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/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		
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			
	<i>Packing Gland Material</i>	<i>Rod Material</i>	<i>Packing Material</i>
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Teflon
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Teflon
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite
R	Hastelloy 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 ⁽¹⁾	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 ⁽²⁾	Hydrostatic Testing with Certificate		
PX ⁽²⁾	Extended Hydrostatic Testing		
Special Cleaning			
P2	Cleaning for Special Processes		
PA	Cleaning per ASTM G93 level D (section 11.4)		

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Rosemount 485 Annubar Primary Ordering Information

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⁽³⁾ Material Certificate per ISO 10474 3.1.B and EN 10204 3.1.B

Code Conformance

J1 Canadian Registration

J2⁽⁴⁾ ANSI B31.1

J3⁽⁴⁾ ANSI B31.3

J4⁽⁴⁾ ANSI B31.8

J5⁽⁵⁾ NACE MR-0175 / ISO 15156

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, *Hastelloy*

G5 OS&Y Gate Valve, Carbon Steel

G6 OS&Y Gate Valve, Stainless Steel

G7 OS&Y Gate Valve, *Hastelloy*

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

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

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

(4) Not available with Electronics Connection Platform 6.

(5) Materials of Construction comply with recommendations per 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.

The Annubar Flowmeter Series

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

See "Rosemount 485 Annubar Primary Ordering Information" on page 55

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 (CDS)" on page 59. The Emerson process Management sizing program will determine this code, based on the application piping.

Line Size			Option Code	Inner Diameter (I.D.) Range	Pipe Wall Thickness		I.D. Range Code
Nominal	Max. O.D.				ANSI Pipes	Non-ANSI Pipes	
2-in. (50 mm)	2.625-in. (66.68 mm)	020		1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
				2.207 to 2.322-in. (56.06 to 58.98 mm)		0.083 to 0.448-in. (2.1 to 11.4 mm)	B
2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025		2.323 to 2.469-in. (59.00 to 62.71 mm)	0.083 to 0.563-in. (2.1 to 14.3 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
				2.648 to 2.751-in. (67.26 to 69.88 mm)		0.083 to 0.460-in. (2.1 to 11.7 mm)	A
3-in. (80 mm)	3.75-in. (95.25 mm)	030		2.752 to 2.899-in. (69.90 to 73.63 mm)	0.083 to 0.563-in. (2.1 to 14.3 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
				3.229 to 3.333-in. (82.02 to 84.66 mm)		0.120 to 0.496-in. (3.0 to 12.6 mm)	B
3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035		3.334 to 3.548-in. (84.68 to 90.12 mm)	0.120 to 0.600-in. (3.0 to 15.2 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
				3.735 to 3.825-in. (94.87 to 97.16 mm)		0.120 to 0.510-in. (3.0 to 13.0 mm)	B
4-in. (100 mm)	5.032-in. (127.81 mm)	040		3.826 to 4.026-in. (97.18 to 102.26 mm)	0.120 to 0.600-in. (3.0 to 15.2 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
				4.438 to 4.571-in. (112.73 to 116.10 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
5-in. (125 mm)	6.094-in. (154.79 mm)	050		4.813 to 5.047-in. (122.25 to 128.19 mm)	0.134 to 0.614-in. (3.4 to 15.6 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
				5.250 to 5.472-in. (133.35 to 139.99 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-in. (150 mm)	6.93-in. (176.02 mm)	060		6.066 to 6.383-in. (154.08 to 162.13 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.297-in. (3.4 to 7.5 mm)	D
				6.384 to 6.624-in. (162.15 to 168.25 mm)		0.134 to 1.132-in. (3.4 to 28.7 mm)	A
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 1.067-in. (3.4 to 27.1 mm)	B
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 1.05-in. (3.4 to 26.7 mm)	C
				7.393 to 7.624-in. (187.78 to 193.65 mm)		0.134 to 1.037-in. (3.4 to 26.3 mm)	D
7-in. (180 mm)	7.93-in. (201.42 mm)	070		7.625 to 7.981-in. (193.68 to 202.72 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
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.134 to 0.216-in. (3.4 to 5.5 mm)	C
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.134 to 0.246-in. (3.4 to 6.2 mm)	D
				8.767 to 9.172-in. (222.68 to 232.97 mm)		0.134 to 1.114-in. (3.4 to 28.3 mm)	B
				9.173 to 9.561-in. (232.99 to 242.85 mm)		0.134 to 0.956-in. (3.4 to 24.3 mm)	C
8-in. (200 mm)	9.688-in. (246.08 mm)	080		9.562 to 10.020-in. (242.87 to 254.51 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 0.986-in. (3.4 to 25.0 mm)	D
				10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				11.000 to 11.373-in. (279.40 to 288.87 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
10-in. (250 mm)	11.75-in. (298.45 mm)	100		11.939 to 12.250-in. (303.25 to 311.15 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
						0.250 to 1.065-in. (6.4 to 27.1 mm)	A
						0.250 to 1.082-in. (6.4 to 27.5 mm)	B
						0.250 to 1.012-in. (6.4 to 25.7 mm)	C
						0.250 to 0.945-in. (6.4 to 24.0 mm)	D
12-in. (300 mm)	13.0375-in. (331.15 mm)	120			0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.018-in. (6.4 to 25.9 mm)	E
						0.250 to 1.097-in. (6.4 to 27.9 mm)	B
						0.250 to 0.906-in. (6.4 to 23.0 mm)	C
						0.250 to 1.159-in. (6.4 to 29.4 mm)	D

HART Configuration Data Sheet (CDS)

DP FLOW CDS

Complete this form to define a custom flow configuration for DP Flowmeters. Unless specified, the flowmeter will be shipped with the default values identified by the H symbol.

For technical assistance in filling out this CDS, call a Rosemount representative.

NOTE

Any missing information will be processed with the indicated default values.

* = Required Item

★ = Default

Customer Information

Customer:	Contact Name:
Customer Phone:	Customer Fax:
Customer Approval Sign-Off:	Customer PO:

Calculation Approval

☐ Check this box if a calculation for approval prior to manufacturing is required

Application and Configuration Data Sheet (Required with Order)

Tag:

Model No ⁽¹⁾

* **Select fluid type** ☐ Liquid ☐ Gas ☐ Steam

* **Fluid name⁽²⁾**

Flowmeter Information (optional)

* Failure Mode Alarm Direction (select one) ☐ Alarm High★ ☐ Alarm Low

Software Tag: _____ (8 characters)

Descriptor: _____ (16 characters)

Message: _____
_____ (32 characters)

Date: Day ____ (numeric) Month ____ (numeric) Year ____ (numeric)

(1) A complete model number is required before Rosemount Inc. can process the order.

(2) If the Fluid is not located in Table 35 on page 61, the "Fluid Data Sheet (FDS)" on page 65 must be completed.

For Rosemount Use Only

S.O.:	LI
CHAMP:	DATE:
	ADMIN:

The Annubar Flowmeter Series

* = Required Item

★ = Default

Primary Element Information

* Select Differential Producer (Select One)

Annubar

- ☐ 485 Annubar/ 3095MFA Mass ProBar, 3051SFA ProBar
☐ 285 Annubar
☐ Annubar Diamond II + / Mass Probar
☐ Long Radius Wall Taps, ASME
☐ Long Radius Wall Taps, ISO
☐ ISA 1932, ISO

Venturi

- ☐ Nozzle, ISO
☐ Rough Cast/Fabricated Inlet, ASME
☐ Round Cast Inlet, ISO
☐ Machined Inlet, ASME
☐ Machined Inlet, ISO
☐ Welded Inlet, ISO

Other (All options require a discharge coefficient value)

- ☐ Calibrated Orifice: Flange, Corner, or D & D/2 Taps.

Discharge coefficient: _____

- ☐ Calibrated Orifice: 2¹/₂ D & 8D Taps

Discharge coefficient: _____

- ☐ Calibrating Nozzle

Discharge coefficient: _____

- ☐ Calibrating Venturi

Discharge coefficient: _____

- ☐ Area Averaging Meter

Discharge coefficient: _____

- ☐ V-Cone®

Discharge coefficient: _____

Diameter (d) _____

Orifice

- ☐ 3051SFP, 3095MFP, 1195
☐ 405C, 405P, 3051SFC, 3095MFC
☐ 1595 Conditioning Orifice
☐ 2¹/₂D & 8D Taps, ASME
☐ Corner Taps, ASME
☐ Corner Taps, ISO
☐ D & D/2 Taps, ASME
☐ D & D/2 Taps, ISO
☐ D & D/2 Taps, ISO 99 Amendment 1
☐ Flange Taps, AGA
☐ Flange Taps, ASME
☐ Flange Taps, ISO
☐ Flange Taps, ISO 99 Amendment 1
☐ Small Bore, Flange Taps, ASME

☐ inch★☐ millimeters

at _____

☐ °F☐ °C☐ 68 °F★☐ ODF _____☐ ODT _____

Special Annubar dimension (required if customer supplies mounting hardware).

Pipe Information

* Orientation / Flow Direction: ☐ Vertical Up ☐ Vertical Down ☐ Horizontal

* Line Size / Schedule: _____ Body I.D. (D): _____

Materials of Construction

* Pipe Material ☐ Carbon Steel ☐ 304 SST ☐ 316 SST ☐ Hastelloy ☐ Other _____* Primary Element Material ☐ 316 SST ☐ Hastelloy ☐ Other _____ (Please verify material availability)

Operating Conditions

	4 mA value	Minimum	Normal	Maximum	Full Scale:20 mA flow rate (design to P and T)	Design
Flow Rate	0	*(1)	*	*		
Pressure (P)	—	*(1)	*	*(1)	*(2)	
Temperature (T)	—	*(1)	*	*(1)	*	

RTD Mode

☐ Normal Mode ★ (Requires a RTD to be connected. If the RTD is disconnected or fails, the 3095MV output goes to alarm value)☐ Fixed Temperature Mode: Specify the fixed temperature value _____ ☐ °F ☐ °C

☐ Backup Mode (Uses the connected RTD for temperature measurement. If the RTD is disconnected or fails, the transmitter uses a fixed temperature value as a backup. This will not cause the mA output to go to alarm value and can potentially cause inaccurate flow measurement.) Fixed temperature value to be used as backup _____ ☐ °F ☐ °C

Product Data Sheet

00813-0100-4809, Rev EA

June 2006

The Annubar Flowmeter Series

* = Required Item

★ = Default

Base Conditions

☐ Standard Base (P=14.696 psia / 101.325 kPa abs, T= 60 °F (15.56 °C))

☐ Normal Base (P=14.696 psia / 101.325 kPa abs, T= 32 °F (0 °C))

☐ Standard Base for Natural Gas (AGA) (P=14.73 psia, T= 60°F (15.56 °C))

☐ User Defined: P= _____ Units: _____ T= _____ Units = _____

Compressibility at Base: _____ OR Density at Base: _____

(1) Operating ranges for pressure and temperature are needed for transmitter configuration.

(2) Required to verify that the product selection meets design criteria.

TABLE 35. Rosemount Fluids Database⁽¹⁾

Acetic Acid	Divinyl Ether	Methane	n-Hexane	1-Heptanol
Acetone	Ethane	Methanol	n-Octane	1-Heptene
Acetonitrile	Ethanol	Methyl Acrylate	n-Pentane	1-Hexene
Acetylene	Ethylamine	Methyl Ethyl Ketone	Oxygen	1-Hexadecanol
Acrylonitrile	Ethylbenzene	Methyl Vinyl Ether	Pentafluorothane	1-Octanol
Air	Ethylene	m-Chloronitrobenzene	Phenol	1-Octene
Allyl Alcohol	Ethylene Glycol	Neon	Propadiene	1-Nonanol
Ammonia	Ethylene Oxide	Neopentane	Pyrene	1-Pentadecanol
Argon	Fluorene	Nitric Acid	Propylene	1-Pentanol
Benzene	Furan	Nitric Oxide	Styrene	1-Pentene
Benzaldehyde	Helium-4	Nitrobenzene	Sulfur Dioxide	1-Undecanol
Benzyl Alcohol	Hydrazine	m-Dichlorobenzene	Propane	1-Nonanal
Biphenyl	Hydrogen	Nitroethane	Toluene	1,2,4- Trichlorobenzene
Carbon Dioxide	Hydrogen Chloride	Nitrogen	Trichloroethylene	1,1,2- Trichloroethane
Carbon Monoxide	Hydrogen Cyanide	Nitromethane	Vinyl Acetate	1,1,2,2- Tetrafluoroethane
Carbon Tetrachloride	Hydrogen Peroxide	Nitrous Oxide	Vinyl Chloride	1,2-Butadiene
Chlorine	Hydrogen Sulfide	n-Butane	Vinyl Cyclohexane	1,3-Butadiene
Chlorotrifluoroethylene	Isobutane	n-Butanol	Water	1,3,5- Trichlorobenzene
Chloroprene	Isobutene	n-Butyraldehyde	1-Butene	1,4-Dioxane
Cycloheptane	Isobutyl benzene	n-Butyronitrile	1-Decene	1,4-Hexadiene
Cyclohexane	Isopentane	n-Decane	1-Decanal	2-Methyl-1-Pentene
Cyclopentane	Isoprene	n-Dodecane	1-Decanol	2,2-Dimethylbutane
Cyclopentene	Isopropanol	n-Heptadecane	1-Dodecene	
Cyclopropane		n-Heptane	1-Dodecanol	

(1) This list is subject to change without notice. Steam per ASME Steam tables. All other fluids per AIChE.

Drawing/Notes

The Annubar Flowmeter Series

Product Data Sheet

00813-0100-4809, Rev EA

June 2006

FOUNDATION fieldbus™ Configuration Data Sheet (CDS)

DP FLOW CDS

Complete this form to define a custom flow configuration for DP Flowmeters. Unless specified, the flowmeter will be shipped with the default values identified by the H symbol.

For technical assistance in filling out this CDS, call a Rosemount representative.

NOTE

Any missing information will be processed with the indicated default values.

* = Required Item

★ = Default

Customer Information

Customer: _____ Contact Name: _____

Customer Phone: _____ Customer Fax: _____

Customer Approval Sign-Off: _____ Customer PO: _____

Calculation Approval

☐ Check this box if a calculation for approval prior to manufacturing is required

Application and Configuration Data Sheet (Required with Order)

Tag: _____

Model No ⁽¹⁾

* **Select fluid type** ☐ Liquid ☐ Gas ☐ Steam

* **Fluid name⁽²⁾**

Flowmeter Information (optional)

* Failure Mode Alarm Direction (select one) ☐ Alarm High★ ☐ Alarm Low

Software Tag: _____ (16 characters)

Descriptor: _____
_____ (32 characters)

Message: _____
_____ (32 characters)

Date: Day ____ (numeric) Month ____ (numeric) Year ____ (numeric)

(1) A complete model number is required before Rosemount Inc. can process the order.

(2) If the Fluid is not located in Table 35 on page 61, the "Fluid Data Sheet (FDS)" on page 65 must be completed.

For Rosemount Use Only

S.O.: _____ LI
CHAMP: _____ DATE: _____
ADMIN: _____

Product Data Sheet

00813-0100-4809, Rev EA

June 2006

The Annubar Flowmeter Series

* = Required Item

★ = Default

Primary Element Information

* Select Differential Producer (Select One)

Annubar

☐ 485 Annubar/ 3095MFA Mass ProBar, 3051SFA ProBar

☐ 285 Annubar

☐ Annubar Diamond II + / Mass Probar

☐ Long Radius Wall Taps, ASME

☐ Long Radius Wall Taps, ISO

☐ ISA 1932, ISO

Venturi

☐ Nozzle, ISO

☐ Rough Cast/Fabricated Inlet, ASME

☐ Round Cast Inlet, ISO

☐ Machined Inlet, ASME

☐ Machined Inlet, ISO

☐ Welded Inlet, ISO

Other (All options require a discharge coefficient value)

☐ Calibrated Orifice: Flange, Corner, or D & D/2 Taps.

Discharge coefficient: _____

☐ Calibrated Orifice: 2¹/₂ D & 8D Taps

Discharge coefficient: _____

☐ Calibrating Nozzle

Discharge coefficient: _____

☐ Calibrating Venturi

Discharge coefficient: _____

☐ Area Averaging Meter

Discharge coefficient: _____

☐ V-Cone®

Discharge coefficient: _____

Diameter (d) _____

Orifice

☐ 3051SFP, 3095MFP, 1195

☐ 405C, 405P, 3051SFC, 3095MFC

☐ 1595 Conditioning Orifice

☐ 2¹/₂D & 8D Taps, ASME

☐ Corner Taps, ASME

☐ Corner Taps, ISO

☐ D & D/2 Taps, ASME

☐ D & D/2 Taps, ISO

☐ D & D/2 Taps, ISO 99 Amendment 1

☐ Flange Taps, AGA

☐ Flange Taps, ASME

☐ Flange Taps, ISO

☐ Flange Taps, ISO 99 Amendment 1

☐ Small Bore, Flange Taps, ASME

☐ inch★

☐ millimeters

at _____

☐ °F

☐ °C

☐ 68 °F★

☐ ODF _____

☐ ODT _____

Special Annubar dimension (required if customer supplies mounting hardware).

Pipe Information

* Orientation / Flow Direction:

☐ Vertical Up

☐ Vertical Down

☐ Horizontal

* Line Size / Schedule: _____

Body I.D. (D): _____

Materials of Construction

* Pipe Material

☐ Carbon Steel

☐ 304 SST

☐ 316 SST

☐ Hastelloy

☐ Other _____

* Primary Element Material

☐ 316 SST

☐ Hastelloy

☐ Other _____ (Please verify material availability)

Operating Conditions

	4 mA value	Minimum	Normal	Maximum	Full Scale:20 mA flow rate (design to P and T)	Design
Flow Rate	0	*(1)	*	*		
Pressure (P)	—	*(1)	*	*(1)	*(2)	
Temperature (T)	—	*(1)	*	*(1)	*	

RTD Mode

☐ Normal Mode ★ (Requires a RTD to be connected. If the RTD is disconnected or fails, the 3095MV output goes to alarm value)

☐ Fixed Temperature Mode:

Specify the fixed temperature value _____

☐ °F

☐ °C

☐ Backup Mode (Uses the connected RTD for temperature measurement. If the RTD is disconnected or fails, the transmitter uses a fixed temperature value as a backup. This will not cause the mA output to go to alarm value and can potentially cause inaccurate flow measurement.) Fixed temperature value to be used as backup _____ ☐ °F ☐ °C

The Annubar Flowmeter Series

* = Required Item

★ = Default

Base Conditions

☐ Standard Base (P=14.696 psia / 101.325 kPa abs, T= 60 °F (15.56 °C))

☐ Normal Base (P=14.696 psia / 101.325 kPa abs, T= 32 °F (0 °C))

☐ Standard Base for Natural Gas (AGA) (P=14.73 psia, T= 60°F (15.56 °C))

☐ User Defined: P= _____ Units: _____ T= _____ Units = _____

Compressibility at Base: _____ OR Density at Base: _____

(1) Operating ranges for pressure and temperature are needed for transmitter configuration.

(2) Required to verify that the product selection meets design criteria.

TABLE 1. Rosemount Fluids Database⁽¹⁾

Acetic Acid	Divinyl Ether	Methane	n-Hexane	1-Heptanol
Acetone	Ethane	Methanol	n-Octane	1-Heptene
Acetonitrile	Ethanol	Methyl Acrylate	n-Pentane	1-Hexene
Acetylene	Ethylamine	Methyl Ethyl Ketone	Oxygen	1-Hexadecanol
Acrylonitrile	Ethylbenzene	Methyl Vinyl Ether	Pentafluorothane	1-Octanol
Air	Ethylene	m-Chloronitrobenzene	Phenol	1-Octene
Allyl Alcohol	Ethylene Glycol	Neon	Propadiene	1-Nonanol
Ammonia	Ethylene Oxide	Neopentane	Pyrene	1-Pentadecanol
Argon	Fluorene	Nitric Acid	Propylene	1-Pentanol
Benzene	Furan	Nitric Oxide	Styrene	1-Pentene
Benzaldehyde	Helium-4	Nitrobenzene	Sulfur Dioxide	1-Undecanol
Benzyl Alcohol	Hydrazine	m-Dichlorobenzene	Propane	1-Nonanal
Biphenyl	Hydrogen	Nitroethane	Toluene	1,2,4- Trichlorobenzene
Carbon Dioxide	Hydrogen Chloride	Nitrogen	Trichloroethylene	1,1,2- Trichloroethane
Carbon Monoxide	Hydrogen Cyanide	Nitromethane	Vinyl Acetate	1,1,2,2- Tetrafluoroethane
Carbon Tetrachloride	Hydrogen Peroxide	Nitrous Oxide	Vinyl Chloride	1,2-Butadiene
Chlorine	Hydrogen Sulfide	n-Butane	Vinyl Cyclohexane	1,3-Butadiene
Chlorotrifluoroethylene	Isobutane	n-Butanol	Water	1,3,5- Trichlorobenzene
Chloroprene	Isobutene	n-Butyraldehyde	1-Butene	1,4-Dioxane
Cycloheptane	Isobutyl benzene	n-Butyronitrile	1-Decene	1,4-Hexadiene
Cyclohexane	Isopentane	n-Decane	1-Decanal	2-Methyl-1-Pentene
Cyclopentane	Isoprene	n-Dodecane	1-Decanol	2,2-Dimethylbutane
Cyclopentene	Isopropanol	n-Heptadecane	1-Dodecene	
Cyclopropane		n-Heptane	1-Dodecanol	

(1) This list is subject to change without notice. Steam per ASME Steam tables. All other fluids per AIChE.

Block Tag Names

AI Block Name (Flow): _____ (AI 1400 ★)

AI Block Name (DP): _____ (AI 1500 ★)

AI Block Name (SP): _____ (AI 1600 ★)

AI Block Name (PT): _____ (AI 1700 ★)

INTEG Block Name (Flow Total): _____ (INTEG 2100 ★)

Drawing/Notes

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:

The Annubar Flowmeter Series

TABLE 36. Custom Liquid Worksheet

* = Required Item

★ = Default

Mass Liquid Density and Viscosity Information

1. Fill in the following operating temperatures

- a) _____ min
 b) _____ [$^{1/3}(\text{max} - \text{min})$] + min
 c) _____ [$^{2/3}(\text{max} - \text{min})$] + 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

☐ Density in lbs/CuFt

☐ Density in kg/CuM

Viscosity

☐ Viscosity in centipoise

☐ Viscosity in lbs/ft sec

☐ Viscosity in pascal sec

Temperature

a) _____ min

b) _____ [$^{1/3}(\text{max} - \text{min})$] + min

c) _____ [$^{2/3}(\text{max} - \text{min})$] + min

d) _____ max

Temperature

a) _____ min.

b) _____ [$^{1/3}(\text{max} - \text{min})$] + min

c) _____ [$^{2/3}(\text{max} - \text{min})$] + min

d) _____ max

Base density: _____

(at base reference conditions specified)

Volumetric Liquid Density and Viscosity Information

* Density at Flow: _____

Units: ☐ lb/ft³ ☐ Kg/m³ ☐ Other:

OR

Specific Gravity at Flow: _____

* Viscosity at Flow: _____

Units: ☐ Centipoise ☐ Other:

Product Data Sheet

00813-0100-4809, Rev EA

June 2006

The Annubar Flowmeter Series

TABLE 37. Custom Gas Worksheet

* = Required Item

★ = Default

Mass Gas Compressibility and Viscosity Information

1. Fill in the following operating pressures and operating temperatures

Operating Pressures

- 1) _____ min
2) _____ [$^{1/3}$ (max - min))] + min
3) _____ [$^{2/3}$ (max - min))] + min
4) _____ max

Operating Temperatures

- 5) _____ min
6) _____ [$^{1/2}$ (max - min))] + min
7) _____ 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

1) _____

2) _____

3) _____

4) _____

1) _____

2) _____

3) _____

4) _____

1) _____

2) _____

3) _____

4) _____

Temperature

5) _____

5) _____

5) _____

5) _____

6) _____

6) _____

6) _____

6) _____

7) _____

7) _____

7) _____

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/ft³ ☐ Kg/m³ ☐ 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 ★

The Annubar Flowmeter Series

TABLE 38. Natural Gas Worksheet

NOTE

The minimum requirement for the Volumetric options is highlighted gray on page 68.

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 ₂ H ₆	Ethane mole percent	%	0 – 100 percent
C ₃ H ₈	Propane mole percent	%	0 – 12 percent
H ₂ O	Water mole percent	%	0 – Dew point
H ₂ S	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 ₄ H ₁₀	i-Butane mole percent	%	0 – 6 percent ⁽¹⁾
C ₄ H ₁₀	n-Butane mole percent	%	0 – 6 percent ⁽¹⁾
C ₅ H ₁₂	i-Pentane mole percent	%	0 – 4 percent ⁽²⁾
C ₅ H ₁₂	n-Pentane mole percent	%	0 – 4 percent
C ₆ H ₁₄	n-Hexane mole percent	%	0 – Dew Point
C ₇ H ₁₈	n-Heptane mole percent	%	0 – Dew Point
C ₈ H ₁₈	n-Octane mole percent	%	0 – Dew Point
C ₉ H ₂₀	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-CO₂)

	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-CO₂-N₂)

	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

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