Product Data Sheet
00813-0100-4028, Rev BA
Catalog 2006 - 2007

Rosemount 285 *Annubar*®
Primary Element Series

- *Designed for general purpose applications*
- *Increased plant uptime with the maintenance-free design*
- *Energy savings gained through minimal permanent pressure loss*
- *Industry leading integrated DP flowmeters are created when Annubar Averaging Pitot Tube (APT) primary elements are packaged with Rosemount pressure transmitters*

HART® CE

Contents

The 285 *Annubar* Primary Element Series

Designed for general purpose applications

The *Annubar*'s revolutionary shape with sensing holes, promises the best accuracy and repeatability in applications with low to medium pressure and temperature requirements.

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.

Industry leading integrated DP flowmeters

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

Integral mount head allows close coupling to most Rosemount transmitters which provides flowmeter capabilities.

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 3095MV 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.

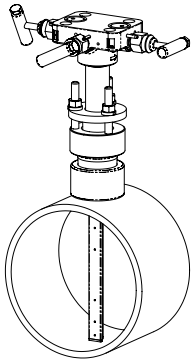
Orifice Plate Primary Element Systems: Rosemount 1495 and 1595 Orifice Plates, 1496 Flange Unions and 1497 Meter Sections

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.

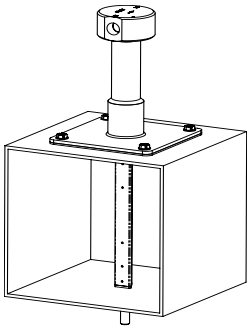
285 *Annubar* Primary Element Series Selection Guide

Rosemount 285 *Annubar* with Pak-Lok Mounting

- Designed to give the highest performance in applications with low to medium pressure and temperature requirements
- Innovative T-shape design provides accuracy to ±1.00%
- Optional integral manifold head allows direct mounting of DP transmitters
- Ideal fluid type: liquid, gas, and steam



Rosemount 285 *Annubar* with Pak-Lok Mounting



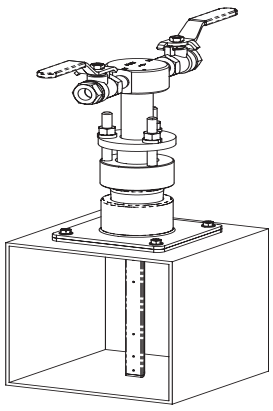
Rosemount 285 *Annubar* with Duct Mount

Rosemount 285 *Annubar* with Duct Mount

- Combines the 285 Annubar technology with duct mounting installation
- For applications requiring duct mounting installation
- Ideal fluid types: gas

Rosemount 285 *Annubar* with Duct Mount Compression Fitting

- For application in ducts requiring additional mounting support
- Ideal fluid types: gas



Rosemount 285 *Annubar* with Duct Mount Compression Fitting

Rosemount 285 *Annubar* Primary

SPECIFICATIONS

Performance

Performance Statement Assumptions
Measured pipe I.D.

Discharge Coefficient Factor
Liquid: ±1.0% of flow rate
Gas and Steam: ±2.0% of flow rate

Repeatability
±0.1%

Line Sizes
- Sensor Size 1: 2-in. to 8-in. (50 to 200 mm)
- Sensor Size 2: 8-in. and above
  For larger line sizes, consult factory.

NOTE
Some mounting styles not available in large line sizes.

TABLE 1. 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)

$$R_d = \frac{d \quad v \quad p}{}$$

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

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

Flow Turndown
10:1or better

Functional

Service
- Liquid
- Gas
- Steam (limited)

Temperature Limits(1)
- -40 to 300°F (-40 to 149°C)
- -40 to 850°F (-40 to 454°C) for Duct Mount Version (D1) only

Pressure Limits(1)
- Pak-Lok: 150# ANSI (275 psig at 100 °F (19 bar at 38 °C))
- Duct Mount (D1 & D2): 10 PSIG (0.6 bar)

Pressure and Temperature Limits
Direct Mount Electronics
- Up to 150# ANSI (275 psig at 100 °F (19 bar at 38 °C))
- Integral temperature measurement is not available.

Remote Mount Electronics
- Up to 150# ANSI (275 psig at 100 °F (19 bar at 38 °C)).
- Integral temperature measurement is not available.

Physical

Annubar Sensor Material
- 316 Stainless Steel

Pak-Lock
See “Dimensional Drawings” on page 6
Pak-Lok Model (option P1)
- Provided with a compression sealing mechanism rated up to 150# ANSI (275 psig at 100 °F (19 bar at 38 °C))
- Teflon Packing (–40 to 300 °F (–40 to 149 °C))

Duct Mount
See “Dimensional Drawings” on page 7.
Duct Mount without Compression Fitting Model (option D1)
- Provided with duct mounting rated up to 10 psig at 850°F (0.6 bar at 454°C).

Duct Mount with Compression Fitting
See “Dimensional Drawings” on page 8.
Duct Mount with Compression Fitting Model (option D2)
- Provided with duct mount compression fitting rated up to 10 psig at 300°F (0.6 bar at 38°C).

Instrument Connections Temperature Ranges
TABLE 2. Minimum / Maximum Temperature Range

Code	Description	Temperature
G1	Needle Valves, Carbon Steel	-40 to 500°F (-40 to 260°C)
G2	Needle Valves, Stainless Steel	-40 to 500°F (-40 to 260°C)
B1	Ball Valve, Carbon Steel	-40 to 300°F (-40 to 149°C)
B2	Ball Valve, Stainless Steel	-40 to 300°F (-40 to 149°C)

(1) Annubar option selections may effect pressure and temperature 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

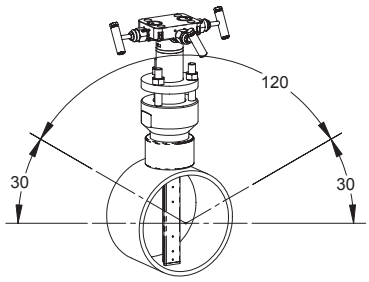
(1) Consult the factory for instructions regarding use in square or rectangular ducts.

(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.

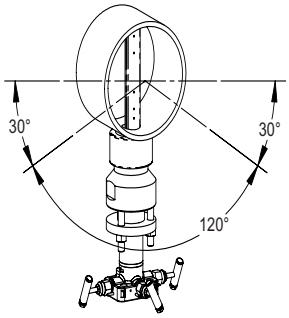
Flowmeter Orientation

Gas (Horizontal)



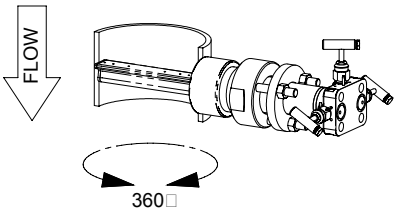
15-490000-901

Liquid and Steam (Horizontal)



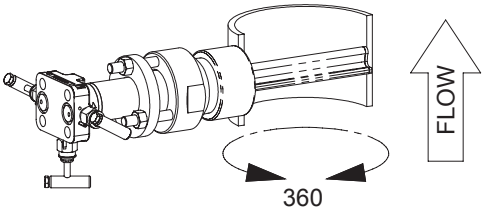
15-490001-901

Gas (Vertical)



15-490002-901

Steam (Vertical)



15-490003-901

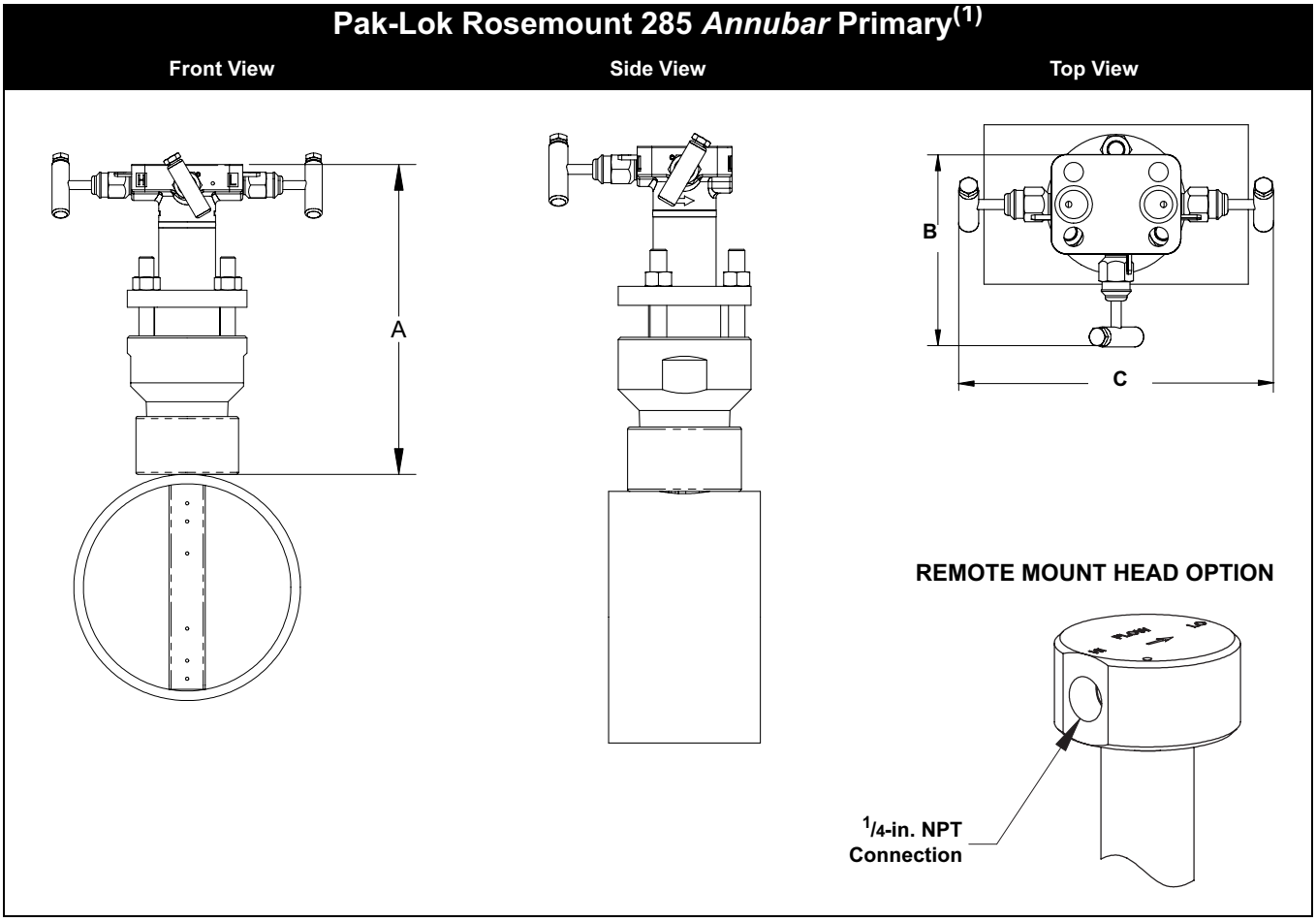
Drill Hole Size According to Sensor Size

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

•

Dimensional Drawings

Pak-Lok Rosemount 285 *Annubar* Primary(1)



(1) The Pak-Lok Annubar model is available up to 150# ANSI (275 psig at 100 °F (19 bar at 38 °C)).

TABLE 3. Rosemount 285 *Annubar* Primary - Pak-Lok

Sensor Size	A (Max)	B (Max)	C (Max)
1	8.50 (215.9)	5.00 (127.0)	9.00 (228.6)
2	11.00 (279.4)	5.00 (127.0)	9.00 (228.6)

Dimensions are in inches (millimeters)

Dimensional Drawings (continued)

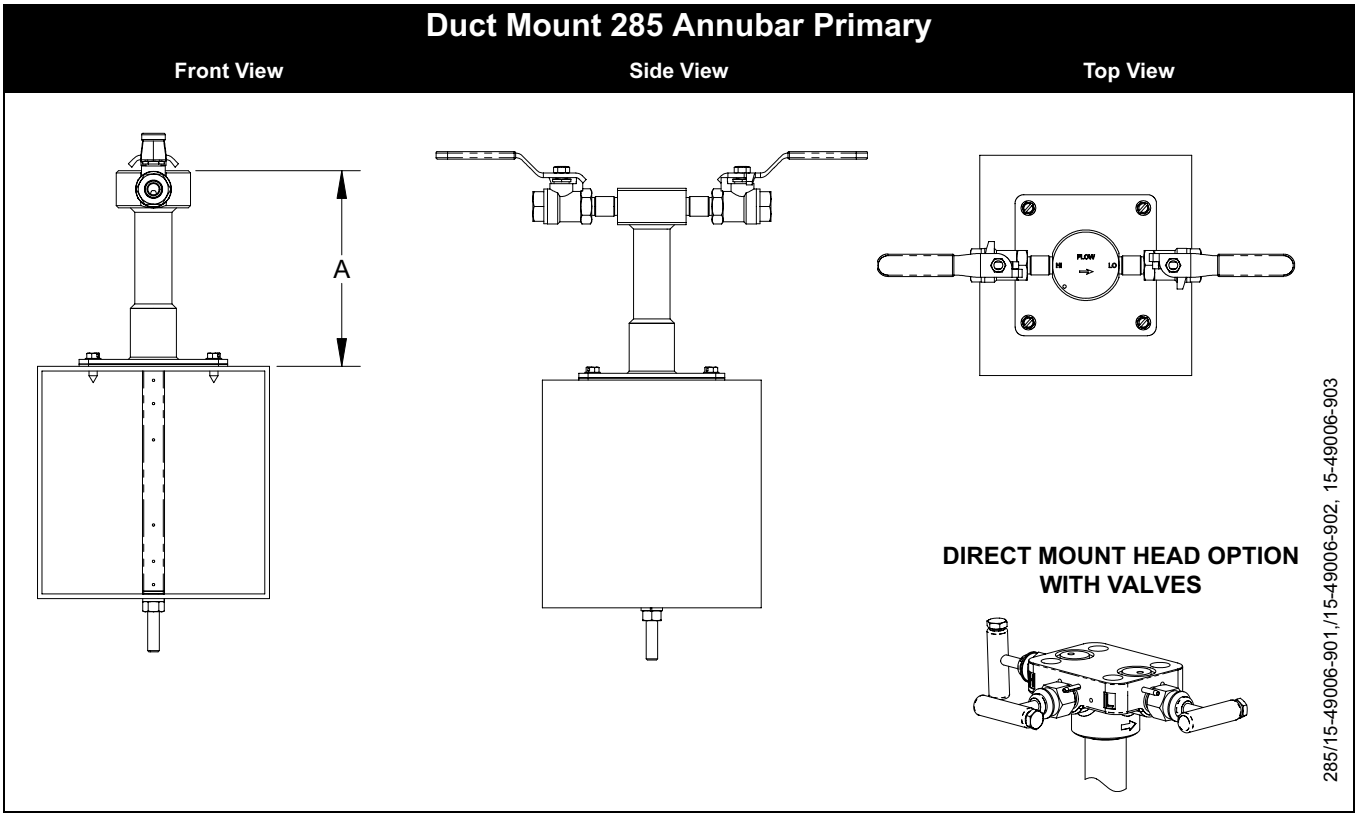


TABLE 4. Rosemount 285 Annubar with Duct Mount

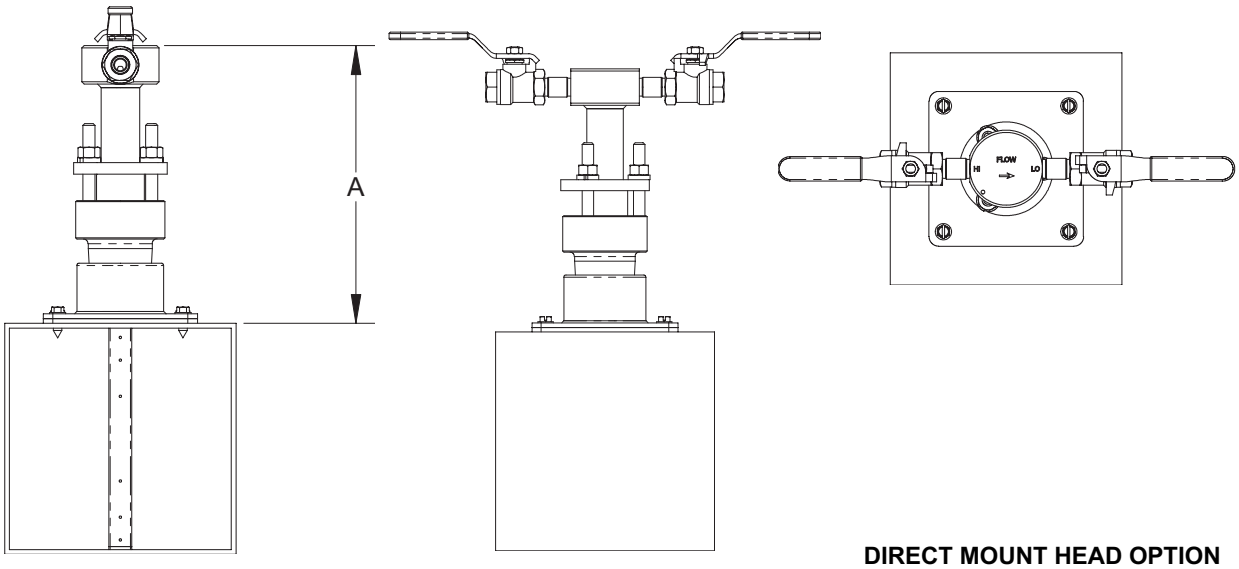
Sensor Size	A (Max)
1	7.00 (177.8)
2	9.00 (228.6)

Dimensions are in inches (millimeters)

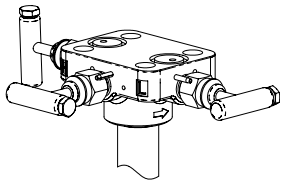
Dimensional Drawings (continued)

Duct Mount with Compression Fitting 285 *Annubar* Primary

Front View **Side View** **Top View**



DIRECT MOUNT HEAD OPTION WITH VALVES



Note
Maximum opposite side stud length is 1 1/2-in. (38 mm) long.

TABLE 5. Duct Mount with Compression Fitting

Sensor Size	A (Max)
1	8.50 (215.9)
2	11.00 (279.4)

Dimensions are in inches (millimeters)

ORDERING INFORMATION

Rosemount 285 *Annubar* Primary Ordering Information

Model	DP Flow Primary Type
285	Economy *Annubar*
Code	**Fluid Type**
L	Liquid
G	Gas
S	Steam
Code	**Line Size**
020	2-in. (50 mm)
025	2 1/2-in. (63.5 mm)
030	3-in. (80 mm)
035	3 1/2-in. (89 mm)
040	4-in. (100 mm)
050	5-in. (125 mm)
060	6-in. (150 mm)
080	8-in. (200 mm)
100	10-in. (250 mm)
120	12-in. (300 mm)
140	14-in. (350 mm)
160	16-in. (400 mm)
180	18-in. (450 mm)
200	20-in. (500 mm)
240	24-in. (600 mm)
300	30-in. (750 mm)
360	36-in. (900 mm)
420	42-in. (1066 mm)
480	48-in. (1210 mm)
600	60-in. (1520 mm)
720	72-in. (1820 mm)
780	78-in. (1950 mm)
840	84-in. (2100 mm)
900	90-in. (2250 mm)
960	96-in. (2400 mm)
Code	**Pipe I.D. Range (Refer to Pipe ID Range Table for Code)**
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 (sensor size 2) or greater than 8 inches (sensor size 1).
Code	**Piping Configuration**
C	Circular
R	Rectangular or Square
Code	**Pipe Material/Mounting Assembly Material**
C	Carbon Steel
S	316 Stainless Steel
0	No Mounting (Customer Supplied)
Code	***Annubar* Type**
P1	Pak-Lok
D1	Duct Mount Plate without Compression Fitting
D2	Duct Mount Plate with Compression Fitting

Continued on Next Page

Code	Sensor Material
S	316 Stainless Steel
Code	**Sensor Size**
1	Sensor Size 1
2	Sensor Size 2
Code	**Electronics Connection Platform**
3	Direct-mount
7	Remote-mount NPT Connections
Code	**Options**
	Instrument Connections for Remote Mount Option
G1	Needle Valves, CS
G2	Needle Valves, SS
B1	Ball Valves, CS
B2	Ball Valves, SS
	Variable Mount Height
VM	Variable Mounting Height for Customer Supplied Mounting
	Attach To
H1	Attach to Transmitter
	Manifold
F2(1)	3-Valve Manifold, SST
	Special Inspection (2)
QC1	Visual and Dimensional Inspection w/Cert
QC7	Inspection and Performance Certificate
	Material Traceability Certification (2)
Q8	Material Cert per ISO 10474 3.1.B and EN 10204 3.1.B
	Special Shipment
Y1	Mounting Hardware Shipped Separately

(1) Applies to 285 Primary Element only. If F2 option is ordered with Electronic Connections Platform Code '3' (Direct Mount), manifold is integral to head. If F2 is ordered with Code '7' (Remote Mount), the manifold is supplied loose.

(2) Applies to 285 Primary Element Only.

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

See “Rosemount 285 Annubar Primary Ordering Information” on page 9

For pipes with an Inner Diameter (I.D.) Range / Pipe Wall Thickness not found in this table or with a line size greater than 12-in. (300 mm), choose option code Z and specify the exact pipe dimensions (I.D. and Pipe Wall Thickness) on the “Configuration Data Sheet (CDS)” on page 12. The Emerson process Management sizing program will determine this code, based on the application piping.

	Line Size				Pipe Wall Thickness		I.D.
	Nominal	Max. O.D.	Option Code	Inner Diameter (I.D.) Range	ANSI Pipes	Non-ANSI Pipes	Range Code
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)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
	2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025	2.207 to 2.322-in. (56.06 to 58.98 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.448-in. (2.1 to 11.4 mm)	B
				2.323 to 2.469-in. (59.00 to 62.71 mm)		0.083 to 0.417-in. (2.1 to 10.6 mm)	C
				2.470 to 2.598-in. (62.74 to 65.99 mm)		0.083 to 0.435-in. (2.1 to 11.0 mm)	D
				2.599 to 2.647-in. (66.01 to 67.23 mm)		0.083 to 0.515-in. (2.1 to 13.1 mm)	E
	3-in. (80 mm)	3.75-in. (95.25 mm)	030	2.648 to 2.751-in. (67.26 to 69.88 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.460-in. (2.1 to 11.7 mm)	A
				2.752 to 2.899-in. (69.90 to 73.63 mm)		0.083 to 0.416-in. (2.1 to 10.6 mm)	B
				2.900 to 3.068-in. (73.66 to 77.93 mm)		0.083 to 0.395-in. (2.1 to 10.0 mm)	C
				3.069 to 3.228-in. (77.95 to 81.99 mm)		0.083 to 0.404-in (2.1 to 10.3 mm)	D
	3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035	3.229 to 3.333-in. (82.02 to 84.66 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.496-in. (3.0 to 12.6 mm)	B
				3.334 to 3.548-in. (84.68 to 90.12 mm)		0.120 to 0.386-in. (3.0 to 9.8 mm)	C
				3.549 to 3.734-in. (90.14 to 94.84 mm)		0.120 to 0.415-in. (3.0 to 10.5 mm)	D
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	B
				3.826 to 4.026-in. (97.18 to 102.26 mm)		0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.027 to 4.237-in. (102.29 to 107.62 mm)		0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.238 to 4.437-in. (107.65 to 112.70 mm)		0.120 to 0.401-in. (3.0 to 10.2 mm)	E
	5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.438 to 4.571-in. (112.73 to 116.10 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	A
				4.572 to 4.812-in. (116.13 to 122.22 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				4.813 to 5.047-in. (122.25 to 128.19 mm)		0.134 to 0.380-in. (3.4 to 9.7 mm)	C
				5.048 to 5.249-in. (128.22 to 133.32 mm)		0.134 to 0.413-in. (3.4 to 10.5 mm)	D
	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 138.99 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.392-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 0.310-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
	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
Sensor Size 2	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 1.052-in. (6.4 to 26.7 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
	10-in. (250 mm)	11.75-in. (298.45 mm)	100	8.767 to 9.172-in. (222.68 to 232.97 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.065-in. (6.4 to 27.1 mm)	A
				9.173 to 9.561-in. (232.99 to 242.85 mm)		0.250 to 1.082-in. (6.4 to 27.5 mm)	B
				9.562 to 10.020-in. (242.87 to 254.51 mm)		0.250 to 1.012-in. (6.4 to 25.7 mm)	C
				10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.945-in. (6.4 to 24.0 mm)	D
				10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 1.018-in. (6.4 to 25.9 mm)	E
	12-in. (300 mm)	13.0375-in. (331.15 mm)	120	11.000 to 11.373-in. (279.40 to 288.87 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.097-in. (6.4 to 27.9 mm)	B
				11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 0.906-in. (6.4 to 23.0 mm)	C
				11.939 to 12.250-in. (303.25 to 311.15 mm)		0.250 to 1.159-in. (6.4 to 29.4 mm)	D

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 6 on page 14, the "Fluid Data Sheet (FDS)" on page 15 must be completed.

For Rosemount Use Only

S.O.: LI

CHAMP: DATE:

ADMIN:

Rosemount 285 Annubar Primary Element

* = Required Item
★ = Default

Primary Element Information

* Select Differential Producer (Select One)

Annubar
❑ 485 *Annubar*/ 3095MFA Mass *ProBar*, 3051SFA *ProBar*
❑ 285 *Annubar* Primary Element Series
❑ *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: $2^1/_2$ D & 8D Taps
Discharge coefficient: _____
❑ Calibrating Nozzle
Discharge coefficient: _____
❑ Calibrating Venturi
Discharge coefficient: _____
❑ Area Averaging Meter
Discharge coefficient: _____
❑ V-Cone®
Discharge coefficient: _____

Orifice
❑ 3051SFP, 3095MFP, 1195
❑ 405C, 405P, 3051SFC, 3095MFC
❑ 1595 Conditioning Orifice
❑ $2^1/_2$D & 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

Diameter (d) _____ ❑ inch★ ❑ millimeters at _____ ❑ °F ❑ °C ❑ 68 °F★

Special *Annubar* dimension (required if customer supplies mounting hardware). ❑ ODF _____ ❑ ODT _____

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

* = 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 6. 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	1-0ctanol
Air	Ethylene	m-Chloronitrobenzene	Phenol	1-Octene
Allyl Alcohol	Ethylene	Neon	Propadiene	1-Nonanol
Ammonia	GlycolEthylene	Neopentane	Pyrene	1-Pentadecanol
Argon	Oxide	Nitric Acid	Propylene	1-Pentanol
Benzene	Fluorene	Nitric Oxide	Styrene	1-Pentene
Benzaldehyde	Furan	Nitrobenzene	Sulfer Dioxide	1-Undecanol
Benzyl Alcohol	Helium-4	m-Dichlorobenzene	Propane	1-Nonanal
Biphenyl	Hydrazine	Nitroethane	Toluene	1,2,4- Trichlorobenzene
Carbon Dioxide	Hydrogen	Nitrogen	Trichloroethylene	1,1,2- Trichloroethane
Carbon Monoxide	Hydrogen Chloride	Nitromethane	Vinyl Acetate	1,1,2,2- Tetrafluoroethane
Carbon Tetrachloride	Hydrogen Cyanide	Nitrous Oxide	Vinyl Chloride	1,2-Butadiene
Chlorine	Hydrogen Peroxide	n-Butane	Vinyl Cyclohexane	1,3-Butadiene
Chlorotrifluoroethylene	Hydrogen Sulfide	n-Butanol	Water	1,3,5- Trichlorobenzene
Chloroprene	Isobutane	n-Butyraldehyde	1-Butene	1,4-Dioxane
Cycloheptane	Isobutene	n-Butyronitrile	1-Decene	1,4-Hexadiene
Cyclohexane	Isobutyl benzene	n-Decane	1-Decanal	2-Methyl-1-Pentene
Cyclopentane	Isopentane	n-Dodecane	1-Decanol	2,2-Dimethylbutane
Cyclopentene	Isoprene	n-Heptadecane	1-Dodecene	
Cyclopropane	Isopropanol	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

Fluid Data Sheet (FDS)

For custom fluid not in the Rosemount Fluid Database

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

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

* = Required Item
★ = Default

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

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

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

TABLE 7. Custom Liquid Worksheet

* = Required Item

★ = Default

Mass Liquid Density and Viscosity Information

1. Fill in the following operating temperatures

   a) _____ min

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

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

   d) _____ max

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

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

Base density: _____
(at base reference conditions specified)

Volumetric Liquid Density and Viscosity Information

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

OR

Specific Gravity at Flow: _____

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

TABLE 8. Custom Gas Worksheet

* = Required Item
★ = Default

Mass Gas Compressibility and Viscosity Information

1. Fill in the following operating pressures and operating temperatures

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

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

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

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

Pressure	Temperature	Temperature
1) _____	5) _____	5) _____
2) _____	5) _____	8) _____
3) _____	5) _____	9) _____
4) _____	5) _____	7) _____
1) _____	6) _____	
2) _____	6) _____	Molecular Weight: _____
3) _____	6) _____	Isentropic Exponent: _____ 1.4 ★
4) _____	6) _____	
1) _____	7) _____	
2) _____	7) _____	
3) _____	7) _____	
4) _____	7) _____	

Standard density/compressibility: _____

Volumetric Gas Compressibility and Viscosity Information

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

OR

M.W. / Specific Gravity at Flow: _____

Compressibility at Flow: _____

Compressibility at Base: _____

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

TABLE 9. Natural Gas Worksheet

NOTE
The minimum requirement for the Volumetric options is highlighted gray on page 18.

Compressibility Factor Information

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

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

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

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

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

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

Notes

Notes

Product Data Sheet
00813-0100-4028, Rev BA
Catalog 2006 - 2007

Rosemount 285 Annubar Primary Element

Emerson Process Management

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA
T (U.S.) 1-800-999-9307
T (International) (952) 906-8888
F (952) 949-7001

www.rosemount.com

Emerson Process Management
Heath Place
Bognor Regis
West Sussex PO22 9SH
England
T 44 (0) 1243 863121
F 44 (0) 1243 867554

Emerson Process Management Asia Pacific Private Limited
1 Pandan Crescent
Singapore 128461
T (65) 6777 8211
F (65) 6777 0947
Enquiries@AP.EmersonProcess.com

EMERSON™
Process Management