Product Data Sheet
00813-0100-4028, Rev CA
Catalog 2008 - 2009

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*

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.

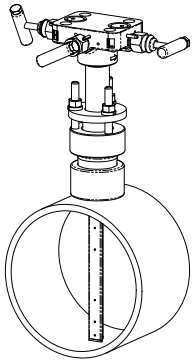
Orifice Plate Primary Element Systems: Rosemount 1495 and 1595 Orifice Plates, 1496 Flange Unions and 1497 Meter Sections

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.

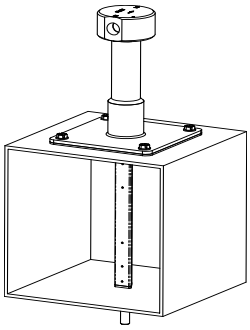
285 *Annubar* Primary Element Series Selection Guide

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



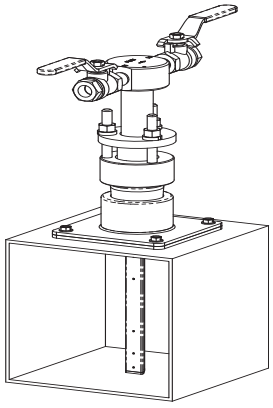
Rosemount 285 *Annubar* with Duct Mount

Rosemount 285 *Annubar* with Duct Mount (No compression fitting)

- Combines the 285 Annubar technology with duct mounting installation
- For applications requiring duct mounting installation
- Ideal fluid types: gas
- Threaded stud for opposite side support

Rosemount 285 *Annubar* with Duct Mount Compression Fitting

- For application in ducts requiring additional mounting support
- Ideal fluid types: gas
- No opposite side support required



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)

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

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

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

Flow Turndown
10:1or better

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))
- Maximum temperature: 500 °F (260 °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-Lok
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))
- PTFE Packing (–40 to 300 °F (–40 to 149 °C))

Duct Mount
See “Dimensional Drawings” on page Flow-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 Flow-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.

Rosemount 285 Annubar Primary Element

Installation Considerations

Straight Run Requirements[1]

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

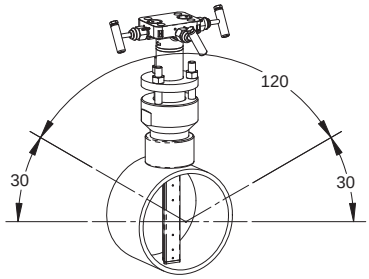
(1) Consult the factory for instructions regarding use in square or rectangular ducts.

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

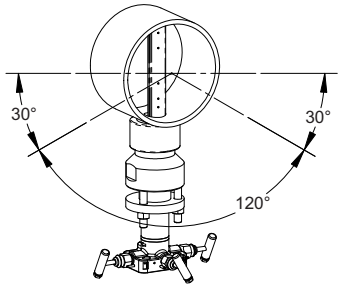
(3) Use straightening vane to reduce the required straight run length.

Flowmeter Orientation (Recommended)

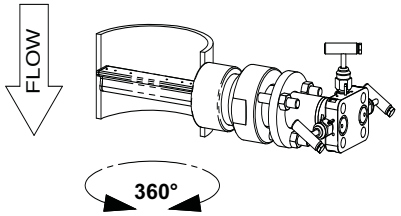
Gas (Horizontal)



Liquid and Steam (Horizontal)

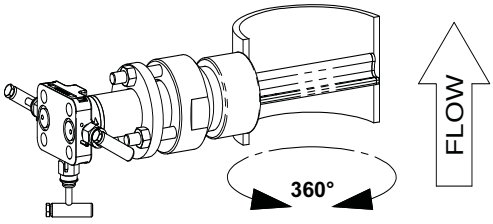


Gas (Vertical)



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

Steam (Vertical)



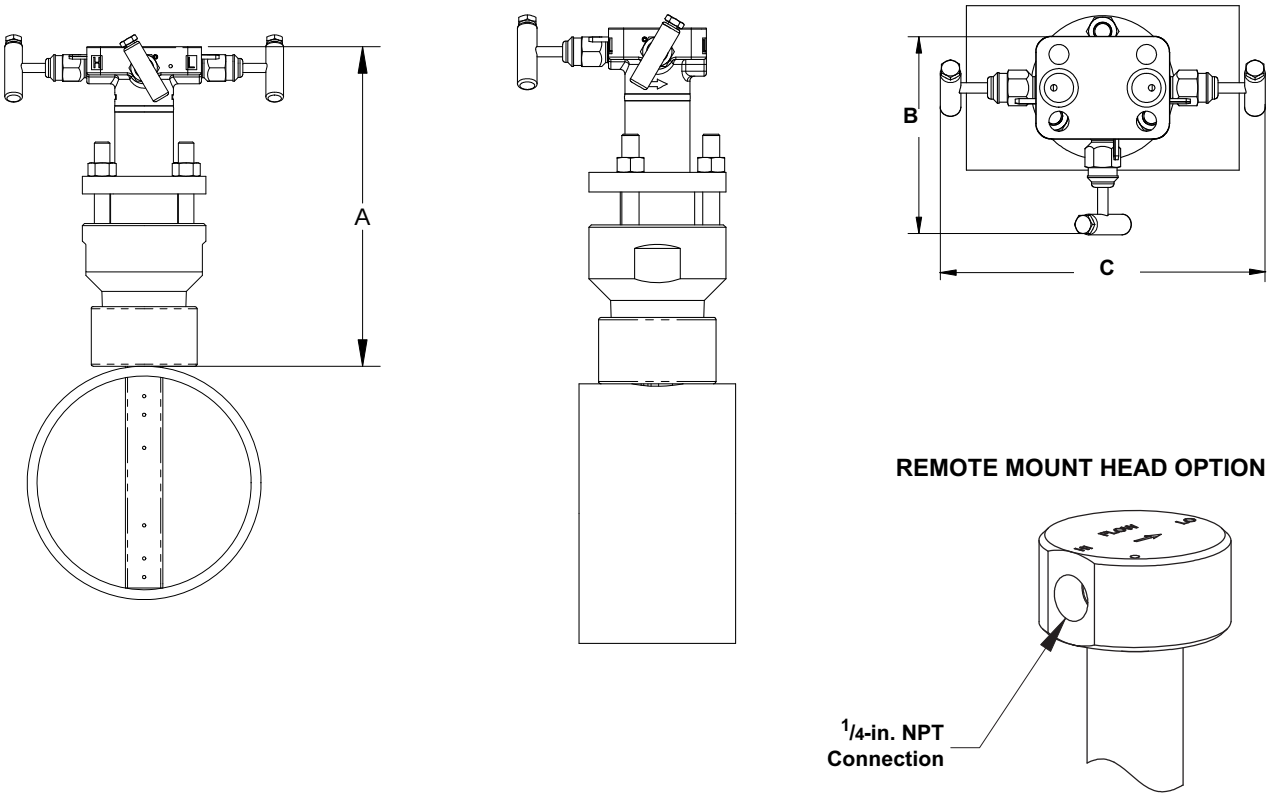
Drill Hole Size According to Sensor Size

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

Dimensional Drawings

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

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



(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

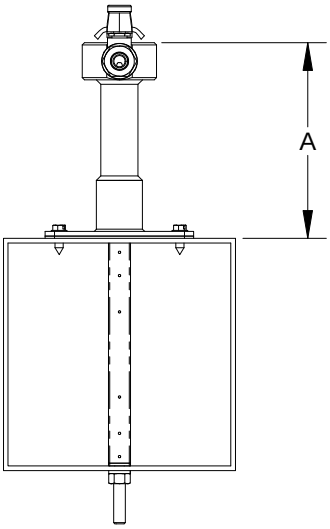
Sensor Size	A (Max)	B (Max)	C (Max)
1	8.50 (215.9)	5.00 (127.0)	9.00 (228.6)
2	11.00 (279.4)	5.00 (127.0)	9.00 (228.6)

Dimensions are in inches (millimeters)

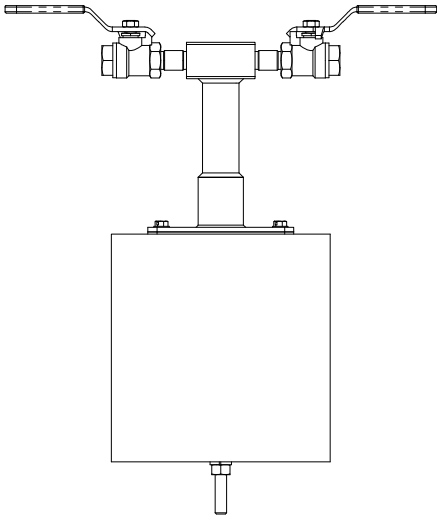
Dimensional Drawings (continued)

Duct Mount 285 Annubar Primary

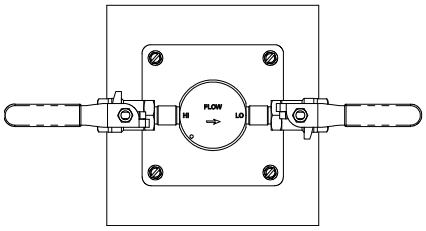
Front View



Side View



Top View



DIRECT MOUNT HEAD OPTION WITH VALVES (F2 OPTION)

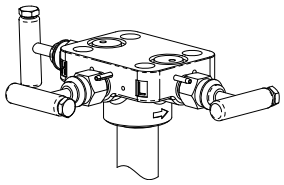


TABLE 4. Rosemount 285 Annubar with Duct Mount

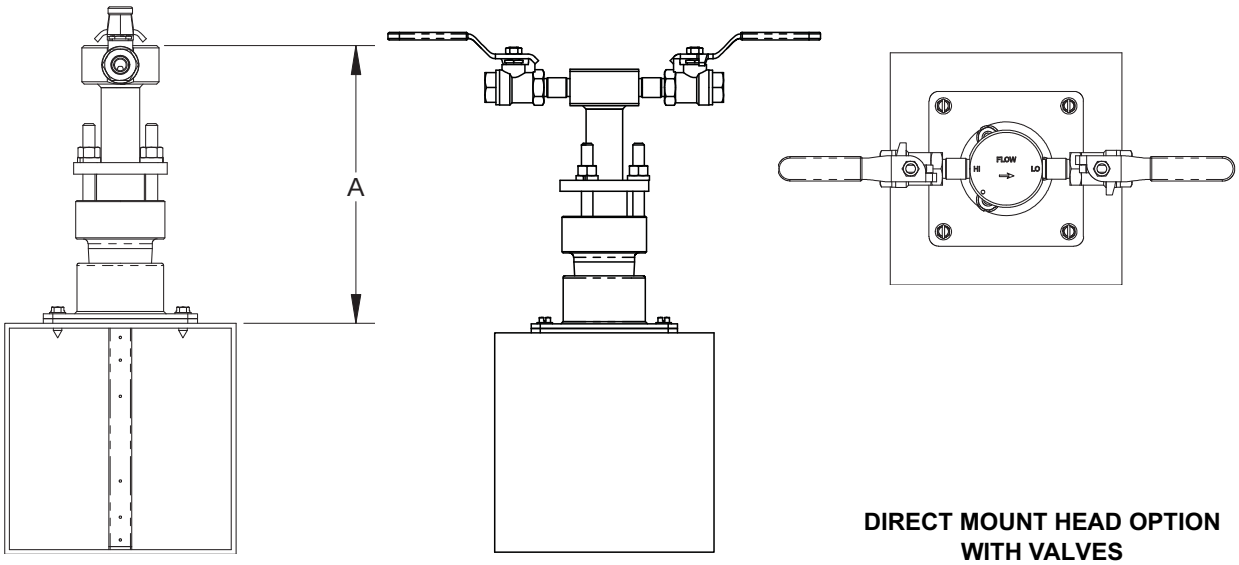
Sensor Size	A (Max)
1	7.00 (177.8)
2	9.00 (228.6)

Dimensions are in inches (millimeters)

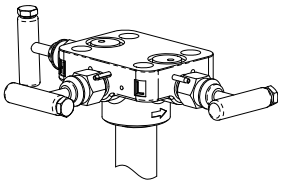
Dimensional Drawings (continued)

Duct Mount with Compression Fitting 285 *Annubar* Primary

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



DIRECT MOUNT HEAD OPTION WITH VALVES (F2 OPTION)



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	Annubar Primary Element
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 (1)
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 “” on page 11. The Emerson process Management sizing program will determine this code, based on the application piping.

	Line Size				Pipe Wall Thickness		
	Nominal	Max. O.D.	Option Code	Inner Diameter (I.D.) Range	ANSI Pipes	Non-ANSI Pipes	I.D. 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

Product Data Sheet
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Rosemount 285 Annubar Primary Element

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