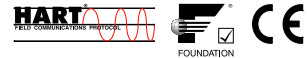


# Rosemount Integral Orifice Flowmeter Series

**HIGHLY ACCURATE SMALL-BORE FLOW  
MEASUREMENT CAPABILITY WITH  
MINIMAL INSTALLATION AND  
MAINTENANCE REQUIREMENTS**

- Improves accuracy and repeatability in 1/2-in., 1-in., and 1 1/2-in. line sizes
- Reduces leak points by over 50% and minimizes line plugging
- Improves reliability with consistent installations
- Multivariable measurement for gas and steam



## Content

Rosemount Integral Orifice Flowmeter Series . . . . .	page 2
1195 Integral Orifice Series Selection Guide . . . . .	page 3
Rosemount 3051SFP Proplate Flowmeter . . . . .	page 4
Specifications . . . . .	page 4
Product Certifications . . . . .	page 8
Dimensional Drawings . . . . .	page 11
Ordering Information . . . . .	page 12
Rosemount 3095MFP Mass Proplate Flowmeter . . . . .	page 16
Specifications . . . . .	page 16
Product Certifications . . . . .	page 19
Dimensional Drawings . . . . .	page 21
Ordering Information . . . . .	page 22
Rosemount 1195 Integral Orifice Primary Element . . . . .	page 25
Specifications . . . . .	page 25
Dimensional Drawings . . . . .	page 28
Ordering Information . . . . .	page 29
Configuration Data Sheet (CDS) . . . . .	page 34
Fluid Data Sheet (FDS) . . . . .	page 37

## Rosemount Integral Orifice Flowmeter Series

### Industry leading integrated DP flowmeters

By integrating Rosemount pressure transmitters with the 1195 Integral Orifice Series primary element, Rosemount provides the highest performing DP Flowmeters. This fully integrated flowmeter eliminates the need for fittings, tubing, valves, adapters, and mounting brackets, thereby reducing welding and installation time.

### Improves accuracy and repeatability in 1/2-in., 1-in., and 1 1/2-in. line sizes

Using an integral orifice flowmeter solution will eliminate the three measurement inaccuracies recorded in small orifice line installations.

1. The Rosemount 1195 integral orifice honed body reduces ID uncertainty
2. By inserting precision bored upstream and downstream sections of pipe, the velocity profile distortion due to pipe roughness is reduced
3. The self-centering design of the 1195 Integral Orifice Plate eliminates plate misalignment

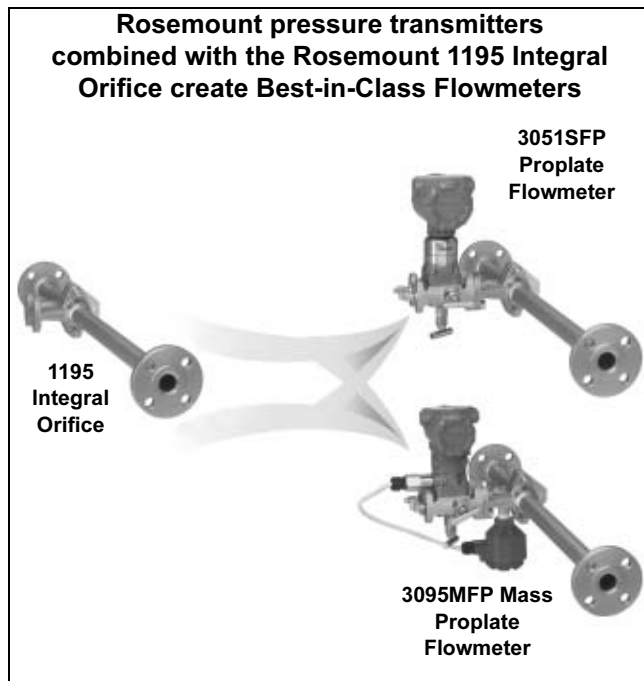
Using integral orifice flowmeter solutions will greatly improve measurement accuracy and repeatability.

### Improves reliability and maintenance costs

The integral orifice flowmeter solutions eliminate impulse lines, reducing leak points by over 50% and decrease start-up time due to the flexibility of numerous process connection options. The direct mount design minimizes line plugging by eliminating long lines, small-bore ports, and crevices while providing consistently reliable installations.

### MultiVariable measurement for gas and steam

Measuring mass flow (base volumetric) in Gas and Steam reduces process variability. The Embedded Flow Software re-calculates ALL flow coefficients and calculates density and mass flow in Real Time. Coupled with DP technology, the Integral Orifice Flowmeter solution is designed to maximize performance in real-world conditions.



### Advanced *PlantWeb*<sup>®</sup> functionality



Rosemount orifice 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, and 485**

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.

### **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.

## 1195 Integral Orifice Series Selection Guide

### Rosemount 3051SFP Proplate Flowmeter

See ordering information on page 12.

- Combines the Rosemount 3051S scalable pressure transmitter with the 1195 Integral Orifice Primary
- Accuracy up to  $\pm 0.95\%$  of volumetric flow rate
- Remote meter assembly enables direct mounting with “at-grade” operator interface
- *FOUNDATION*<sup>®</sup> fieldbus protocol available
- Ideal fluid type: liquid



3051SFP Integral Orifice Flowmeter



3095MFP Integral Orifice Mass Flowmeter

### Rosemount 3095MFP Mass Proplate Flowmeter

See ordering information on page 22.

- Combines the Rosemount 3095MV MultiVariable mass flow transmitter with the 1195 Integral Orifice
- Accuracy up to  $\pm 0.90\%$  of mass flow rate in gas and steam
- Measures differential pressure, static pressure, and process temperature all in one flowmeter assembly
- Dynamically calculates compensated mass flow
- Ideal fluid types: gas and steam

### Rosemount 1195 Integral Orifice Primary

See ordering information on page 29.

- Integral manifold head allows direct mounting of DP transmitters
- Ideal fluid types: liquid, gas, and steam
- Accuracy up to  $\pm 0.75\%$  of discharge coefficient uncertainty
- Direct mounting capability



1195 Integral Orifice

## Rosemount 3051SFP Proplate Flowmeter

### SPECIFICATIONS

#### Performance

##### System Reference Accuracy

Percentage (%) of volumetric flow rate<sup>(1)</sup>

Beta ( $\beta$ ) <sup>(2)</sup>	Classic (8:1 flow turndown)	Ultra (8:1 flow turndown)	Ultra for Flow <sup>(3)</sup> (14:1 flow turndown)
$\beta < 0.1$	±2.70%	±2.65%	±2.60%
$0.1 < \beta < 0.2$	±1.60%	±1.45%	1.40%
$0.2 < \beta < 0.6$	±1.20%	±1.10%	±0.95%
$0.6 < \beta < 0.8$	±1.80%	±1.70%	±1.65%

(1) Without associated straight run piping, discharge coefficient uncertainty can add up to 1.5% - 5% additional error. Consult the factory for additional information.

(2)  $\beta = \frac{\text{Orifice Plate Bore}}{\text{body I.D.}}$

(3) Extends the flow range over a 14:1 turndown.

#### Repeatability

±0.1%

#### Line Sizes

- 1/2-in. (15 mm)
- 1-in. (25 mm)
- 1 1/2-in. (40 mm)

#### 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

- Use associated piping.
- 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.

#### Functional

##### Service

- Liquid
- Gas
- Steam

##### Power Supply

4–20 mA option

- External power supply required. Standard transmitter (4–20 mA) operates on 10.5 to 42.4 v dc with no load

##### FOUNDATION Fieldbus option

- External power supply required. Transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage

#### Process Temperature Limits

##### Direct Mount Electronics

- –40 to 450 °F (40 to 232 °C)

##### Remote Mount Electronics

- –148 to 850 °F (–100 to 454 °C)<sup>(1)</sup>

#### 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)

(1) Bolt Material code G must be provided.

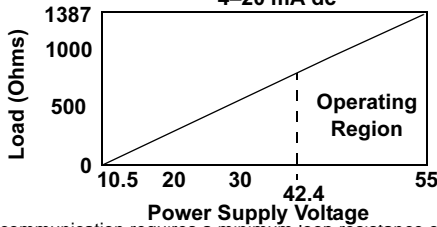
### Static Pressure Limits

- Range 1A: Operates within specification between static line pressures of 0.5 psia to 2000 psig (0.03 bar-A to 138 bar-G)
- 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)

### Load Limitations

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

$$\text{Max. Loop Resistance} = 43.5 (\text{Power Supply Voltage} - 10.5) \text{ 4-20 mA dc}$$



HART communication requires a minimum loop resistance of 250 ohms.

### Overpressure Limits

Flowmeters withstand the following limits without damage:

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

TABLE 1. Overpressure Limits

Line Size	Process Connection Code	Maximum Working Pressure @ 100 °F <sup>(1)</sup> (2)
1/2-in. (12.7 mm)	S1 or P2 T1 or P1	3000 psig (207 bar) 1500 psig (103 bar)
1-in. (25.4 mm)	S1 or P2 T1 or P1	2000 psig (138 bar) 1500 psig (103 bar)
1 1/2-in. (38.1 mm)	S1 or P2 T1 or P1	1500 psig (103 bar) 1500 psig (103 bar)
All	Flanged	Meets flange primary pressure rating per ANSI B16.5 (EN-1092-1 for DIN flanges)

(1) For pressure ratings at temperatures less than -20 °F (-29 °C) or above 100 °F (38 °C) consult an Emerson Process Management representative.

(2) Transmitter static pressure range may limit maximum working pressure. Refer to Static Pressure Ranges specification.

### Humidity Limits

- 0–100% relative humidity

### Inert Sensor Fill Fluid

Not available with Performance Class 3: Ultra for Flow

### Turn-On Time

Performance within specifications less than 2.0 seconds 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 code A)

- If self-diagnostics detect a gross transmitter failure, the analog signal will be driven offscale to alert the user. Rosemount standard, NAMUR, and custom alarm levels are available (see Table 2 below)
- High or low alarm signal is software-selectable or hardware-selectable via the optional switch (option D1)

TABLE 2. Alarm Configuration

	High Alarm	Low Alarm
Rosemount	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant <sup>(1)</sup>	≥ 22.5 mA	≤ 3.6 mA
Custom levels <sup>(2)</sup>	20.2 - 23.0 mA	3.6 - 3.8 mA

(1) Analog output levels are compliant with NAMUR recommendation NE 43.

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

### FOUNDATION Fieldbus (output code F)

- The AI block allows the user to configure HI-HI, LO, or LO-LO, alarms

### Dynamic Performance

	4 - 20 mA (HART <sup>®</sup> ) <sup>(1)</sup>	FOUNDATION Fieldbus <sup>(3)</sup>	Typical Transmitter Response Time
--	---	------------------------------------	-----------------------------------

#### Total Response Time (Td + Tc)<sup>(2)</sup>:

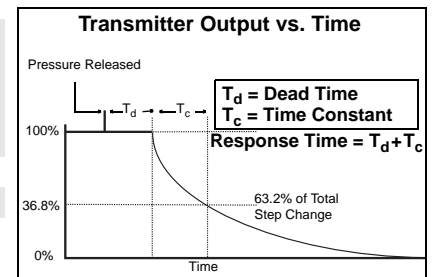
3051S_C, Ranges 2-5:	100 milliseconds	152 milliseconds
Range 1:	255 milliseconds	307 milliseconds
Range 0:	700 milliseconds	752 milliseconds
3051S_T:	100 milliseconds	152 milliseconds
3051S_L:	See Instrument Toolkit™	See Instrument Toolkit

<b>Dead Time (Td)</b>	45 milliseconds (nominal)	97 milliseconds
<b>Update Rate</b>	22 times per second	22 times per second

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

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

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



3051-3051\_17A

## Installation Considerations

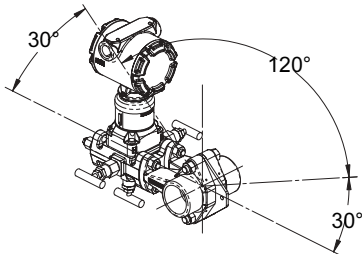
### Pipe Orientation

Orientation/ Flow Direction	Process <sup>(1)</sup>		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	R	R
Vertical Down	R	NR	NR

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

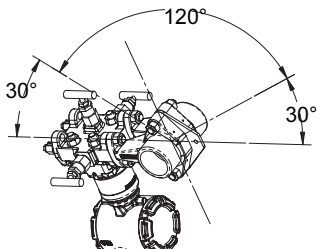
### Flowmeter Orientation

#### Gas (Horizontal)



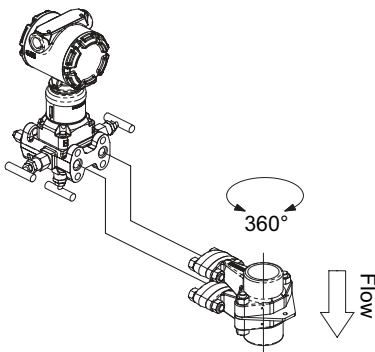
4686-38-490000-999

#### Liquid and Steam (Horizontal)



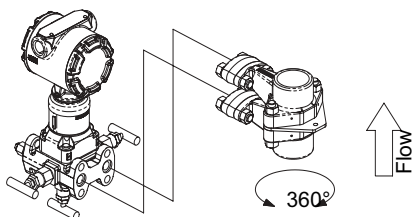
4686-38-490001-999

#### Gas (Vertical)



4686-38-490002-999

#### Liquid (Vertical)



4686-38-490003-999

## Physical

### Temperature Measurement

#### Remote RTD

- 100 Ohm platinum with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing)
- Standard RTD cable is shielded armored cable, length is 12 feet (3.66 m)

Thermowell with Remote RTD with 1/2-in. SST weld couplet

### Electrical Considerations

1/2-14 NPT, G1/2, and CM20 conduit. HART interface connections permanently fixed to terminal block

### Material of Construction

#### Orifice Plate

- 316/316L SST
- Hastelloy C-276
- Monel 400

#### Body

- 316 SST (CF8M), material per ASTM A351
- Hastelloy C-276 (CW12MW), material per ASTM A494

#### Flange and Pipe Material (If Applicable)

- A312 Gr 316/316L, B622 UNS N10276
- Flange pressure limits are per ANSI B16.5
- Flange face finish per ANSI B16.5, 125 to 250 RMS

#### Body Bolts/Studs

- ASTM A193 Gr B8M studs
- SAE J429 Gr 8 bolts (meets or exceeds ASTM A193 B7 requirements) for body bolt/stud material option code G for high temperatures.

#### Transmitter Connection Studs

- ASTM A193 Gr B8M studs

#### Gaskets/O-rings

- Glass filled Teflon® (PTFE)
- Optional high temperature Incone® X-750
- Gaskets and o-rings must be replaced each time the 3051SFP is disassembled for installation or maintenance.

### Orifice Type

#### Square edged—orifice bore size

- 0.066-in and larger

#### Quadrant edged—orifice bore size (for 1/2-in. line size only)

- 0.034-in
- 0.020-in
- 0.014-in
- 0.010-in

### NOTE

Integral orifice bodies contain corner tapped pressure ports.

## Pipe Lengths

- Upstream and downstream associated piping sections are available on the 3051SFP. The table below lists the standard overall length (lay length) as a function of end connections and line size.

Flanged Process Connection <sup>(1) (2) (3)</sup>	Line Size		
	1/2-in. (15 mm)	1-in. (25 mm)	1 1/2-in. (40 mm)
RF, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN16, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN40, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN100, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 150, weld-neck	21.8 (554)	33.2 (843)	44.9 (1140)
RF, ANSI Class 300, weld-neck	22.2 (559)	33.7 (856)	45.5 (1156)
RF, ANSI Class 600, weld-neck	22.8 (579)	34.3 (871)	46.1 (1171)
RTJ, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
<b>NPT / Beveled Process Connection<sup>(1)(2)(3)</sup></b>	18 (457)	28.9 (734)	40.3 (1023)

(1) See the ordering information for model code description.

(2) Consult factory for other lengths.

(3) See page 32 for additional information on associated pipe lengths.

## Weight

The following weights are approximate

Line Size	With Body		With Flanged Piping <sup>(1)</sup>	
	lb	kg	lb	kg
1/2-in. (15 mm)	13.6	6.2	17.6	8.0
1-in. (25 mm)	15.6	7.1	21.6	9.8
1 1/2-in. (40 mm)	17.6	8.0	34.6	15.7

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

## 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 / Inconel X-750

### Integral Manifold O-Rings

- Teflon (PTFE) / Graphite (D7)

## 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)

- SST (CS optional for high temperature)

### Electronic Housing

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

### Paint

- Polyurethane

### Bolts

- CS
- SST

## 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](http://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)

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 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: 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** 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** 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** ATEX Intrinsic Safety  
Certificate No.: BAS01ATEX1303X  II 1G  
EEx ia IIC T5 (-60°C ≤ T<sub>a</sub> ≤ 40°C)  
T4 (-60°C ≤ T<sub>a</sub> ≤ 70°C)  
T4 (-60°C ≤ T<sub>a</sub> ≤ 40°C) (FISCO)  
**CE** 1180

TABLE 3. Input Parameters

Loop / Power	Groups
U <sub>i</sub> = 30 V	HART / FOUNDATION Fieldbus/ Remote Display / SIS
U <sub>i</sub> = 17.5 V	FISCO
I <sub>i</sub> = 300 mA	HART / FOUNDATION Fieldbus/ Remote Display / SIS
I <sub>i</sub> = 380 mA	FISCO
P <sub>i</sub> = 1.0 W	HART / Remote Display / SIS
P <sub>i</sub> = 1.3 W	FOUNDATION Fieldbus
P <sub>i</sub> = 5.32 W	FISCO
C <sub>i</sub> = 30 nF	SuperModule™
C <sub>i</sub> = 11.4 nF	HART / SIS
C <sub>i</sub> = 0	FOUNDATION Fieldbus / Remote Display / FISCO
L <sub>i</sub> = 0	HART / FOUNDATION Fieldbus/ SIS / FISCO
L <sub>i</sub> = 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.

**N1** ATEX Type n  
Certificate No.: BAS01ATEX3304X  II 3 G  
EEx nL IIC T5 ( $T_a = -40\text{ °C TO } 70\text{ °C}$ )  
 $U_i = 45\text{ Vdc max}$   
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  
 $T_{105\text{ °C}} (-20\text{ °C} \leq T_{\text{amb}} \leq 85\text{ °C})$   
 $V_{\text{max}} = 42.4\text{ volts max}$   
 $A = 24\text{ mA}$   
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 ( $-50\text{ °C} \leq T_{\text{amb}} \leq 65\text{ °C}$ )  
EEx d IIC T5 ( $-50\text{ °C} \leq T_{\text{amb}} \leq 80\text{ °C}$ )  
 $V_{\text{max}} = 42.4\text{ V}$   
**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 3051S pressure transmitter must include a Series 300S housing integrally mounted to a Series 3051S Sensor module as per Rosemount drawing 03151-1023.

## Australian Certifications

**E7** SAA Explosion-proof and DIP  
Certification No.: AUS Ex 3798X  
Ex d IIC T6 ( $T_a = 60\text{ °C}$ ) IP66  
DIP A21 TA T6 ( $T_a = 60\text{ °C}$ ) 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 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 300S housing, in order to comply with flameproof requirements.
6. It is a condition of safe use that each 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 300S housing, the replacement housing shall have the same certification marking code information as the housing it replaces.

## IECEX Certifications

- I7** IECEx Intrinsic Safety  
Certificate No.: IECExBAS04.0017X  
Ex ia IIC T5 ( $T_a = -60\text{ °C}$  to  $40\text{ °C}$ ) -Hart/SIS/Remote Meter  
Ex ia IIC T4 ( $T_a = -60\text{ °C}$  to  $70\text{ °C}$ ) -Hart/SIS/Remote Meter  
Ex ia IIC T4 ( $T_a = -60\text{ °C}$  to  $70\text{ °C}$ ) -Foundation Fieldbus  
Ex ia IIC T4 ( $T_a = -60\text{ °C}$  to  $40\text{ °C}$ ) -FISCO  
IP66

TABLE 4. 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
$C_i = 30\text{ nF}$	SuperModule™
$C_i = 11.4\text{ nF}$	HART / SIS
$C_i = 0$	FOUNDATION Fieldbus / Remote Display / FISCO
$L_i = 0$	HART / FOUNDATION Fieldbus/ SIS / FISCO
$L_i = 60\text{ }\mu\text{H}$	Remote Display

### Special conditions for safe use (x)

- The 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.
- 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  $70\text{ °C}$ )  
 $U_i = 45\text{ Vdc MAX}$   
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.

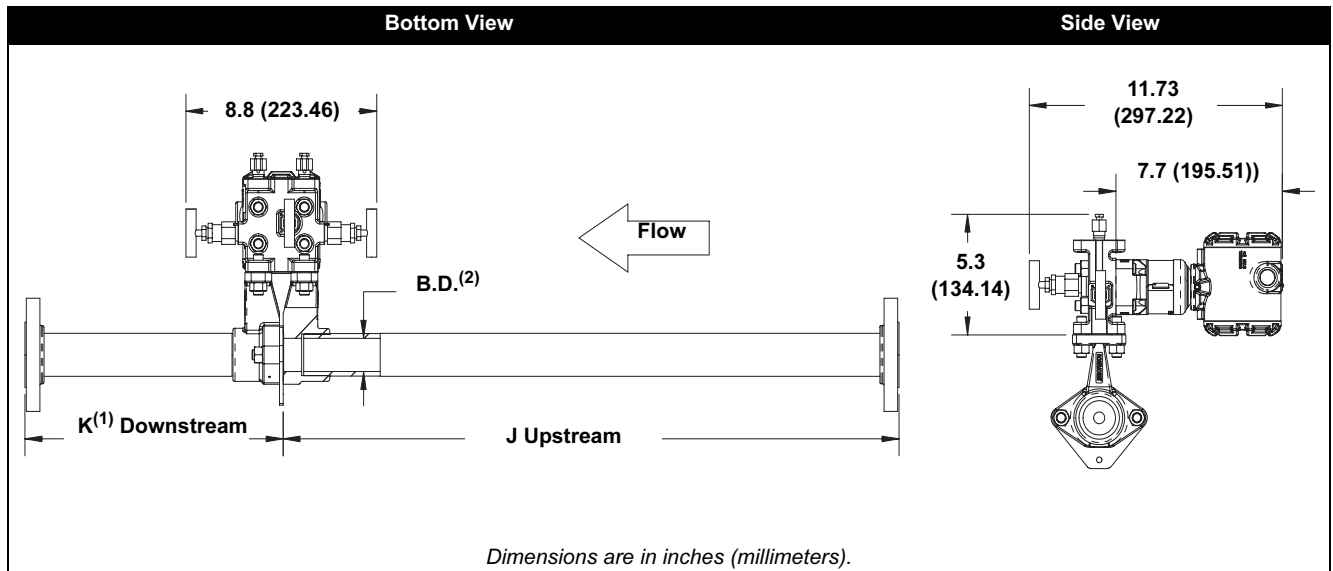
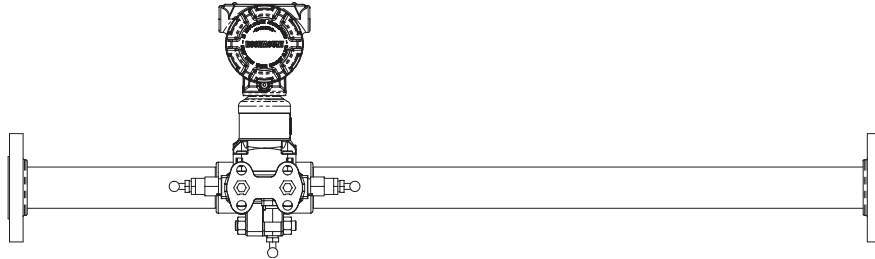
## Combinations of Certifications

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

**DIMENSIONAL DRAWINGS**

**Rosemount 3051SFP Proplate Flowmeter**  
 Front View



Dimension	Line Size					
	1/2-in. (12.7 mm)		1-in. (25.4 mm)		1 1/2-in. (38.1 mm)	
J (RF slip-on, RTJ slip-on, RF-DIN slip-on)	12.4-in.	318 mm	20.2-in.	513 mm	28.4-in.	721 mm
J (RF 150#, weld-neck)	14.3-in.	363 mm	22.3-in.	566 mm	30.7-in.	780 mm
J (RF 300#, weld-neck)	14.5-in.	368 mm	22.6-in.	574 mm	31.0-in.	787 mm
J (RF 600#, weld-neck)	14.8-in.	376 mm	22.9-in.	582 mm	31.3-in.	795 mm
K ((RF slip-on, RTJ slip-on, RF-DIN slip-on) <sup>(1)</sup>	5.7-in.	148 mm	8.7-in.	221 mm	11.9-in.	302 mm
K (RF 150#, weld-neck)	7.5-in.	191 mm	10.9-in.	277 mm	14.2-in.	361 mm
K (RF 300#, weld-neck)	7.7-in.	196 mm	11.1-in.	282 mm	14.5-in.	368 mm
K (RF 600#, weld-neck)	8.0-in.	203 mm	11.4-in.	290 mm	14.8-in.	376 mm
B.D. <sup>(2)</sup>	0.664-in.	16.9 mm	1.097-in.	27.86 mm	1.567-in.	39.80 mm

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

(2) B.D. is diameter of the precision bored portion of the upstream and downstream piping.

# Rosemount Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

## ORDERING INFORMATION

### Rosemount 3051SFP Proplate Flowmeter Ordering Information

Model	Product Description
3051SFP	Proplate Flowmeter
Code	Measurement Type
D	Differential Pressure
Code	Body Material
S	316 SST
H	Hastelloy C-276
Code	Line Size / Schedule
005	1/2-in. (15 mm)
010	1-in. (25 mm)
015	1 1/2-in. (40 mm)
Code	Process Connection
T1	NPT Female Body (not available with remote thermowell and RTD)
S1 <sup>(1)</sup>	Socket Weld Body (not available with remote thermowell and RTD)
P1	Pipe Ends: NPT threaded
P2	Pipe Ends: Beveled
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on
D1	Pipe Ends: Flanged, RF, DIN PN16, slip-on
D2	Pipe Ends: Flanged, RF, DIN PN40, slip-on
D3	Pipe Ends: Flanged, RF, DIN PN100, slip-on
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on
P9	Special process connections
Code	Orifice Plate Material
S	316 SST
H	Hastelloy C-276
M	Monel
Code	Bore Size Option
0010	0.010-in. (0.25 mm) for 1/2-in. pipe
0014	0.014-in. (0.36 mm) for 1/2-in. pipe
0020	0.020-in. (0.51 mm) for 1/2-in. pipe
0034	0.034-in. (0.86 mm) for 1/2-in. pipe
0066	0.066-in. (1.68 mm) for 1/2-in. pipe
0109	0.109-in. (2.77 mm) for 1/2-in. pipe
0160 <sup>(2)</sup>	0.160-in. (4.06 mm) for 1/2-in. pipe
0196 <sup>(2)</sup>	0.196-in. (4.98 mm) for 1/2-in. pipe
0260 <sup>(2)</sup>	0.260-in. (6.60 mm) for 1/2-in. pipe
0340 <sup>(2)</sup>	0.340-in. (8.64 mm) for 1/2-in. pipe
0150	0.150-in. (3.81 mm) for 1-in. pipe
0250 <sup>(2)</sup>	0.250-in. (6.35 mm) for 1-in. pipe
0345 <sup>(2)</sup>	0.345-in. (8.76 mm) for 1-in. pipe
0500 <sup>(2)</sup>	0.500-in. (12.70 mm) for 1-in. pipe
0630 <sup>(2)</sup>	0.630-in. (16.00 mm) for 1-in. pipe
0800	0.800-in. (20.32 mm) for 1-in. pipe
0295	0.295-in. (7.49 mm) for 1 1/2-in. pipe

**Rosemount 3051SFP Proplate Flowmeter Ordering Information**

0376 <sup>(2)</sup>	0.376-in. (9.55 mm) for 1 1/2-in. pipe		
0512 <sup>(2)</sup>	0.512-in. (13.00 mm) for 1 1/2-in. pipe		
0748 <sup>(2)</sup>	0.748-in. (19.00 mm) for 1 1/2-in. pipe		
1022	1.022-in. (25.96 mm) for 1 1/2-in. pipe		
1184	1.184-in. (30.07 mm) for 1 1/2-in. pipe		
<b>Code</b>	<b>Electronics Connection Platform</b>		
D3	Direct-mount, 3-valve manifold, SST		
D4	Direct-mount, 3-valve manifold, <i>Hastelloy-C</i>		
D5	Direct-mount, 5-valve manifold, SST		
D6	Direct-mount, 5-valve manifold, <i>Hastelloy-C</i>		
D7	Direct-mount, High Temperature, 5-valve manifold, SST		
R3	Remote-mount, 3-valve manifold, SST		
R4	Remote-mount, 3-valve manifold, <i>Hastelloy-C</i>		
R5	Remote-mount, 5-valve manifold, SST		
R6	Remote-mount, 5-valve manifold, <i>Hastelloy-C</i>		
<b>Code</b>	<b>Differential Pressure Range</b>		
1A	0 to 25 in H <sub>2</sub> O (0 to 62.2 mbar)		
2A	0 to 250 in H <sub>2</sub> O (0 to 623 mbar)		
3A	0 to 1000 in H <sub>2</sub> O (0 to 2.5 bar)		
<b>Code</b>	<b>Output Protocol</b>		
A	4–20 mA with digital signal based on <i>HART</i> protocol		
B <sup>(3)</sup>	4–20 mA Safety Certified with digital signal based on <i>HART</i> protocol (requires <i>PlantWeb</i> housing)		
F	<i>FOUNDATION</i> fieldbus: AI block, Link Master, Input Selector Block (requires <i>PlantWeb</i> housing)		
<b>Code</b>	<b>Electronics Housing Style</b>	<b>Material</b>	<b>Conduit Entry Size</b>
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	G1/2
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	G1/2
2A	Junction Box Housing	Aluminum	1/2-14 NPT
2B	Junction Box Housing	Aluminum	M20 x 1.5 (CM20)
2C	Junction Box Housing	Aluminum	G1/2
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	G1/2
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
<b>Code</b>	<b>Performance Class</b>		
3 <sup>(4)</sup>	Ultra for Flow: up to 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty		
1	Class 1 (Ultra): up to 1.05% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty		
2	Class 2 (Classic): up to 1.20% flow rate accuracy, 8:1 flow turndown, 5-year stability		
<b>Code</b>	<b>Options</b>		
<b>Transmitter / Body Bolt Material</b>			
G	High temperature (850 °F (454 °C)) (SAE J429 Gr8 / Body bolts with A193 Gr B8M transmitter studs)		
<b>Temperature Sensor</b>			
T <sup>(5)</sup>	Thermowell and RTD		
<b>Optional Bore Calculation</b>			
BC	Bore Calculation		
<b>Optional Connection</b>			
G1	DIN 19231 Transmitter Connection		
<b>Hydrostatic Testing</b>			
P1	Hydrostatic Testing		

# Rosemount Integral Orifice Flowmeter Series

Product Data Sheet  
00813-0100-4686, Rev KA  
October 2004

## Rosemount 3051SFP Proplate Flowmeter Ordering Information

### Special Cleaning

P2	Cleaning for special processes
PA	Cleaning per ASTM G93 Level D (section 11.4)

### Dye Penetrant Exam

V1	Dye Penetrant Exam
----	--------------------

### Radiographic Examination

V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)
----	---

### Flow Calibration

WD <sup>(6)</sup>	Discharge Coefficient Verification
WZ <sup>(6)</sup>	Special Calibration

### Special Inspection

QC1	Visual and Dimensional Inspection with certificate
QC7	Inspection and performance certificate

### Material Traceability Certification

Q8 <sup>(7)</sup>	Material certification per ISO 10474 3.1.B and EN 10204 3.1.B
-------------------	---

### Code Conformance

J2 <sup>(8)</sup>	ANSI / ASME B31.1
J3 <sup>(8)</sup>	ANSI / ASME B31.3
J4 <sup>(8)</sup>	ANSI / ASME B31.8

### Materials Conformance

J5 <sup>(9)</sup>	NACE MR-0175 / ISO 15156
-------------------	--------------------------

### Country Certification

J1	Canadian Registration
J6	European Pressure Directive (PED)

### Transmitter Calibration Certification

Q4	Calibration Data Certificate for Transmitter
----	--

### Product Certifications

E1	ATEX Flameproof
I1	ATEX Intrinsically Safe
N1	ATEX Type n
K1	ATEX Flameproof, Intrinsically Safe, Type n, and Dust (combination of E1, I1, N1, and ND)
ND	ATEX Combustible Dust
E5	FM Explosion-proof
I5	FM Intrinsically Safe, non-incendive
K5	FM Explosion-proof, Intrinsically Safe, non-incendive (combination of E5 and I5)
E6	CSA Explosion-proof
I6	CSA Intrinsically Safe, non-incendive
K6	CSA Flameproof, Intrinsically Safe, non-incendive (combination of E6 and I6)
E7	SAA Flameproof and DIP
I7	IECEx Intrinsically Safe
N7	IECEx Type n
K7	SAA Flameproof and DIP, IECEx Intrinsically Safe, and Type n (combination of E7, I7, and N7)
KA	ATEX and CSA Flameproof and Intrinsically Safe (combination of E1, I1, E6, and I6) <i>Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M</i>
KB	FM and CSA Explosion-proof and Intrinsically Safe (combination of E5, E6, I5, and I6) <i>Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M</i>
KC	FM and ATEX Explosion-proof and Intrinsically Safe (combination of E5, E1, I5, and I1) <i>Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M</i>
KD	FM, CSA, and ATEX Explosion-proof and Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1) <i>Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.</i>

### Alternative Transmitter Material of Construction

L1	Inert Sensor Fill Fluid (not available with Differential Pressure range code 1A)
L2	Graphite-filled Teflon <sup>®</sup> (PTFE) o-ring
LA	Inert sensor fill fluid and graphite-filled Teflon (PTFE) o-ring

**Rosemount 3051SFP Proplate Flowmeter Ordering Information**

**Display**

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

**Terminal Blocks**

T1	Transient Protection
T2 <sup>(10)</sup>	Terminal block with WAGO® spring clamp terminals
T3 <sup>(10)</sup>	Transient terminal block with WAGO spring clamp terminals

**PlantWeb Control Anywhere Software**

A01	Regulatory control suite: PID, arith, signal char, integ, etc. (requires PlantWeb housing and FOUNDATION fieldbus)
-----	--

**PlantWeb Advanced Diagnostic Software**

D01	Diagnostics suite: Plugged Impulse Line and SPM diagnostics (requires PlantWeb housing and FOUNDATION fieldbus)
-----	---

**Alarm Limits**

C4 <sup>(11)</sup>	NAMUR alarm and saturation signal levels, high alarm
C5 <sup>(11)</sup>	NAMUR alarm and saturation signal levels, low alarm
C6 <sup>(11)</sup>	Custom alarm and saturation signal levels, high alarm
C7 <sup>(11)</sup>	Custom alarm and saturation signal levels, low alarm
C8 <sup>(11)</sup>	Low alarm (standard Rosemount alarm and saturation signal levels)

**Special Transmitter Configuration (Hardware)**

D1 <sup>(11)</sup>	Hardware Adjustment (zero, span, security)
D4	External ground screw
DA <sup>(11)</sup>	Hardware adjustment (zero, span, security) and external ground screw

**Conduit Electrical Connector**

GE <sup>(12)</sup>	M12, 4-pin, Male Connector (eurofast®)
GM <sup>(12)</sup>	A size Mini, 4-pin, Male Connector (minifast®)

**Typical Model Number: 3051SFP D S 010 A3 S 0150 D3 1A A 1A 3**

- (1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.
- (2) Best flow coefficient uncertainty is between  $(0.2 < \beta < 0.6)$ .  $0.6 \beta$  is not available for  $1/2$ -in. pipe size.
- (3) Requires Hardware Adjustments option code D1.
- (4) Not available for Differential Pressure range code 1A or Output Protocol code B.
- (5) Thermowell material is the same as the 1195 body material.
- (6) Not available for bore sizes 0010, 0014, 0020, or 0034.
- (7) Includes certificates for mechanical and chemical properties of bodies, orifice plates, pipes, flanges, and adapters as applicable.
- (8) Not available with DIN Process Connection codes D1, D2, or D3.
- (9) 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.
- (10) Available with Output Protocol code A and PlantWeb housing only.
- (11) Not available with FOUNDATION fieldbus protocol.
- (12) Not available with certain hazardous location certifications. Contact an Emerson Process Management representative for details.

## Rosemount 3095MFP Mass Proplate Flowmeter

### SPECIFICATIONS

#### Performance

##### System Reference Accuracy

Percentage (%) of mass flow rate<sup>(1)</sup>

Beta ( $\beta$ ) <sup>(2)</sup>	Mass Flow Accuracy (8:1 flow turndown)
$\beta < 0.1$	$\pm 2.60\%$
$0.1 < \beta < 0.2$	$\pm 1.35\%$
$0.2 < \beta < 0.6$	$\pm 0.90\%$
$0.6 < \beta < 0.8$	$\pm 1.60\%$

(1) Without associated straight run piping, discharge coefficient uncertainty can add up to 1.5% - 5% additional error. Consult the factory for additional information.

(2)  $\beta = \frac{\text{Orifice Plate Bore}}{\text{body I.D.}}$

#### Repeatability

$\pm 0.1\%$

#### Line Sizes

- 1/2-in. (15 mm)
- 1-in. (25 mm)
- 1 1/2-in. (40 mm)

#### Output

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

#### Performance Statement Assumptions

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

#### Sizing

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

#### Optional Performance Class Specification

Ultra for Flow (Code U3): up to  $\pm 0.95\%$  mass flow rate accuracy, 10:1 turndown, 10-year stability, limited 12-year warranty

#### 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

- –40 to 450 °F (–40 to 232 °C)

Remote Mount Electronics

- –148 to 850 °F (–100 to 454 °C)<sup>(1)</sup>

##### 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)

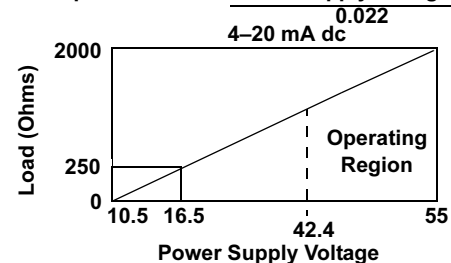
##### Static Pressure Limits

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

##### Load Limitations

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

$$\text{Max. Loop Resistance} = \frac{\text{Power Supply Voltage} - 11.0}{0.022}$$



For CSA approval, power supply must not exceed 42.4 V dc. HART communication requires a minimum loop resistance of 250 ohms.

(1) Bolt Material code G must be selected.

### Overpressure Limits

- Zero to two times the absolute pressure range with a maximum of 3626 psia (250 bar).

TABLE 5. Overpressure Limits

Line Size	Process Connection Code	Maximum Working Pressure @ 100 °F <sup>(1)</sup> (2)
1/2-in. (12.7 mm)	S1 or P2 T1 or P1	3000 psig (207 bar) 1500 psig (103 bar)
1-in. (25.4 mm)	S1 or P2 T1 or P1	2000 psig (138 bar) 1500 psig (103 bar)
1 1/2-in. (38.1 mm)	S1 or P2 T1 or P1	1500 psig (103 bar) 1500 psig (103 bar)
All	Flanged	Meets flange primary pressure rating per ANSI B16.5 (EN-1092-1 for DIN flanges)

- (1) For pressure ratings at temperatures less than -20 °F (-29 °C) or above 100 °F (38 °C) consult an Emerson Process Management representative.
- (2) Transmitter static pressure range may limit maximum working pressure. Refer to Static Pressure Ranges specification.

### Humidity Limits

0–100% relative humidity

### Inert Sensor Fill Fluid

- Not available with Static Pressure range codes B and D
- Not available with Differential Pressure range code 1

### 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

HART 4–20mA (output code A)

- If self-diagnostics detect a gross transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.7 mA to alert the user. High or low alarm signal is user-selectable by internal jumper.)

### Installation Considerations

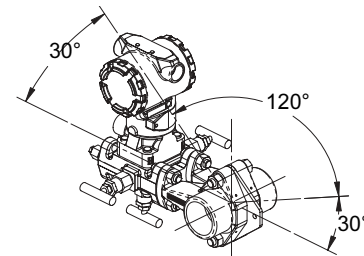
#### Pipe Orientation

Orientation/ Flow Direction	Process <sup>(1)</sup>		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	R	R
Vertical Down	R	NR	NR

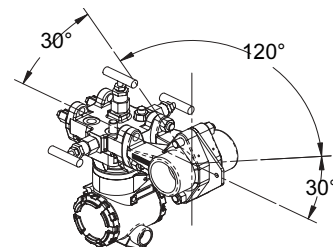
- (1) D = Direct mount acceptable (recommended)  
 R = Remote mount acceptable  
 NR = Not recommended

#### Flowmeter Orientation

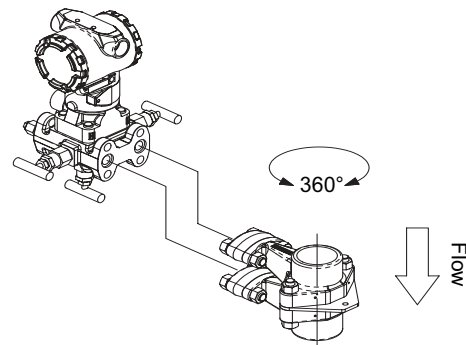
##### Gas (Horizontal)



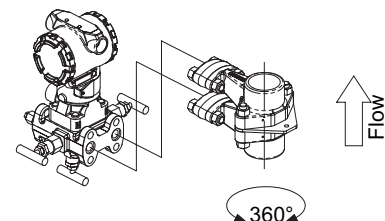
##### Liquid and Steam (Horizontal)



##### Gas (Vertical)



##### Liquid (Vertical)



4686-38-490025-999

4686-38-490026-999

4686-38-490027-999

4686-38-490028-999

# Rosemount Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

## Physical

### Temperature Measurement

#### Remote RTD

- 100 Ohm platinum with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing)
- Standard RTD cable is shielded armored cable, length is 12 feet (3.66 m)
- Remote RTD material is SST

Thermowell with Remote RTD with 1/2-in. SST weld couplet

### Electrical Considerations

1/2–14 NPT, G1/2, and CM20 conduit. HART interface connections permanently fixed to terminal block

### Material of Construction

#### Orifice Plate

- 316/316L SST
- Hastelloy C-276
- Monel 400

#### Body

- 316 SST (CF8M), material per ASTM A351
- Hastelloy C-276 (CW12MW), material per ASTM A494

#### Flange and Pipe Material (If Applicable)

- A312 Gr 316/316L, B622 UNS N10276
- Flange pressure limits are per ANSI B16.5
- Flange face finish per ANSI B16.5, 125 to 250 RMS

#### Body Bolts/Studs

- ASTM A193 Gr B8M studs
- SAE J429 Gr 8 bolts (meets or exceeds ASTM A193 B7 requirements) for body bolt/stud material option code G for high temperatures.

#### Transmitter Connection Studs

- ASTM A193 Gr B8M studs

#### Gaskets/O-rings

- Glass filled Teflon® (PTFE)
- Optional high temperature Inconel® X-750
- Gaskets and o-rings must be replaced each time the 3095MFP is disassembled for installation or maintenance.

### Orifice Type

Square edged—orifice bore size

- 0.066-in and larger

Quadrant edged—orifice bore size (for 1/2-in. line size only)

- 0.034-in
- 0.020-in
- 0.014-in
- 0.010-in

### NOTE

Integral Orifice bodies contain corner tapped pressure ports.

### Pipe Lengths

- Upstream and downstream associated piping sections are available on the 1195. The table below lists the standard overall length (lay length) as a function of end connections and line size.

Flanged Process Connection <sup>(1) (2) (3)</sup>	Line Size		
	1/2-in. (15 mm)	1-in. (25 mm)	1 1/2-in. (40 mm)
RF, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN16, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN40, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN100, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 150, weld-neck	21.8 (554)	33.2 (843)	44.9 (1140)
RF, ANSI Class 300, weld-neck	22.2 (559)	33.7 (856)	45.5 (1156)
RF, ANSI Class 600, weld-neck	22.8 (579)	34.3 (871)	46.1 (1171)
RTJ, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
<b>NPT / Beveled Process Connection<sup>(1)(2)(3)</sup></b>	18 (457)	28.9 (734)	40.3 (1023)

(1) See the ordering information for model code description.

(2) Consult factory for other lengths.

(3) See page 32 for additional information on associated pipe lengths.

### Weight

The following weights are approximate

Line Size	With Body		With Flanged Piping <sup>(1)</sup>	
	lb	kg	lb	kg
1/2-in. (15 mm)	16.1	7.3	20.1	9.1
1-in. (25 mm)	18.1	8.2	24.1	10.9
1 1/2-in. (40 mm)	20.1	9.1	37.1	16.8

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

## 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 / Inconel X-750

### Integral Manifold O-Rings

- Teflon (PTFE) / Graphite (D7)

## 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)

- SST (CS optional for high temperature)

### Electronic Housing

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

### Paint

- Polyurethane

### Bolts

- CS
- SST

## 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 on the Rosemount website at [www.rosemount.com](http://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

3095MFP Integral Orifice Mass Flowmeter —  
Refer to declaration of conformity for 1195 Integral Orifice Series classification.

#### 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 ( $T_{amb} = -45\text{ }^{\circ}\text{C}$  to  $40\text{ }^{\circ}\text{C}$ )  
EEx ia IIC T4 ( $T_{amb} = -45\text{ }^{\circ}\text{C}$  to  $70\text{ }^{\circ}\text{C}$ )  
**CE** 1180

TABLE 6. 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 7. 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 8. 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 ( $T_{amb} = -45\text{ }^{\circ}\text{C}$  to  $40\text{ }^{\circ}\text{C}$ )  
EEx nL IIC T4 ( $T_{amb} = -45\text{ }^{\circ}\text{C}$  to  $70\text{ }^{\circ}\text{C}$ )  
 $U_i = 55\text{V}$

### 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 ( $-50\text{ }^{\circ}\text{C} \leq T_{amb} \leq 80\text{ }^{\circ}\text{C}$ )  
T6 ( $-50\text{ }^{\circ}\text{C} \leq T_{amb} \leq 65\text{ }^{\circ}\text{C}$ )

### 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 fro installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

- ND ATEX Dust  
Certificate Number: KEMA02ATEX2321  II 1 D  
 $V = 55\text{ Vdc MAX}$   
 $I = 23\text{ mA MAX}$   
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 Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

## ORDERING INFORMATION

### Rosemount 3095MFP Mass Proplate Flowmeter Ordering Information

Model	Product Description
3095MFP	Mass Proplate Flowmeter
Code	Body Material
S	316 SST
H	Hastelloy C-276
Code	Line Size / Schedule
005	1/2-in. (15 mm)
010	1-in. (25 mm)
015	1 1/2-in. (40 mm)
Code	Process Connection
T1	NPT Female Body (not available with remote thermowell and RTD, requires Temperature Sensor code N)
S1 <sup>(1)</sup>	Socket Weld Body (not available with remote thermowell and RTD, requires Temperature Sensor code N)
P1	Pipe Ends: NPT threaded
P2	Pipe Ends: Beveled
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on
D1	Pipe Ends: Flanged, RF, DIN PN16, slip-on
D2	Pipe Ends: Flanged, RF, DIN PN40, slip-on
D3	Pipe Ends: Flanged, RF, DIN PN100, slip-on
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on
P9	Special process connections
Code	Orifice Plate Material
S	316 SST
H	Hastelloy C-276
M	Monel
Code	Bore Size Option
0010	0.010-in. (0.25 mm) for 1/2-in. pipe
0014	0.014-in. (0.36 mm) for 1/2-in. pipe
0020	0.020-in. (0.51 mm) for 1/2-in. pipe
0034	0.034-in. (0.86 mm) for 1/2-in. pipe
0066	0.066-in. (1.68 mm) for 1/2-in. pipe
0109	0.109-in. (2.77 mm) for 1/2-in. pipe
0160 <sup>(2)</sup>	0.160-in. (4.06 mm) for 1/2-in. pipe
0196 <sup>(2)</sup>	0.196-in. (4.98 mm) for 1/2-in. pipe
0260 <sup>(2)</sup>	0.260-in. (6.60 mm) for 1/2-in. pipe
0340 <sup>(2)</sup>	0.340-in. (8.64 mm) for 1/2-in. pipe
0150	0.150-in. (3.81 mm) for 1-in. pipe
0250 <sup>(2)</sup>	0.250-in. (6.35 mm) for 1-in. pipe
0345 <sup>(2)</sup>	0.345-in. (8.76 mm) for 1-in. pipe
0500 <sup>(2)</sup>	0.500-in. (12.70 mm) for 1-in. pipe
0630 <sup>(2)</sup>	0.630-in. (16.00 mm) for 1-in. pipe
0800	0.800-in. (20.32 mm) for 1-in. pipe
0295	0.295-in. (7.49 mm) for 1 1/2-in. pipe
0376 <sup>(2)</sup>	0.376-in. (9.55 mm) for 1 1/2-in. pipe
0512 <sup>(2)</sup>	0.512-in. (13.00 mm) for 1 1/2-in. pipe
0748 <sup>(2)</sup>	0.748-in. (19.00 mm) for 1 1/2-in. pipe

**Rosemount 3095MFP Mass Proplate Flowmeter Ordering Information**

1022	1.022-in. (25.96 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe	
1184	1.184-in. (30.07 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe	
<b>Code</b>	<b>Electronics Connection Platform</b>	
D3	Direct-mount, 3-valve manifold, SST	
D4	Direct-mount, 3-valve manifold, <i>Hastelloy-C</i>	
D5	Direct-mount, 5-valve manifold, SST	
D6	Direct-mount, 5-valve manifold, <i>Hastelloy-C</i>	
D7	Direct-mount, High Temperature, 5-valve manifold, SST	
R3	Remote-mount, 3-valve manifold, SST	
R4	Remote-mount, 3-valve manifold, <i>Hastelloy-C</i>	
R5	Remote-mount, 5-valve manifold, SST	
R6	Remote-mount, 5-valve manifold, <i>Hastelloy-C</i>	
<b>Code</b>	<b>Differential Pressure Range</b>	
1	0 to 25 in H <sub>2</sub> O (0 to 62.2 mbar)	
2	0 to 250 in H <sub>2</sub> O (0 to 623 mbar)	
3	0 to 1000 in H <sub>2</sub> O (0 to 2.5 bar)	
<b>Code</b>	<b>Static Pressure Range</b>	
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)	
<b>Code</b>	<b>Output Protocol</b>	
A	4–20 mA with digital signal based on <i>HART</i> protocol	
<b>Code</b>	<b>Transmitter Housing Material</b>	<b>Conduit Entry Size</b>
1A	Polyurethane-covered aluminum	1 <sup>1</sup> / <sub>2</sub> -14 NPT
1B	Polyurethane-covered aluminum	M20 x 1.5 (CM20)
1C	Polyurethane-covered aluminum	G <sup>1</sup> / <sub>2</sub>
1J	SST	1 <sup>1</sup> / <sub>2</sub> -14 NPT
1K	SST	M20 x 1.5 (CM20)
1L	SST	G <sup>1</sup> / <sub>2</sub>
<b>Code</b>	<b>Options</b>	
<b>Performance Class</b>		
U3 <sup>(3)</sup>	Ultra for Flow: up to 0.95% mass flow rate accuracy, up to 10:1 turndown, 10-year stability, limited 12-year warranty	
<b>Transmitter / Body Bolt Material</b>		
G	High temperature (850 °F (454 °C)) (SAE J429 Gr8 / Body bolts with A193 Gr B8M transmitter studs)	
<b>Temperature Sensor<sup>(4)</sup></b>		
N	No thermowell and RTD (fixed temperature mode)	
<b>Optional Bore Calculation</b>		
BC	Bore Calculation	
<b>Optional Connection</b>		
G1	DIN 19231 Transmitter Connection	
<b>Hydrostatic Testing</b>		
P1	Hydrostatic Testing	
<b>Special Cleaning</b>		
P2	Cleaning for special processes	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
<b>Dye Penetrant Exam</b>		
V1	Dye Penetrant Exam	
<b>Radiographic Examination</b>		
V2	Radiographic Examination (available only with Process Connection codes W1, W3, and W6)	
<b>Flow Calibration</b>		
WD <sup>(5)</sup>	Discharge Coefficient Verification	
WZ <sup>(5)</sup>	Special Calibration	

# Rosemount Integral Orifice Flowmeter Series

Product Data Sheet  
00813-0100-4686, Rev KA  
October 2004

## Rosemount 3095MFP Mass Proplate Flowmeter Ordering Information

### Special Inspection

QC1	Visual and Dimensional Inspection with certificate
QC7	Inspection and performance certificate

### Material Traceability Certification

Q8 <sup>(6)</sup>	Material certification per ISO 10474 3.1.B and EN 10204 3.1.B
-------------------	---

### Code Conformance

J2 <sup>(7)</sup>	ANSI / ASME B31.1
J3 <sup>(8)</sup>	ANSI / ASME B31.3
J4 <sup>(8)</sup>	ANSI / ASME B31.8

### Material Conformance

J5 <sup>(8)</sup>	NACE MR-0175 / ISO 15156
-------------------	--------------------------

### Country Certification

J1	Canadian Registration
J6	European Pressure Directive (PED)

### Transmitter Calibration Certificate

Q4	Calibration Data Certificate for Transmitter
----	--

### 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 Combustible Dust
K1	ATEX Flameproof, Intrinsic Safety, Type n, and Dust (combination of E1, I1, N1, and ND)

### Alternative Transmitter Material of Construction

L1	Inert Sensor Fill Fluid (not available with Static Pressure range codes B and D)
----	--

### Display

M5	Integral mount LCD display
----	----------------------------

### Terminal Blocks

T1	Transient Protection
----	----------------------

**Typical Model Number: 3095MFP S 010 A3 S 0150 D3 1 C A 1A**

- (1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.
- (2) Best flow coefficient uncertainty is between  $(0.2 < \beta < 0.6)$ .  $0.6 \beta$  is not available for  $1/2$ -in. pipe size.
- (3) Not available with Differential Pressure Range code 1A. Not available with Option code L1.
- (4) Rosemount 3095MFP is supplied with an integral temperature sensor as standard.
- (5) Not available for bore sizes 0010, 0014, 0020, or 0034.
- (6) Includes certificates for mechanical and chemical properties of bodies, orifice plates, pipes, flanges, and adapters as applicable.
- (7) Not available with DIN Process Connection codes D1, D2, or D3.
- (8) 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.

## Rosemount 1195 Integral Orifice Primary Element

### SPECIFICATIONS

#### Performance

##### Discharge Coefficient Uncertainty<sup>(1)</sup>

Beta ( $\beta$ ) <sup>(2)</sup>	Discharge Coefficient Uncertainty
$\beta < 0.1$	$\pm 2.50\%$
$0.1 < \beta < 0.2$	$\pm 1.25\%$
$0.2 < \beta < 0.6$	$\pm 0.75\%$
$0.6 < \beta < 0.8$	$\pm 1.50\%$

(1) Without associated straight run piping, discharge coefficient uncertainty can add up to 1.5% - 5% additional error. Consult the factory for additional information.

(2)  $\beta = \frac{\text{Orifice Plate Bore}}{\text{body I.D.}}$

#### Line Sizes

- 1/2-in. (15 mm)
- 1-in. (25 mm)
- 1 1/2-in. (40 mm)

#### Sizing

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

### Functional

#### Service

- Liquid
- Gas
- Vapor

#### Process Temperature Limits

Standard (direct/remote mount):

- -40 to 450 °F (-40 to 232 °C)

Extended (remote mount only with option code T):

- -148 to 850 °F (-100 to 454 °C)

#### Maximum Working Pressure

- Pressure retention per ANSI B16.5 600# or DIN PN100

TABLE 9. Overpressure Limits

Line Size	Process Connection Code	Maximum Working Pressure @ 100 °F <sup>(1)(2)</sup>
1/2-in. (12.7 mm)	S1 or P2 T1 or P1	3000 psig (207 bar) 1500 psig (103 bar)
1-in. (25.4 mm)	S1 or P2 T1 or P1	2000 psig (138 bar) 1500 psig (103 bar)
1 1/2-in. (38.1 mm)	S1 or P2 T1 or P1	1500 psig (103 bar) 1500 psig (103 bar)
All	Flanged	Meets flange primary pressure rating per ANSI B16.5 (EN-1092-1 for DIN flanges)

(1) For pressure ratings at temperatures less than -20 °F (-29 °C) or above 100 °F (38 °C) consult an Emerson Process Management representative.

(2) Transmitter static pressure range may limit maximum working pressure. Refer to Static Pressure Ranges specification.

#### Assembly to a transmitter

Select option code D11 for the Rosemount 3051S transmitter (or option code S3 for the Rosemount 3051C or 3095MV transmitters) to factory assemble the Rosemount 1195 to a Rosemount pressure transmitter. The D11 (or S3) option will drive square-root mode operation (output proportional to flow rate.) If the 1195 and transmitter are not factory assembled, they may be shipped separately. Option code S4 is required on the 1195 if assembly to a transmitter is required. For a consolidated shipment, inform an Emerson Process Management sales representative when placing the order.

## Installation Consideration

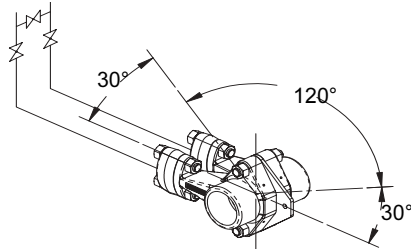
### Pipe Orientation

Orientation/ Flow Direction	Process <sup>(1)</sup>		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	D/R	R
Vertical Down	D/R	NR	NR

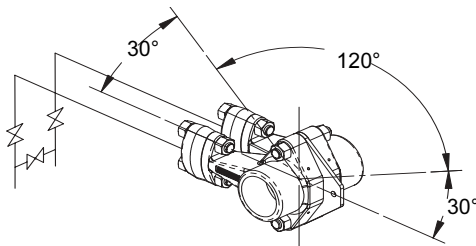
(1) D = Direct mount acceptable (recommended)  
R = Remote mount acceptable  
NR = Not recommended

### Primary Orientation

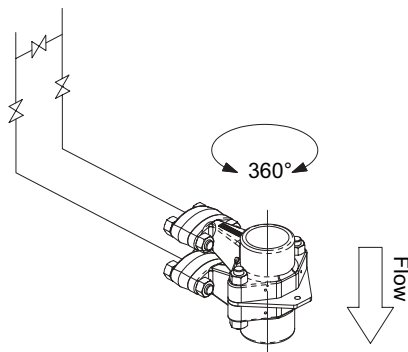
#### Gas (Horizontal)



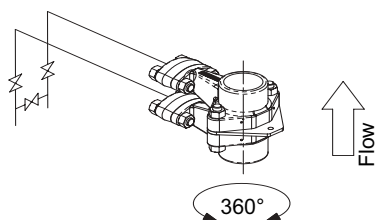
#### Liquid and Steam (Horizontal)



#### Gas (Vertical)



#### Liquid (Vertical)



4686-38-490021-999

4686-38-490022-999

## Physical

### Material of Construction

#### Orifice Plate

- 316/316L SST
- Hastelloy C-276
- Monel 400

#### Body

- 316 SST (CF8M), material per ASTM A351
- Hastelloy C-276 (CW12MW), material per ASTM A494

#### Flange and Pipe Material (If Applicable)

- A312 Gr 316/316L, B622 UNS N10276
- Flange pressure limits are per ANSI B16.5
- Flange face finish per ANSI B16.5, 125 to 250 RMS

#### Body Bolts/Studs

- ASTM A193 Gr B8M studs
- SAE J429 Gr 8 bolts (meets or exceeds ASTM A193 B7 requirements) for body bolt/stud material option code G for high temperatures.

#### Transmitter Connection Studs

- ASTM A193 Gr B8M studs

#### Gaskets/O-rings

- Glass filled Teflon® (PTFE)
- Optional high temperature Inconel® X-750
- Gaskets and o-rings must be replaced each time the 1195 is disassembled for installation or maintenance.

### Orifice Type

#### Square edge—orifice bore sizes

- 0.066-in. and larger

#### Quadrant edge—orifice bore sizes (for 1/2-in. line size only)

- 0.034-in.
- 0.020-in.
- 0.014-in.
- 0.010-in.

### NOTE

Integral orifice bodies contain corner tapped pressure ports.

## Pipe Lengths

Upstream and downstream associated piping sections are available on the 1195. The table below lists the standard overall length (lay length) as a function of end connections and line size.

Flanged Process Connection <sup>(1)</sup> (2) (3)	Line Size		
	1/2-in. (15 mm)	1-in. (25 mm)	1 1/2-in. (40 mm)
RF, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN16, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN40, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN100, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 150, weld-neck	21.8 (554)	33.2 (843)	44.9 (1140)
RF, ANSI Class 300, weld-neck	22.2 (559)	33.7 (856)	45.5 (1156)
RF, ANSI Class 600, weld-neck	22.8 (579)	34.3 (871)	46.1 (1171)
RTJ, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
NPT / Beveled Process Connection <sup>(1)(2)(3)</sup>	18 (457)	28.9 (734)	40.3 (1023)

(1) See the ordering information for model code description.

(2) Consult factory for other lengths.

(3) See page 32 for additional information on associated pipe lengths.

## Transmitter Connections

2 1/8-in. (54 mm) center-to-center. Other transmitter spacing can be accommodated using the optional remote adapters and customer-supplied impulse piping. DIN 19213 connections are available.

## Torque Values of Standard Bolts

Orifice Body Studs (for body bolt/stud material codes C or D)

- 60 ft-lb (81 N-m)

Orifice Body Bolts (for body bolt/stud material code G)

- 78 ft-lb (105 N-m)

Transmitter studs

- 34-38 ft-lb (46-52 N-m)

3-valve manifold bolting

- 34-38 ft-lb (46-52 N-m)

## Weight

The following weights are approximate

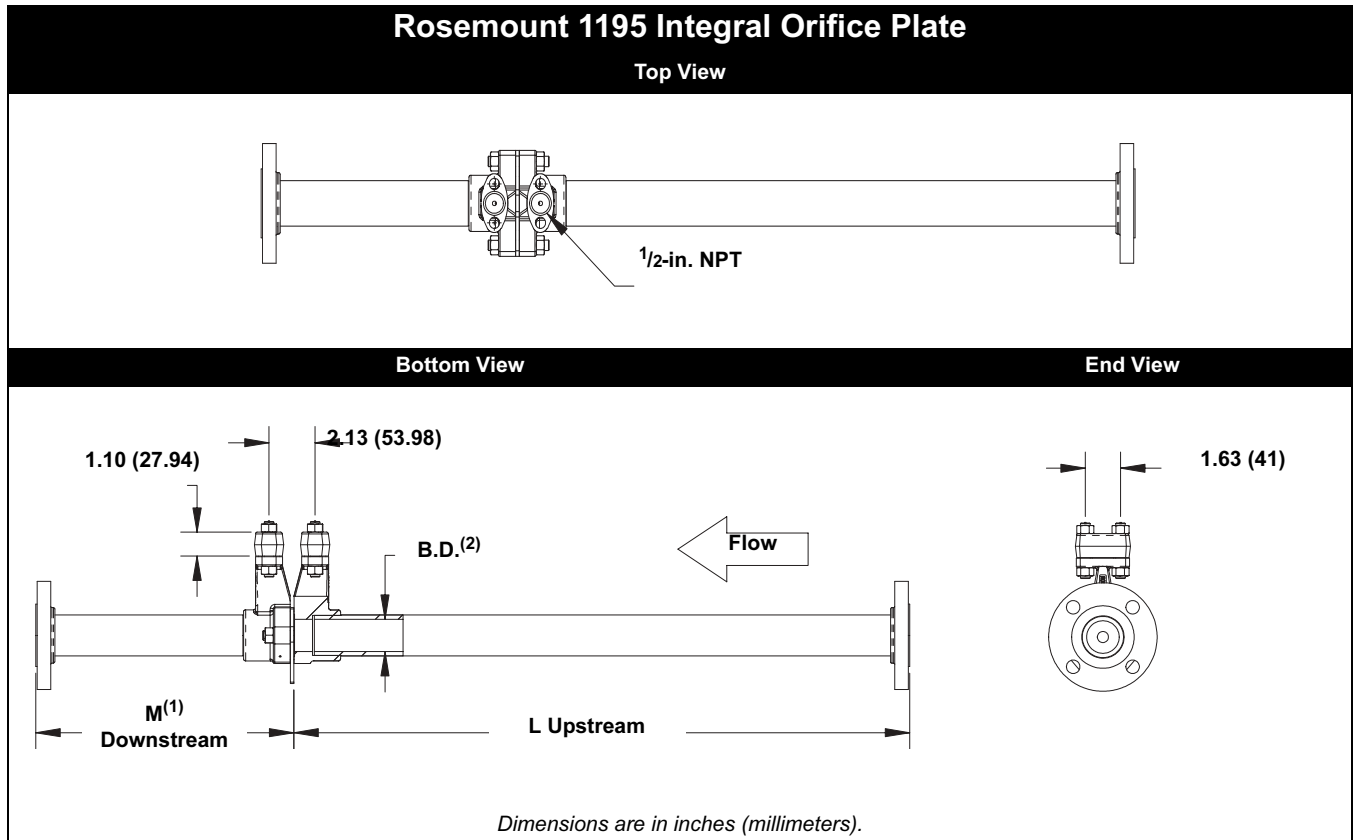
Line Size	1195 Only		With Flanged Piping <sup>(1)</sup>	
	lb	kg	lb	kg
1/2-in. (15 mm)	4.0	1.8	8	3.6
1-in. (25 mm)	6.0	2.7	12	5.4
1 1/2-in. (40 mm)	8.0	3.6	25	11.3

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

# Rosemount Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

## DIMENSIONAL DRAWINGS



Dimension	Line Size					
	1/2-in. (12.7 mm)		1-in. (25.4 mm)		1 1/2-in. (38.1 mm)	
L	12.4-in.	315 mm	20.1-in.	511 mm	28.2-in.	716 mm
M	5.6-in.	142 mm	8.6-in.	218 mm	11.7-in.	297 mm
B.D.(1)	0.664-in.	16.9 mm	1.097-in.	27.86 mm	1.567-in.	39.80 mm

(1) B.D is diameter of the precision bored portion of the upstream and downstream piping.

## ORDERING INFORMATION

### Rosemount 1195 Integral Orifice Primary Element Ordering Information

Model	Product Description
1195	Integral Orifice Primary Element
Code	Body Material
S	316 SST
H	Hastelloy C-276
Code	Line Size / Schedule
005	1/2-in. (15 mm)
010	1-in. (25 mm)
015	1 1/2-in. (40 mm)
Code	Process Connection
T1	NPT Female Body (not available with remote thermowell and RTD)
S1 <sup>(1)</sup>	Socket Weld Body (not available with remote thermowell and RTD)
P1	Pipe Ends: NPT threaded
P2	Pipe Ends: Beveled
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on
D1	Pipe Ends: Flanged, RF, DIN PN16, slip-on
D2	Pipe Ends: Flanged, RF, DIN PN40, slip-on
D3	Pipe Ends: Flanged, RF, DIN PN100, slip-on
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on
P9	Special process connections
Code	Orifice Plate Material
S	316 SST
H	Hastelloy C-276
M	Monel
Code	Bore Size Option
0010	0.010-in. (0.25 mm) for 1/2-in. pipe
0014	0.014-in. (0.36 mm) for 1/2-in. pipe
0020	0.020-in. (0.51 mm) for 1/2-in. pipe
0034	0.034-in. (0.86 mm) for 1/2-in. pipe
0066	0.066-in. (1.68 mm) for 1/2-in. pipe
0109	0.109-in. (2.77 mm) for 1/2-in. pipe
0160 <sup>(2)</sup>	0.160-in. (4.06 mm) for 1/2-in. pipe
0196 <sup>(2)</sup>	0.196-in. (4.98 mm) for 1/2-in. pipe
0260 <sup>(2)</sup>	0.260-in. (6.60 mm) for 1/2-in. pipe
0340 <sup>(2)</sup>	0.340-in. (8.64 mm) for 1/2-in. pipe
0150	0.150-in. (3.81 mm) for 1-in. pipe
0250 <sup>(2)</sup>	0.250-in. (6.35 mm) for 1-in. pipe

# Rosemount Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

## Rosemount 1195 Integral Orifice Primary Element Ordering Information

0345 <sup>(2)</sup>	0.345-in. (8.76 mm) for 1-in. pipe
0500 <sup>(2)</sup>	0.500-in. (12.70 mm) for 1-in. pipe
0630 <sup>(2)</sup>	0.630-in. (16.00 mm) for 1-in. pipe
0800	0.800-in. (20.32 mm) for 1-in. pipe
0295	0.295-in. (7.49 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe
0376 <sup>(2)</sup>	0.376-in. (9.55 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe
0512 <sup>(2)</sup>	0.512-in. (13.00 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe
0748 <sup>(2)</sup>	0.748-in. (19.00 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe
1022	1.022-in. (25.96 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe
1184	1.184-in. (30.07 mm) for 1 <sup>1</sup> / <sub>2</sub> -in. pipe

### Code Transmitter / Body Bolt Material

C	316 SST (1 <sup>1</sup> / <sub>2</sub> -in. transmitter studs)
G <sup>(3)</sup>	High temperature (850 °F (454 °C)) (SAE J429 Gr8 / Body bolts with A193 Gr B8M transmitter studs)

### Code Options

#### Temperature Sensor

S <sup>(4)</sup>	Thermowell and RTD (SST Temperature Housing)
T <sup>(4)</sup>	Thermowell and RTD (Aluminum Temperature Housing)

#### Assemble to Transmitter

S4 <sup>(5)</sup>	Factory assembly – attached to transmitter and manifold
-------------------	---

#### Optional Bore Calculation

BC	Bore Calculation
----	------------------

#### Optional Connection

G1	DIN 19231 Transmitter Connection
----	----------------------------------

#### Adapters for Remote Mounting

G2	1 <sup>1</sup> / <sub>2</sub> -14 NPT Remote Adapters – SST
G3	1 <sup>1</sup> / <sub>2</sub> -14 NPT Remote Adapters – <i>Hastelloy C</i>

#### Hydrostatic Testing

P1	Hydrostatic Testing
----	---------------------

#### Special Cleaning

P2	Cleaning for special processes
PA	Cleaning per ASTM G93 Level D (section 11.4)

#### Dye Penetrant Exam

V1	Dye Penetrant Exam
----	--------------------

#### Radiographic Examination

V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)
----	---

### Rosemount 1195 Integral Orifice Primary Element Ordering Information

**Flow Calibration**

WD <sup>(6)</sup>	Discharge coefficient Verification
WZ <sup>(6)</sup>	Special Calibration

**Special Inspection**

QC1	Visual and Dimensional Inspection with Certificate
QC7	Inspection and Performance Certificate

**Material Traceability Certification**

Q8 <sup>(7)</sup>	Material certification per ISO 10474 3.1.B and EN 10204 3.1.B
-------------------	---

**Code Conformance**

J2 <sup>(8)</sup>	ANSI B31.1
J3 <sup>(8)</sup>	ANSI B31.3
J4 <sup>(8)</sup>	ANSI B31.8

**Materials Conformance**

J5 <sup>(9)</sup>	NACE MR-0175 / ISO 15156
-------------------	--------------------------

**Country Certification**

J1	Canadian Registration
J6	European Pressure Directive (PED)

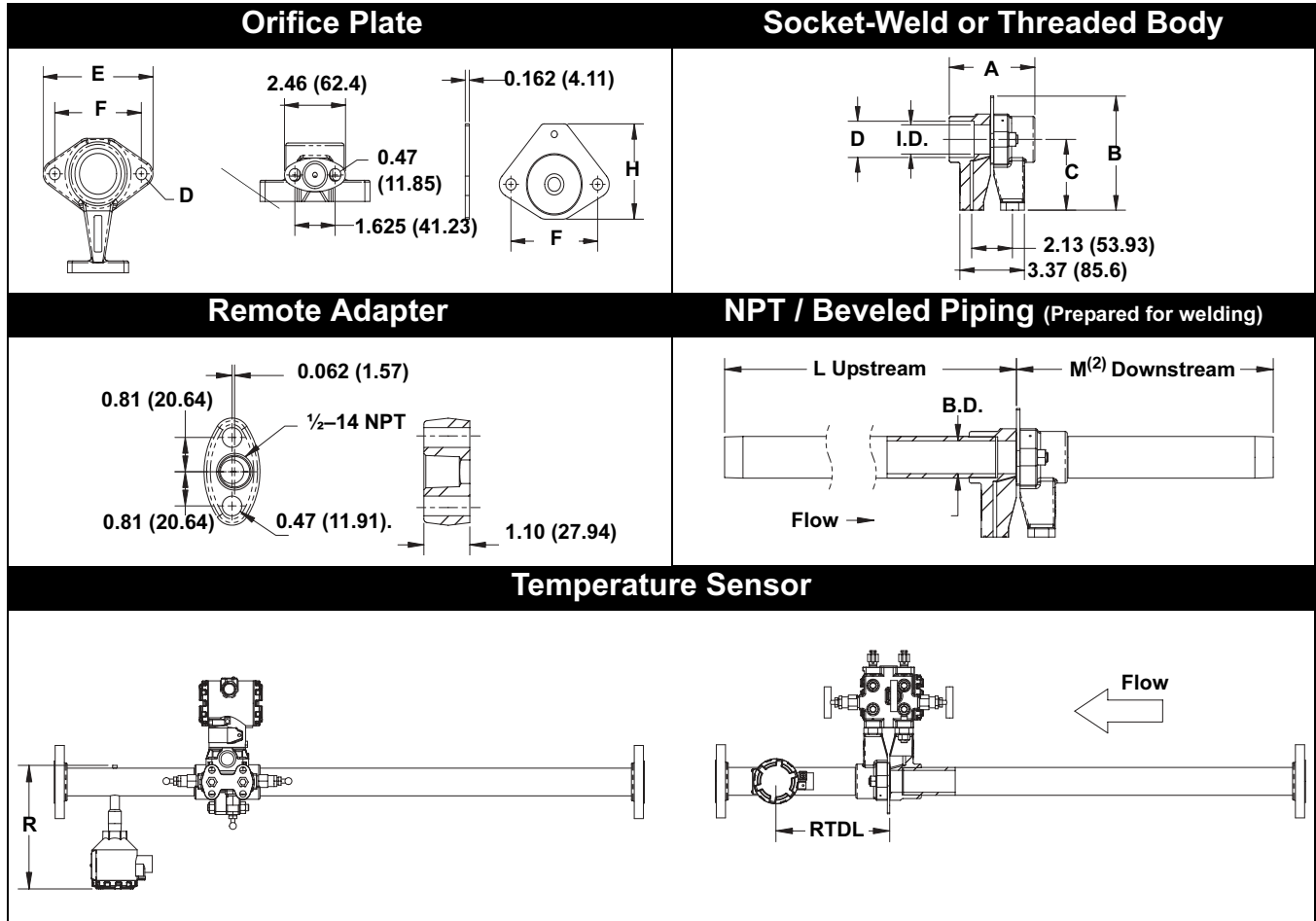
**Special Configuration (Hardware)**

A1	External Ground Screw for Temperature Connection Head
A2	Cover Clamp and External Ground Screw for Temperature Connection Head

**Typical Model Number: 1195 S 010 A3 S 0150 C**

- (1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.
- (2) Best flow coefficient uncertainty is between  $(0.2 < \beta < 0.6)$ .  $0.6 \beta$  is not available for  $1/2$ -in. pipe size.
- (3) Not available with Assemble to Transmitter code S4 or Temperature Sensor code R with E5.
- (4) Thermowell material is the same as the 1195 body material.
- (5) Not available with Process Connection code S1.
- (6) Not available for bore sizes 0010, 0014, 0020, or 0034.
- (7) Includes certificates for mechanical and chemical properties of bodies, orifice plates, pipes, flanges, and adapters as applicable.
- (8) Not available with DIN Process Connection codes D1, D2, or D3.
- (9) 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.

## DIMENSIONAL DRAWINGS



38-4900014-999

38-4900018-999

38-4900032-999

Dimension	Line Size					
	1/2-in. (12.7 mm)		1-in. (25.4 mm)		1 1/2-in. (38.1 mm)	
A	3.4-in.	86 mm	3.8-in.	97 mm	4.5-in.	114 mm
B	4.7-in.	119.38 mm	5.2-in.	132.08 mm	5.9-in.	149.86 mm
C	3.0-in.	76 mm	3.3-in.	84 mm	3.7-in.	94 mm
D <sup>(1)</sup>	0.805-in.	20.45 mm	1.280-in.	32.51 mm	1.865-in.	47.37 mm
E	3.6-in.	91 mm	3.9-in.	99 mm	4.4-in.	112 mm
F	2.6-in.	66 mm	3.0-in.	76 mm	3.5-in.	89 mm
H	2.5-in.	64 mm	3.0-in.	76 mm	3.5-in.	89 mm
L	12.4-in.	315 mm	20.1-in.	511 mm	28.2-in.	716 mm
M	5.6-in.	142 mm	8.6-in.	218 mm	11.7-in.	297 mm
B.D. <sup>(2)</sup>	0.664-in.	16.9 mm	1.097-in.	27.86 mm	1.567-in.	39.80 mm
I.D.	0.622-in.	15.8 mm	1.049-in.	26.64 mm	1.500-in.	38.1 mm

(1) To improve pipe perpendicularity for gasket sealing, socket diameter "D" is smaller than standard pipe O.D. Pipe O.D. must be machined smaller than socket diameter "D" to ensure proper fit.

(2) B.D. is diameter of the precision bored portion of the upstream and downstream piping.

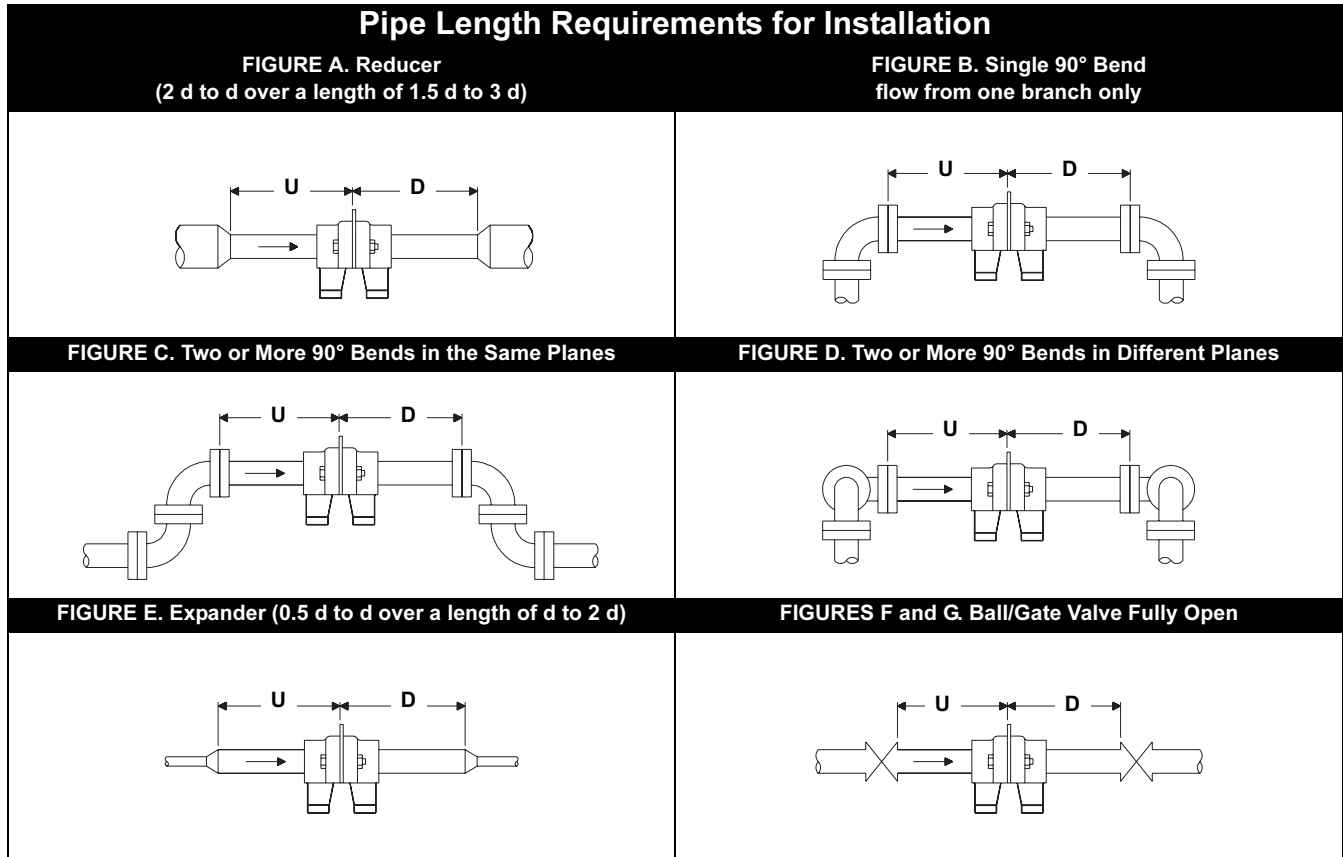


TABLE 10. Recommended lengths of pipe

The following chart gives the upstream (U) and downstream (D) lengths as a guideline recommended by ISO 5167 for the above installations. The lengths are given in terms of pipe diameters. For example, for a 1-in. line size with a beta ratio (b) of 0.4 using installation type B above, the straight length of upstream piping required is  $16 \times 1 = 16$  in., and downstream  $6 \times 1 = 6$  in.

$\beta$	On Upstream (U)						On Downstream (D) FIGURES A - G
	FIGURE A <sup>(1)</sup>	FIGURE B <sup>(1)</sup>	FIGURE C <sup>(1)</sup>	FIGURE D <sup>(1)</sup>	FIGURE E <sup>(1)</sup>	FIGURE F and G <sup>(1)</sup>	
<0.20	5 <sup>(2)</sup>	6 (3)	10 <sup>(2)</sup>	34 (17)	6 <sup>(2)</sup>	12 (6)	4 (2)
0.40	5 <sup>(2)</sup>	16 (3)	10 <sup>(2)</sup>	50 (25)	12 (8)	12 (6)	6 (3)
0.50	8 (5)	22 (9)	18 (10)	75 (34)	20 (9)	12 (6)	6 (3)
0.60	9 (5)	42 (13)	30 (18)	65 (18)	26 (11)	14 (7)	7 (3,5)
0.67	12 (6)	44 (20)	44 (18)	60 (18)	28 (14)	18 (9)	7 (3,5)
0.75	13 (8)	44 (20)	44 (18)	75 (18)	36 (18)	24 (12)	8 (4)
	<b>U</b>						<b>D</b>

(1) Values in parenthesis correspond to an additional +0.5% discharge coefficient uncertainty.

(2) Straight length gives zero additional uncertainty; data not available for shorter lengths.

## 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 <sup>(1)</sup>

\* **Select fluid type**       Liquid       Gas       Steam

\* **Fluid name<sup>(2)</sup>**

#### 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 11 on page -36, the "Fluid Data Sheet (FDS)" on page 37 must be completed.

#### For Rosemount Use Only

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

\* = Required Item  
 ★ = Default

**Primary Element Information**

\* Select Differential Producer (Select One)

**Annubar**

- 485 Annubar/ 3095MFA Mass ProBar, 3051SFA ProBar
- 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: \_\_\_\_\_

Diameter (d) \_\_\_\_\_  inch★  millimeters at \_\_\_\_\_  °F  °C

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

# Rosemount Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

\* = 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 11. Rosemount Fluids Database<sup>(1)</sup>

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	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	Sulfur 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

<input type="checkbox"/> Custom Liquid– Complete Table	<input type="checkbox"/> Liquid
<input type="checkbox"/> Custom Gas– Complete Table	<input type="checkbox"/> Gas
<input type="checkbox"/> Custom Natural Gas– Complete Table	<input type="checkbox"/> Natural Gas

---

#### For Rosemount Use Only

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

# Rosemount Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

**TABLE 12. 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/ft<sup>3</sup>  Kg/m<sup>3</sup>  Other:

OR

Specific Gravity at Flow: \_\_\_\_\_

\* Viscosity at Flow: \_\_\_\_\_ Units:  Centipoise  Other:

**TABLE 13. 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                      Temperature

- |          |          |
|----------|----------|
| 1) _____ | 5) _____ |
| 2) _____ | 5) _____ |
| 3) _____ | 5) _____ |
| 4) _____ | 5) _____ |
| 1) _____ | 6) _____ |
| 2) _____ | 6) _____ |
| 3) _____ | 6) _____ |
| 4) _____ | 6) _____ |
| 1) _____ | 7) _____ |
| 2) _____ | 7) _____ |
| 3) _____ | 7) _____ |
| 4) _____ | 7) _____ |

Viscosity

- Viscosity in centipoise
  - Viscosity in lbs/ft sec
  - Viscosity in pascal sec
- Temperature

- 5) \_\_\_\_\_
- 8) \_\_\_\_\_
- 9) \_\_\_\_\_
- 7) \_\_\_\_\_

Molecular Weight: \_\_\_\_\_

Isentropic Exponent: \_\_\_\_\_ 1.4 ★

Standard density/compressibility: \_\_\_\_\_

**Volumetric Gas Compressibility and Viscosity Information**

\* Density at Flow: \_\_\_\_\_ Units:  lb/ft<sup>3</sup>     Kg/m<sup>3</sup>     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 ★

# Rosemount Integral Orifice Flowmeter Series

**Product Data Sheet**  
00813-0100-4686, Rev KA  
October 2004

**TABLE 14. Natural Gas Worksheet**

**NOTE**

The minimum requirement for the Volumetric options is highlighted gray below.

**Compressibility Factor Information**

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

Detail Characterization Method (AGA8 1992)

		Mole	Valid Range
CH <sub>4</sub>	Methane mole percent	%	0 – 100 percent
N <sub>2</sub>	Nitrogen mole percent	%	0 – 100 percent
CO <sub>2</sub>	Carbon Dioxide mole percent	%	0 – 100 percent
C <sub>2</sub> H <sub>6</sub>	Ethane mole percent	%	0 – 100 percent
C <sub>3</sub> H <sub>8</sub>	Propane mole percent	%	0 – 12 percent
H <sub>2</sub> O	Water mole percent	%	0 – Dew point
H <sub>2</sub> S	Hydrogen Sulfide mole percent	%	0 – 100 percent
H <sub>2</sub>	Hydrogen mole percent	%	0 – 100 percent
CO	Carbon monoxide mole percent	%	0 – 3.0 percent
O <sub>2</sub>	Oxygen mole percent	%	0 – 21 percent
C <sub>4</sub> H <sub>10</sub>	i-Butane mole percent	%	0 – 6 percent <sup>(1)</sup>
C <sub>4</sub> H <sub>10</sub>	n-Butane mole percent	%	0 – 6 percent <sup>(1)</sup>
C <sub>5</sub> H <sub>12</sub>	i-Pentane mole percent	%	0 – 4 percent <sup>(2)</sup>
C <sub>5</sub> H <sub>12</sub>	n-Pentane mole percent	%	0 – 4 percent
C <sub>6</sub> H <sub>14</sub>	n-Hexane mole percent	%	0 – Dew Point
C <sub>7</sub> H <sub>18</sub>	n-Heptane mole percent	%	0 – Dew Point
C <sub>8</sub> H <sub>18</sub>	n-Octane mole percent	%	0 – Dew Point
C <sub>9</sub> H <sub>20</sub>	n-Nonane mole percent	%	0 – Dew Point
C <sub>10</sub> H <sub>22</sub>	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<sub>2</sub>)

	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<sub>2</sub>-N<sub>2</sub>)

	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**

*Rosemount, the Rosemount logotype, ProPlate, Mass ProPlate, and Annubar are registered trademarks of Rosemount Inc. MultiVariable (MV) and Tri-Loop are trademarks of Rosemount Inc. Pentium is a registered trademark of the Intel Corporation. Microsoft, Windows, and Windows NT are registered trademarks of the Microsoft Corporation. Hastelloy is a registered trademark of Haynes International. Monel and Inconel are registered trademarks of International Nickel Co. HART is a registered trademark of the HART Communication Foundation. Teflon is a registered trademark of E.I. du Pont de Nemours & Co. All other marks are the property of their respective owners.*

**Emerson Process Management**

**Rosemount Inc.**

8200 Market Boulevard  
Chanhassen, MN USA 55317  
T (US) (800) 999-9307  
T (Intl) (952) 906-8888  
F (952) 949-7001

[www.rosemount.com](http://www.rosemount.com)

**Emerson Process  
Management GmbH & Co.**

Argelsrieder Feld 3  
82234 Wessling  
Germany  
T 49 (8153) 9390  
F 49 (8153) 939172

**Emerson Process Management Asia  
Pacific Private Limited**

1 Pandan Crescent  
Singapore 128461  
T (65) 6777 8211  
F (65) 6777 0947  
[AP.RMT-Specialist@emersonprocess.com](mailto:AP.RMT-Specialist@emersonprocess.com)

