Foxboro®
by Schneider Electric

Model MAG2IC Intelligent Magnetic Flowmeter with Integrally Mounted Transmitter, Model MAG2RT Remote Mounted Intelligent Transmitter, and Model MAG2RS Remote Mounted Flowtube

The Foxboro® brand MAG2 Series Flowmeters are high performance, intelligent Magnetic Flowmeters based on field proven two-wire, loop powered technology. They offer the stable and accurate measurement of a traditional magnetic flowmeter with low power consumption, resulting in a lower overall cost of ownership. The flowmeters are provided in an integrally mounted transmitter configuration, or with a remote transmitter and flowtube with an interconnecting cable.

FEATURES

- Field proven, loop powered, 2-wire operation.
- High accuracy to ±0.5% of rate.
- Minimum measurable fluid conductivity down to 10 μS/cm.
- Suitable for use in numerous process fluid measurement industries.
- Electrode status diagnostic (determines empty pipe detection, or scaling on electrode).
- Adjustable low flow cutoff.
- 4 to 20 mA dc Analog Output with HART Communications.
- FlowExpertPro™ sizing program; see next page.
- Flanged body flowtubes are offered in 2.5 to 200 mm (0.1 to 8 in) line sizes when integrally mounted, and in 10 to 200 mm (1 to 4 in) line sizes when remote mounted.
- Wafer body flowtubes are offered in 25 to 100 mm (1 to 4 in) line sizes when either integrally or remote mounted.
- Flowtubes used with ANSI Class 150 or 300 flanges, or DN PN10, PN16, or PN25 flanges.
- Standard mounting brackets and hardware for surface or pipe mounting of the remote transmitter.

- Interconnecting cable for remote configurations offered in numerous lengths up to 70 m (233 ft), depending on line size.
- Approved/Certified by many agencies for use in hazardous area locations.
- Enclosure meets IEC IP67 and NEMA 4X ratings.

HIGH ACCURACY AND STABLE OUTPUT

MAG2 provides a high accuracy of ± 0.5% of rate.

MINIMUM MEASURABLE FLUID CONDUCTIVITY

MAG2 offers a minimum process fluid conductivity of 10 μS/cm, which is excellent when compared to other 2-wire magnetic flowmeters, thereby maximizing applicability.

LOW FLOW CUTOFF, DROPOUT, AND EMPTY PIPE DETECTION

Refer to the Functional Specifications section for a description of these flow features.

FLANGED OR WAFER BODY FLOWTUBE WITH INTEGRAL OR REMOTE MOUNTED TRANSMITTER

The MAG2 Series are offered as flanged or wafer body flowtubes with either an integrally or remote mounted transmitter. This provides the user with the flexibility required to satisfy different installation configurations.

4 TO 20 mA WITH HART COMMUNICATIONS

4 to 20 mA with HART communications. Allows direct analog connection to common receivers while also providing remote control and configuration capability with a HART Communicator or a host configurator.

REMOTE MOUNTED TRANSMITTER

Remote mounting of transmitter is offered to allow access to the electronics when the measurement is not in an easily accessible location. Mounting brackets and hardware are provided for mounting the transmitter to a surface or to a nominal DN 50 or 2 inch pipe. The transmitter can be located up to a cable length of 70 m (233 ft) from the flowtube without loss of low level signal for flowtube sizes 25 mm (1 in) or greater, and up to a cable length of 30 m (98.4 ft) for flowtube sizes less than 25 mm (1 in).

LARGE SELECTION OF FLOWTUBE SIZES

Model MAG2IC (with Integral Transmitter)

Flanged Body:

2.5 to 200 mm (0.1 to 8 in) line sizes

Wafer Body:

25 to 100 mm (1 to 4 in) line sizes

Model MAG2RS with Remote Transmitter

Flanged Body:

10 to 200 mm (3/8 to 8 in) line sizes

Wafer Body:

25 to 100 mm (1 to 4 in) line sizes

Flange Ratings

ANSI Class 150 or 300
DIN PN10, PN16, or PN25

WIDE VARIETY OF APPLICATIONS

- Corrosive liquid measurement
- Chemical solution measurement
- Drainage/waste disposal fluid measurement
- Drinking water and waste water service
- Industrial/agricultural water measurement
- Seawater measurement

FlowExpertPro

FlowExpertPro is a program primarily used to size Foxboro flowmeters. It also ensures that the user has selected the proper flowmeter type for his application. This meter selection tool is provided as a free web site to all users, without the need for registration. In addition to flowmeter selection and sizing, FlowExpertPro includes the following features:

- Incorporates a large library of the physical properties of typical process fluids.
- Displays results in tabular or graphic format.
- Allows user to save, print, or E-mail results.
- Provides reference to applicable flowmeter PSSs and other related flowmeter documentation.

The program calculates minimum and maximum flow rates, rangeability, pressure loss, and Reynolds Number, using established flow equations. It also allows for material and flange selection. You are invited to visit www.FlowExpertPro.com to access this program, or contact Global Customer Support (see last page) for further information and technical support.

OPERATING CONDITIONS

Ambient Temperature Limits

-20 and +60°C (-4 and +140°F)

Ambient Relative Humidity Limits

10 and 90% RH

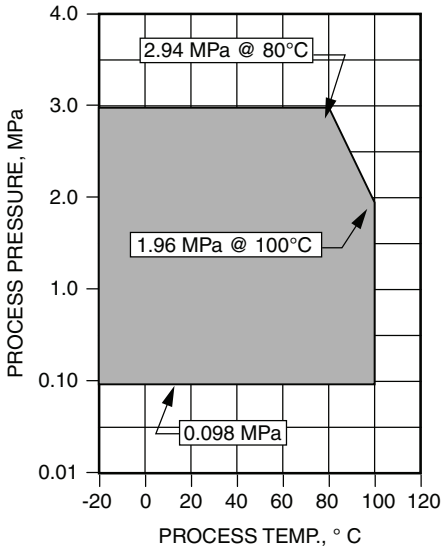
Process Temperature Range

See Figures 1 and 2.

Process Pressure Range

See Figures 1 and 2.

Figure 1. Nominal Line Sizes 2.5 to 10 mm (0.1 to 3/8 in) Process Temperature/Process Pressure Ranges



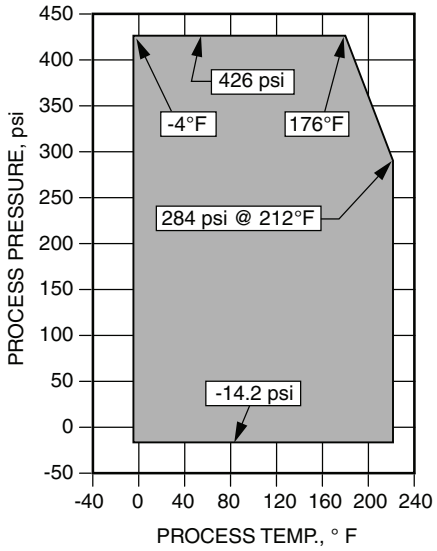
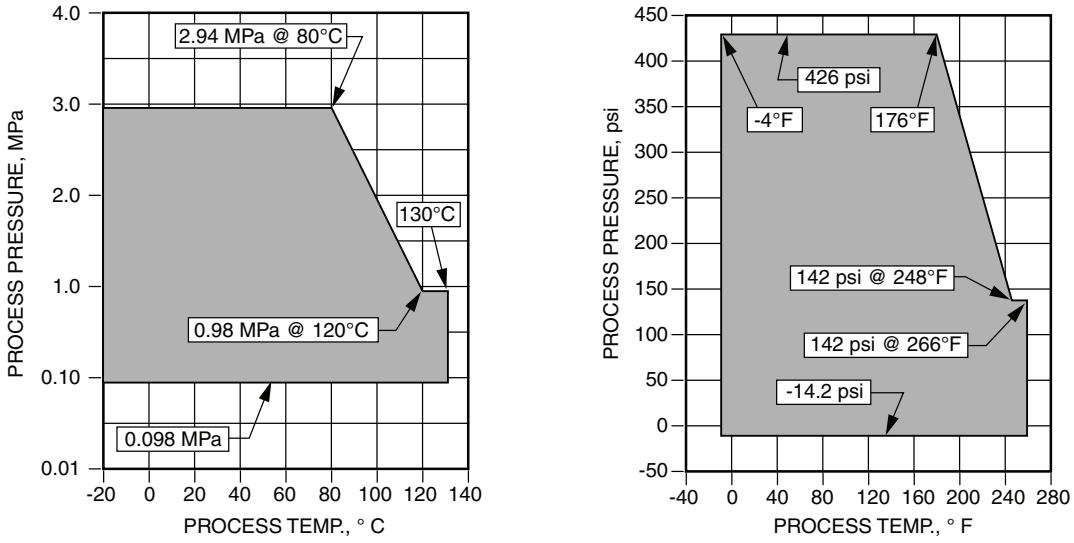


Figure 2. Nominal Line Sizes 15 to 200 mm (1/2 to 8 in) Process Temperature/Process Pressure Ranges



PERFORMANCE SPECIFICATIONS

Analog Output Accuracy

Nominal Line Sizes: 2.5 and 5 mm (0.1 and 0.2 in)

Vs (m/s)	Velocity During Measurement ≥ Vs X 50%	Velocity During Measurement ≤ Vs X 50%
1.0 ≤ Vs ≤ 10	±0.5% of rate	±0.5% of Vs
0.3 ≤ Vs ≤ 1.0	$\pm\frac{0.5}{Vs}$ % of rate	$\pm 0.5 + \left(\frac{0.5}{Vs}\right)$ % of Vs

Nominal Line Sizes 10 and 15 mm (3/8 and 1/2 in)

Vs (m/s)	Velocity During Measurement ≥ Vs X 50%	Velocity During Measurement ≤ Vs X 40%
1.0 ≤ Vs ≤ 10	±0.5% of rate	±0.5% of Vs
0.3 ≤ Vs ≤ 1.0	$\pm\frac{0.5}{Vs}$ % of rate	$\pm 0.4 + \left(\frac{0.5}{Vs}\right)$ % of Vs

Nominal Line Size 25 to 200 mm (1 to 8 in)

Vs (m/s)	Velocity During Measurement ≥ Vs X 50%	Velocity During Measurement ≤ Vs X 30%
1.0 ≤ Vs ≤ 10	± 0.5% of rate	±0.5% of Vs
0.3 ≤ Vs ≤ 1.0	$\pm\frac{0.5}{Vs}$ % of rate	$\pm 0.3 + \left(\frac{0.5}{Vs}\right)$ % of Vs

Note: In the tables above, Vs is the velocity of the setting range in m/s.

Lightning Protection

Equipped with a lightning arrester in the power source and external output terminals; it can withstand a transient surge of 12 kV, 1000 A without permanent damage.

Power Failure

An EEPROM retains data record of totalized value when pulse output is used (retention period approximately 10 years).

Measurable Electrical Conductivity

INTEGRAL TRANSMITTER VERSIONS

10 μS/cm, or greater

REMOTE TRANSMITTER VERSIONS

- Nominal Line Sizes 10 and 15 mm (3/8 and 1/2 in), 50 μS, or greater
- Nominal Line Sizes 25 to 200 mm (1 to 8 in), 10 μS, or greater.

Measurement Flow Range

Refer to Table 1.

Table 1. Measurement Flow Range (a)

Nominal Line Size		When the Maximum Flow Velocity Range is: 0 to 0.3 m/s (0 to 0.98 ft/s)		When the Maximum Flow Velocity Range is: 0 to 10 m/s (0 to 32.8 ft/s)		Conversion Factor
		Then the Measurable Flow Range is:		Then the Measurable Flow Range is:		
mm	in	m^3/h	U.S. gpm	m^3/h	U.S. gpm	K
2.5	0.1	0 to 0.00531	0 to 0.02335	0 to 0.1767	0 to 0.778	56.59
5	0.2	0 to 0.02121	0 to 0.09337	0 to 0.7068	0 to 3.112	14.15
10	3/8	0 to 0.08483	0 to 0.3735	0 to 2.827	0 to 12.44	3.537
15	1/2	0 to 0.1909	0 to 0.8404	0 to 6.361	0 to 28.01	1.572
25	1	0 to 0.5302	0 to 2.335	0 to 17.67	0 to 77.80	0.5659
40	1½	0 to 1.358	0 to 5.976	0 to 45.23	0 to 199.1	0.2210
50	2	0 to 2.121	0 to 9.337	0 to 70.68	0 to 311.2	0.1415
65	2½	0 to 3.584	0 to 15.78	0 to 119.4	0 to 525.9	0.08371
80	3	0 to 5.429	0 to 23.90	0 to 180.9	0 to 796.7	0.05526
100	4	0 to 8.483	0 to 37.35	0 to 282.7	0 to 1244	0.03537
150	6	0 to 19.09	0 to 84.04	0 to 636.1	0 to 2801	0.01572
200	8	0 to 33.93	0 to 149.4	0 to 1130	0 to 4979	0.008842

a. Velocity V (m/s) = (K)(Q); where, K = Conversion Factor = $(1/3600)(4)(\pi D^2)(1000^2)$
and, D = Nominal Line Size (mm);
and, Q = Flow Rate (m^3/h).

FUNCTIONAL SPECIFICATIONS

Power Supply (see Figure 3)

WITHOUT COMMUNICATION

15.6 to 42 V dc

WITH AN OUTPUT LOAD OF 250 Ω WHEN USING A HART COMMUNICATOR

21.05 to 42 V dc

CURRENT CAPACITY

Inrush Current: 24 mA
Steady State Current: 22 mA

Output Signal

Analog output

4 to 20 mA dc

Pulse output

Open Collector Output: 30 V dc, 100 mA maximum Pulse Frequency: 0.0001 to 200 Hz
Pulse Width: 1 ms to 1 s.
Voltage Drop: 2.5 V maximum

Contact output

Open collector output (30 V dc, 100 mA maximum) Pulse or contact output is selectable

Flow Units

Volume flow

m^3, L, cm^3, G (gallon), mG, kG, B (barrel), IG (imperial gallon), mIG, kIG

Mass flow

g, kg, lb, t

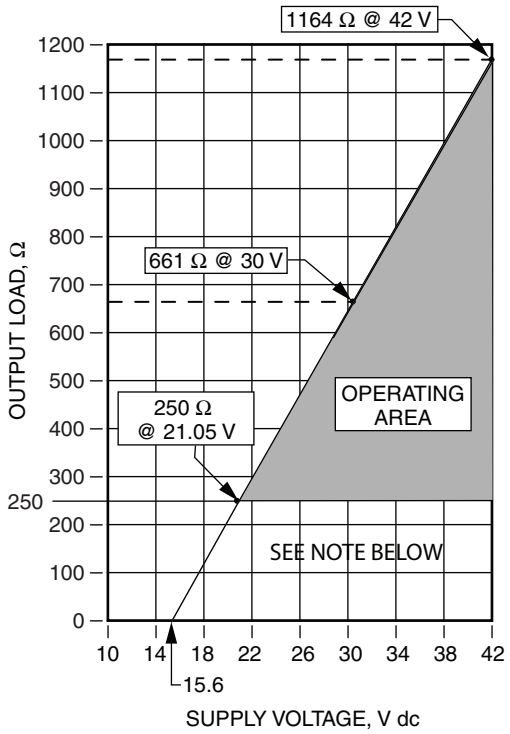
Time

d, h, min, s

Damping

Adjustable between 0.5 and 199.9 seconds.

Figure 3.
4 to 20 mA Output Supply Voltage vs. Output Load



NOTE
A load resistance of 250 ohms or more is required for communications with a HART Communicator or PC-Based Configurator.

Display - LCD

Main display:

7-segment, 8 digits

Sub display:

16 digits, 2 lines

Display contents:

Simultaneously displays % flow rate, actual flow rate (engineering unit), and totalized value.

Data setting

Operation by display keypad

Electrode Status Diagnostic

The Electrode Status Diagnostic (in most applications) can be used to determine if the pipe is empty, or if there is scaling on the electrodes.

These are detected by monitoring the flow rate signal. Once the flow rate signal fluctuates over a certain threshold, the device judges that the tube is empty, or there is scaling on the electrodes. When the tube is empty, or there is scaling on the electrodes, the analog 4 to 20 mA output and pulse output are set to zero flow values. The display alternately shows zero value, empty, or scale on electrode.

There are five threshold levels to meet an environment where the device is installed. Set an appropriate threshold level from below.

- SENSITIVITY HIGH
- SENSITIVITY MID
- SENSITIVITY LOW
- SENSITIVITY LL
- SENSITIVITY LLL

Default setting

OFF

Operating condition

The following conditions must be met when using the empty pipe detection function.

- Diameter: 10 mm or larger
- Electric Conductivity of Fluid: 30 μS/cm or greater
- Grounding: Grounding resistance must be less than 100 Ω
- The noise level must be over the set threshold when the pipe is empty.
- The noise level must be under the set threshold when the process fluid flows in the detector.

Low Flow Cutoff

Adjustable between 0 and 10% of setting range. Below selected value, output is driven to the zero flow rate signal level.

Dropout

Adjustable between 0 and 10% of setting range. Below selected value, pulse output is cut.

PHYSICAL SPECIFICATIONS

Size

Wafer BODY

25, 40, 50, 65, 80, and 100 mm
(1, 1½, 2, 2½, 3, and 4 in)

FlangeD BODY

2.5, 5, 10, 15, 25, 40, 50, 65, 80, 100, 150, and 200 mm (3/8, 1/2, 1, 1½, 2, 2½, 3, 4, 6, and 8 in)

Note: The 2.5 and 5 mm (0.1 and 0.2 in) Flanged Body Tubes are available with the Model MAG2IC Flowmeter only.

Flange Rating

ANSI Class 150 or 300;
DIN PN10, PN16, or PN25

Enclosure Rating

Enclosure has the dusttight and immersion protection rating of IP67 as defined by IEC 60529, and provides the environmental and corrosion resistant protection rating of NEMA 4X.

Transmitter Enclosure Material

Low copper, aluminum alloy

Transmitter Enclosure Finish

Standard

Baked acrylic paint

Corrosion RESISTANT

Baked epoxy paint

Terminal Box Material (Model MAG2RS only)

Low copper, aluminum alloy

Terminal Box Finish (Model MAG2RS only)

Standard

Baked acrylic paint

Corrosion RESISTANT

Baked epoxy paint

Display Cover Material

Tempered glass

Flowtube Body Materials

Case material

Sizes 2.5 to 15 mm (0.1 to 1/2 inch):

CF8M ss

Sizes 25 to 200 mm (1 to 8 inches):

304 ss

Measuring pipe material

304 ss

Flange Material

SIZES 2.5 to 65 mm (0.1 to 2 1/2 in)

304 stainless steel

SIZES 80 to 200 mm (3 to 8 in)

Carbon steel with a corrosion resistant paint.

Process Wetted Materials

Lining

PFA

Electrodes

316L ss, ASTM B574 (Hastelloy C-276 equivalent), Titanium, Tantalum, Nickel (except with Line Size Codes 002, 005, and 010), Zirconium, or Platinum-Iridium

Grounding rings

316 ss, ASTM B575 (Hastelloy C-276 equivalent), Titanium, Tantalum, Zirconium, or Platinum

Dimensions-Nominal

See DIMENSIONS-NOMINAL section.

Approximate Weight: Model MAG2RT (Remote Mounted Transmitter)

2.8 kg (6.2 lb)

Approximate Weight: Model MAG2RS Wafer Body Magnetic Flowtube (Transmitter is Remote)

Nominal Line Size		Approximate Weight Code A (a)	
mm	in	kg	lb
25	1	2	4.4
40	1½	2	4.4
50	2	2.6	5.7
65	2½	3.7	8.2
80	3	4.6	10.1
100	4	6.4	14.1

a. For Flowtubes with Standard Face-to-Face dimension.

Approximate Weight:
Model MAG2IC Flowmeter with Transmitter Integrally Mounted to Wafer Body Flowtube

Nominal Line Size		Approximate Weight Code A (a)	
mm	in	kg	lb
25	1	3.7	8.2
40	1½	3.8	8.4
50	2	4.4	9.7
65	2½	5.5	12.1
80	3	6.4	14.1
100	4	8.2	18.1

a. For Flowtubes with Standard Face-to-Face dimension.

Approximate Weight:
Model MAG2IC Flowmeters with Transmitter Integrally Mounted to Flanged Body Flowtubes

Nominal Line Size		Approximate Weight in kg (lb)			
		ANSI Flanges		DIN Flanges	
mm	in	Class 150	Class 300	PN 10/16	PN 25
2.5	0.1	6.4 kg (14.1 lb)	6.9 kg (15.2 lb)	6.9 kg (15.2 lb)	7.1 kg (15.7 lb)
5	0.2	6.4 kg (14.1 lb)	6.9 kg (15.2 lb)	6.9 kg (15.2 lb)	7.1 kg (15.7 lb)
10	3/8	6.4 kg (14.1 lb)	6.9 kg (15.2 lb)	6.9 kg (15.2 lb)	7.1 kg (15.7 lb)
15	1/2	6.6 kg (14.6 lb)	7.1 kg (15.7 lb)	7.1 kg (15.7 lb)	7.3 kg (16.1 lb)
25	1	8.4 kg (18.5 lb)	9.5 kg (20.9 lb)	9.1 kg (20.1 lb)	9.4 kg (20.7 lb)
40	1 1/2	7.8 kg (17.2 lb)	10.1 kg (22.3 lb)	8.7 kg (19.2 lb)	9.7 kg (21.4 lb)
50	2	12.3 kg (27.1 lb)	13.8 kg (30.4 lb)	13.3 kg (29.3 lb)	13.8 kg (30.4 lb)
65	2 1/2	14.3 kg (33.9 lb) lb	15.8 kg (34.8 lb)	15.3 kg (33.7 lb)	15.8 kg (34.8 lb)
80	3	17.3 kg (38.1 lb)	21.3 kg (47 lb)	14.4 kg (31.7 lb)	16.5 kg (36.3 lb)
100	4	25.1 kg (55.3 lb)	34.2 kg (73.4 lb)	19.6 kg (43.2 lb)	23.4 kg (51.6 lb)
150	6	37.2 kg (82 lb)	56.2 kg (124 lb)	30.7 kg (67.7 lb)	38.6 kg (85.1 lb)
200	8	61.8 kg (136 lb)	90.8 kg (200 lb)	48.1 kg (106 lb	68.5 kg (151 lb)

Approximate Weight:
Model MAG2RS Flanged Body Magnetic Flowtubes (Transmitter is Remote)

Nominal Line Size		Approximate Weight in kg (lb)			
		ANSI Flanges		DIN Flanges	
mm	in	Class 150	Class 300	PN 10/16	PN 25
10	3/8	4.6 kg (10.1 lb)	5.1 kg (11.2 lb)	5.1 kg (11.2 lb)	5.3 kg (11.7 lb)
15	1/2	4.8 kg (10.6 lb)	5.3 kg (11.7 lb)	5.3 kg (11.7 lb)	5.5 kg (12.1 lb)
25	1	6.6 kg (14.6 lb)	7.7 kg (17 lb)	7.3 kg (16.1 lb)	7.6 kg (16.8 lb)
40	1 1/2	6 kg (13.2 lb)	8.3 kg (18.3 lb)	6.9 kg (15.2 lb)	7.9 kg (17.4 lb)
50	2	10.5 kg (23.1 lb)	12 kg (26.5 lb)	11.5 kg (25.4 lb)	12 kg (26.5 lb)
65	2 1/2	12.5 kg (27.6 lb)	14 kg (30.9 lb)	13.5 kg (29.8 lb)	14 kg (30.9 lb)
80	3	15.5 kg (34.2 lb)	19.5 kg (43 lb)	12.6 kg (27.8 lb)	14.7 kg (32.4 lb)
100	4	23.3 kg (51.4 lb)	32.4 kg (71.4 lb)	17.8 kg (39.2 lb)	21.6 kg (47.6 lb)
150	6	35.4 kg (78 lb)	54.4 kg (120 lb)	28.9 kg (63.7 lb)	36.8 kg (81.1 lb)
200	8	60 kg (132 lb)	89 kg (196 lb)	46.3 kg (102 lb)	66.7 kg (147 lb)

INSTALLATION INFORMATION

Wiring Connection

- 1/2 NPT internal thread (not available with ATEX Electrical Safety Codes 3 and 4)
- M20 internal thread
- G 1/2 internal thread

Remote Transmitter Mounting

SURFACE MOUNTED TRANSMITTER

Three brackets and hardware are provided and attach to the transmitter with Foxboro hardware. The brackets are then bolted to surface with hardware provided by user.

PIPE MOUNTED TRANSMITTER

Bracket, U-bolt, and hardware provided for attaching transmitter to bracket, and bracket to a nominal DN 50 or 2-inch pipe.

Grounding

Grounding is essential for flow measurement.

The most effective grounding method is connecting direct to earth ground with minimal impedance. For FM and CSA Electrical Safety Code 1, to maintain Intrinsic safety of system, connect conductor to earth ground so that it has less than 1 Ohm to earth. See ANSI/ISA RP12.06.01 Installation of Intrinsically Safe Systems for Hazardous Locations for guidance on installation of intrinsically safe apparatus.

Pipe Connection

WAFER BODY

Sizes 25 to 100 mm (1 to 4 in)

FLANGE BODY

Sizes 2.5 to 200 mm (0.1 to 8 inch)

Length of Straight Pipe

Required straight pipe length (in pipe diameters) clearance on the upstream side and the downstream side, while installing the flowtube.

Upstream side

- A minimum straight pipe length of 5 pipe diameters is required.
- A minimum straight pipe length of 10 pipe diameters is required if a diffuser/valve/pump is installed on the upstream side.

Downstream side

Straight pipe length of 2 pipe diameters is recommended.

Cable between Remote Transmitter and Flowtube (Also see Figure 8 in Model Code Section)

Length

Sizes 25 to 200 mm (1 to 8 in)

70 m (233 ft) cable length, or less

Sizes 10 and 15 mm (3/8 and 1/2 in)

30 m (98 ft) cable length, or less

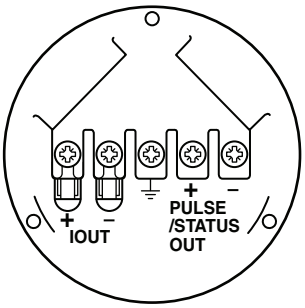
Outside diameter

11.4 mm (0.45 inch)

Terminal Connections

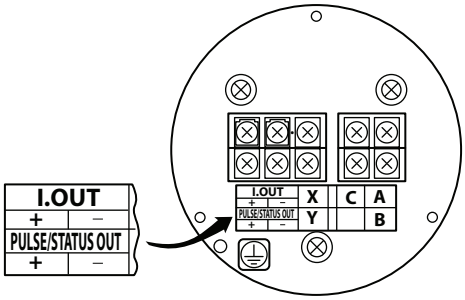
Refer to Figures 4, 5, and 6.

Figure 4. MAG2IC Terminals



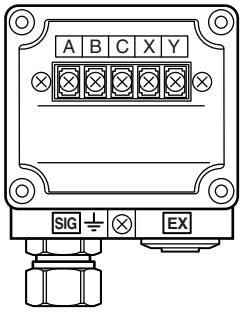
Symbol		Description
I.OUT	+	Flow Rate Signal
	–	
⏚		Earthing (Grounding)
PULSE/ STATUS OUT	+	Pulse Output or Contact Output (Selectable)
	–	

Figure 5. MAG2RT Terminals



Symbol		Description
I.OUT	+	Flow Rate Signal
	–	
⏚		Earthing (Grounding)
PULSE/ STATUS OUT	+	Pulse Output or Contact Output (Selectable)
	–	
X		Excitation Output
Y		
A		Flow Rate Signal Input
B		
C		

Figure 6. MAG2RS Terminals



Symbol	Description
X	Excitation Input
Y	
A	Flow Rate Signal Output
B	
C	
⏚	Earthing (Grounding)

ELECTRICAL SAFETY SPECIFICATIONS

Model MAG2IC Magnetic Flowmeter (Integrally Mounted Magnetic Flow Transmitter)(1)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
CSA Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; and Class III.	T4, Ta = -20 to +60°C.	1
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups E, F, and G; and Class III.	T4, Ta = -20 to +60°C.	2
FM Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; and Class II, Division 1.	T4, Ta = -20 to +60°C.	1
FM Nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2. Also Class I, Zone 2, Group IIC.	T4, Ta = -20 to +60°C.	2

Model MAG2RT Remote Mounted Magnetic Flow Transmitter(1)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups E, F, and G; and Class III, Division 2.	T4, Ta = -20 to +60°C.	2
FM Nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2. Also Class I, Zone 2, Group IIC.	T4, Ta = -20 to +60°C.	2

Model MAG2RS Remote Mounted Magnetic Flowtube(1)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups E, F, and G; and Class III, Division 2.	T4, Ta = -20 to +60°C.	2
FM Nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2. Also Class I, Zone 2, Group IIC.	T4, Ta = -20 to +60°C.	2

1. Also refer to Model Code section.

MODEL CODES

Model MAG2IC - Magnetic Flowmeter with Integrally Mounted Magnetic Flow Transmitter

Description	Model
Magnetic Flowmeter; 2-Wire; Integrally Mounted Transmitter; Flanged or Wafer Body Flowtube.	MAG2IC
Nominal Line Size	
2.5 mm (0.1 in) (Flanged Body only) (a)	-002
5 mm (0.2 in) (Flanged Body only)[a]	-005
10 mm (3/8 in) (Flanged Body only)[a]	-010
15 mm (1/2 in) (Flanged Body only)[a]	-015
25 mm (1 in) (Flanged and Wafer Body)	-025
40 mm (1 1/2 in) (Flanged and Wafer Body)	-040
50 mm (2 in) (Flanged and Wafer Body)	-050
65 mm (2 1/2 in) (Flanged and Wafer Body)	-065
80 mm (3 in) (Flanged and Wafer Body)	-080
100 mm (4 in) (Flanged and Wafer Body)	-100
150 mm (6 in) (Flanged Body only)	-150
200 mm (8 in) (Flanged Body only)	-200
Flowtube Lining Material	
PFA	P
End Connection and Flange Rating	
Wafer Body, ANSI Class 150	21
Wafer Body, ANSI Class 300	22
Wafer Body, DIN PN10	41
Wafer Body, DIN PN16	42
Wafer Body, DIN PN25	43
Flanged Body, ANSI Class 150	A1
Flanged Body, ANSI Class 300	A2
Flanged Body, DIN PN10	D1
Flanged Body, DIN PN16	D2
Flanged Body, DIN PN25	D3
Electrode Material	
316L ss	L
Hastelloy C-276	C
Titanium	K
Zirconium	H
Tantalum	T
Nickel	N
Platinum-Iridium	P

a. A 15 mm (0.5 in) flange is used for Nominal Line Size Codes -002 to -015.

Model MAG2IC - Magnetic Flowmeter with Integrally Mounted Magnetic Flow Transmitter (Cont.)

Description (Cont.)	Model
Earthing (Grounding) Ring	
316 ss	S
Hastelloy C-276	C
Titanium	K
Zirconium	H
Tantalum	T
Platinum	P
Wiring Connection (Transmitter Enclosure)	
G 1/2 Internal Thread - without Watertight Gland	A
G 1/2 Internal Thread - with one Plastic Watertight Gland	B
G 1/2 Internal Thread - with one brass Ni-Plated Watertight Gland	C
1/2 NPT Internal Thread - without Watertight Gland (a)	D
M20 Internal Thread - without Watertight Gland	E
G 1/2 Internal Thread - with two Plastic Watertight Glands	J
G 1/2 Internal Thread - with two Brass Ni-Plated Watertight Glands	K
Face-to-Face Dimension	
Standard	A
Installation/Display Direction (Refer to Figure 7 below)	
Horizontal Piping / Right Side viewed from Upstream	A
Horizontal Piping / Left Side viewed from Upstream	B
Horizontal Piping / Downstream Side	C
Horizontal Piping / Upstream Side	D
Vertical Piping Mounting / Right Side of Piping / Flow Direction: Upward	E
Vertical Piping Mounting / Left Side of Piping / Flow Direction: Upward	F
Calibration	
Standard Calibration (3 points: 0%, 50%, and 100%)	A
Output Signal	
4 to 20 mA dc Analog Output with HART Communications (b)	T
Electrical Safety (Also see Electrical Safety Specifications section for further information)	
No Approvals or Certifications	X
FM/CSA Approved/Certified Explosion proof, Class I, Division 1 (a)	1
FM/CSA Approved/Certified Nonincendive, Class I, Division 2 (a)	2
Finish/Paint	
Standard Paint	X
Corrosion-Resistant Paint	2

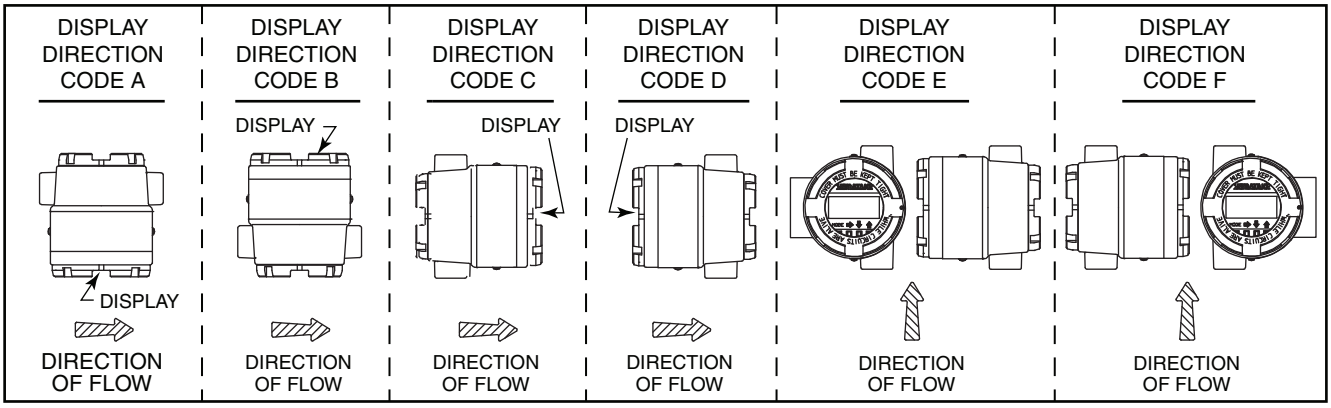
a. Wiring Connection Code D must be selected with Electrical Safety Code 1 or 2.

b. Code T replaces Code H.

Model MAG2IC - Magnetic Flowmeter with Integrally Mounted Magnetic Flow Transmitter (Cont.)

Description (Cont.)	Model
Mounting Hardware	
None	X
304 ss Bolts and Nuts (only for ANSI Class 150 and 300 Wafer Body Flowtubes)	2
Optional Selections (See Descriptions Below)	
None (Required selection if options are not selected)	-X
With Tag Number Plate on the Transmitter Enclosure; maximum 20 characters	-K
With Tag Number Plate attached to Flowmeter with Wire	-L
Example: MAG2IC–025PA1LSDAEAT22X–K	

Figure 7. MAG2IC Configurations with Display Direction Codes A to F



Model MAG2RT - Remote Mounted Magnetic Flow Transmitter

Description	Model
Remote Mounted Magnetic Flow Transmitter; 2-Wire	MAG2RT
Output Signal	
4 to 20 mA dc Analog Output with HART Communications (a)	-T
Wiring Connection (Transmitter Enclosure)	
G 1/2 Internal Thread - without Watertight Gland	A
G 1/2 Internal Thread - with two Plastic Watertight Glands	B
G 1/2 Internal Thread - with two Brass Ni-Plated Watertight Glands	C
1/2 NPT Internal Thread - without Watertight Gland	D
M20 Internal Thread - without Watertight Gland	E
Transmitter Mounting (b)	
Wall Mounting with Standard Surface Mounting Brackets	G
Nominal DN 50 or 2-inch Pipe Mounting with Standard Bracket Set	H
Electrical Safety (Also see Electrical Safety Specifications section)	
No Approvals or Certifications	X
FM/CSA Approved/Certified Nonincendive, Class I, Division 2 (c)	2
Optional Selections See descriptions below.	
None	-X
With Tag Number Plate on the Transmitter Housing; maximum 20 characters	-K
Corrosion-Resistant Paint	-2
Example: MAG2RT–TDH2–K2	

a. Code -T replaces Code -H.
b. Refer to DIMENSIONS-NOMINAL Section.
c. Must select Wiring Connection D.

Note: See Model MAG2RS Code that follows for remote Cable that interconnects the Model MAG2RT Remote Mounted Magnetic Flow Transmitter and Model MAG2RS Remote Mounted Magnetic Flowtube.

Model MAG2RS - Remote Mounted Magnetic Flowtube

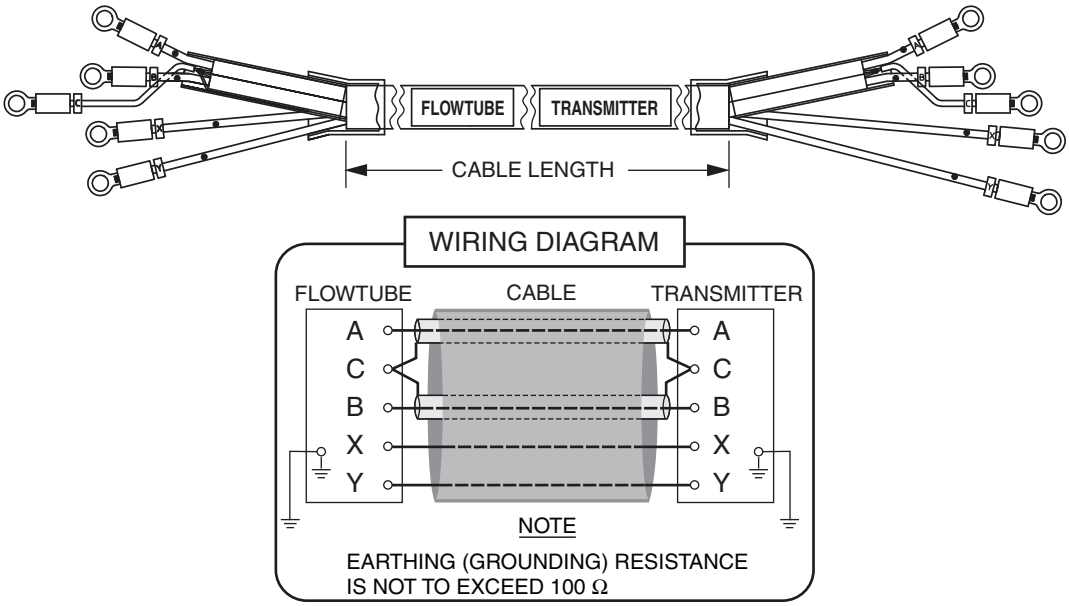
Description	Model
Remote Mounted Magnetic Flowtube	MAG2RS
Nominal Line Size	
10 mm (3/8 in) (Flanged Body only) - a 15 mm (0.5 in) Flange is used with this Line Size	-010
15 mm (1/2 in) (Flanged Body only) - a 15 mm (0.5 in) Flange is used with this Line Size	-015
25 mm (1 in) (Flanged and Wafer Body)	-025
40 mm (1 1/2 in) (Flanged and Wafer Body)	-040
50 mm (2 in) (Flanged and Wafer Body)	-050
65 mm (2 1/2 in) (Flanged and Wafer Body)	-065
80 mm (3 in) (Flanged and Wafer Body)	-080
100 mm (4 in) (Flanged and Wafer Body)	-100
150 mm (6 in) (Flanged Body only)	-150
200 mm (8 in) (Flanged Body only)	-200
Flowtube Lining Material	
PFA	P
End Connection and Flange Rating	
Wafer Body, ANSI 150	21
Wafer Body, ANSI 300	22
Wafer Body, DIN PN10	41
Wafer Body, DIN PN16	42
Wafer Body, DIN PN25	43
Flanged Body, ANSI 150	A1
Flanged Body, ANSI 300	A2
Flanged Body, DIN PN10	D1
Flanged Body, DIN PN16	D2
Flanged Body, DIN PN25	D3
Electrode	
316L ss	L
Hastelloy C-276	C
Titanium	K
Zirconium	H
Tantalum	T
Nickel	N
Platinum-Iridium	P
Earthing (Grounding) Ring	
316 ss	S
Hastelloy C-276	C
Titanium	K
Zirconium	H
Tantalum	T
Platinum	P
Wiring Connection (Flowtube Terminal Box)	
G 1/2 Internal Thread - without Watertight Gland	A
G 1/2 Internal Thread - with one Plastic Watertight Gland	B
G 1/2 Internal Thread - with one Brass Ni-Plated Watertight Gland	C

Model MAG2RS - Remote Mounted Magnetic Flowtube (Cont.)

Description (Continued)	Model
Wiring Connection (Flowtube Terminal Box) (Continued)	
1/2 NPT Internal Thread - without Watertight Gland (a)	D
M20 Internal Thread - without Watertight Gland	E
Face-to-Face Dimension	
Standard	A
Calibration	
Standard Calibration (3 points: 0%, 50%, and 100%)	A
Electrical Safety (Also see Electrical Safety Specifications section)	
No Approvals or Certifications	X
FM/CSA Approved/Certified Nonincendive, Class I, Division 2 (a)	2
Optional Selections See descriptions below.	
Miscellaneous Options	
None (required selection if options are not selected)	-X
With Tag Number Plate on the Flowtube Terminal Box; maximum 16 characters	-K
Corrosion-Resistant Paint	-2
Attached 304 ss Bolts and Nuts for Installation; Water Body Flowtube only	-4
Optional Cable Length Selection for interconnecting Flowtube to Remote Transmitter	
None (make this selection if interconnecting cable is not desired)	-XX
2 m (6.6 ft)	-02
3 m (9.8 ft)	-03
4 m (13.1 ft)	-04
5 m (16.4 ft)	-05
10 m (32.8 ft)	-10
15 m (49.2 ft)	-15
20 m (65.6 ft)	-20
30 m (98.4 ft)	-30
40 m (131.2 ft)	-40
50 m (164.0 ft)	-50
60 m (196.8 ft)	-60
70 m (229.7 ft)	-70
Optional Terminals for Flowtubes (b)	
Terminals for Flowtube and no Terminals on Transmitter	AX
No Terminals on Flowtube and with Terminals on Transmitter	XA
Terminals for both Flowtube and Transmitter	AA
Examples:	
MAG2RS–025P21LSDAA2–K–10AA	
MAG2RS–025P21LSDAA2–K–XX	
MAG2RS–025P21LSDAA2–X–30AA	
MAG2RS–025P21LSDAA2–X–XX	

a. Wiring Connection Code D (1/2 NPT internal thread) must be selected with Electrical Safety Code 2.
b. Select Optional Terminals only when an Optional Cable is selected.

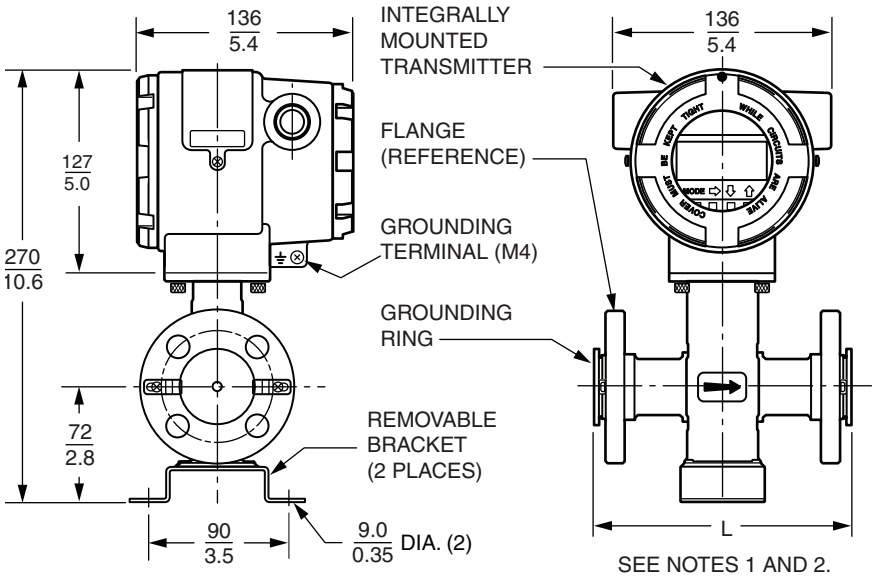
Figure 8. Cable Assembly for Interconnecting the Model MAG2RS Flowtube with the Model MAG2RT Remote Mounted Transmitter



DIMENSIONS – NOMINAL

mm
in

MODEL MAG2IC FLOWMETER WITH INTEGRALLY MOUNTED TRANSMITTER
FLANGED BODY FLOWTUBE - 2.5, 10, and 15 mm (0.1, 3/8, and 1/2 in) SIZES



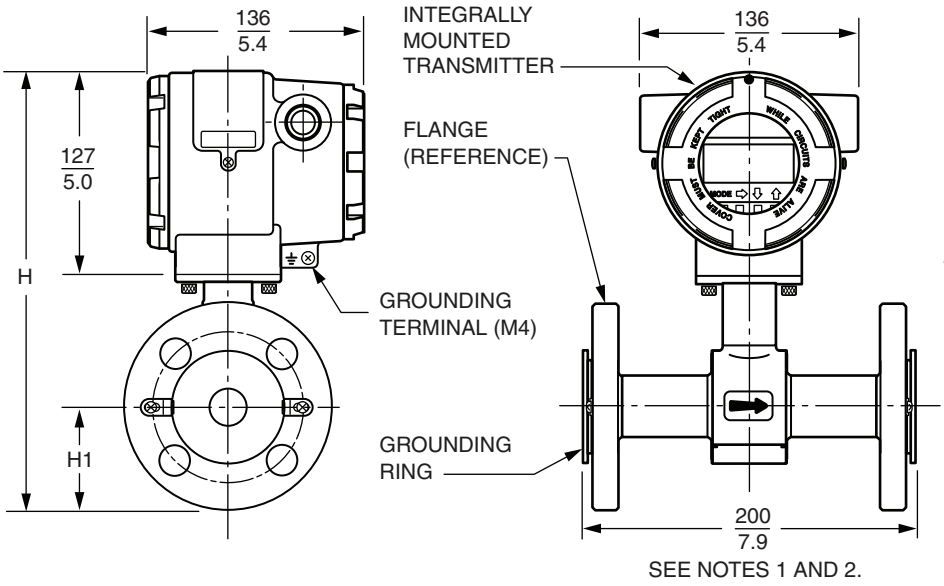
NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimensior is included in the Face-to-Face Dimension.

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
2.5 to 10 mm (0.1 to 3/8 in)	L	160 / 6.3	160 / 6.3	160 / 6.3	160 / 6.3
15 mm (1/2 in)	L	200 / 7.9	200 / 7.9	200 / 7.9	200 / 7.9

mm
in

MODEL MAG2IC FLOWMETER WITH INTEGRALLY MOUNTED TRANSMITTER
FLANGED BODY FLOWTUBE - 25 mm (1 in) SIZE



NOTES

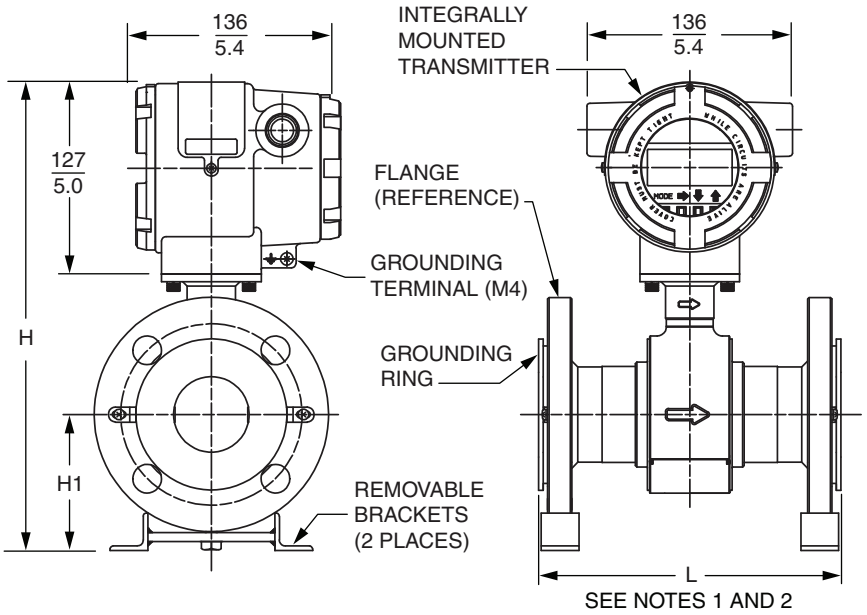
1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.

2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
25 mm (1 in)	H	258 10.2	266 10.5	262 10.3	262 10.3
	H1	54 2.1	62 2.4	58 2.3	58 2.3

mm
in

MODEL MAG2IC FLOWMETER WITH INTEGRALLY MOUNTED TRANSMITTER
FLANGED BODY FLOWTUBE - 40 to 100 mm (1 1/2 to 4 in) SIZES



NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

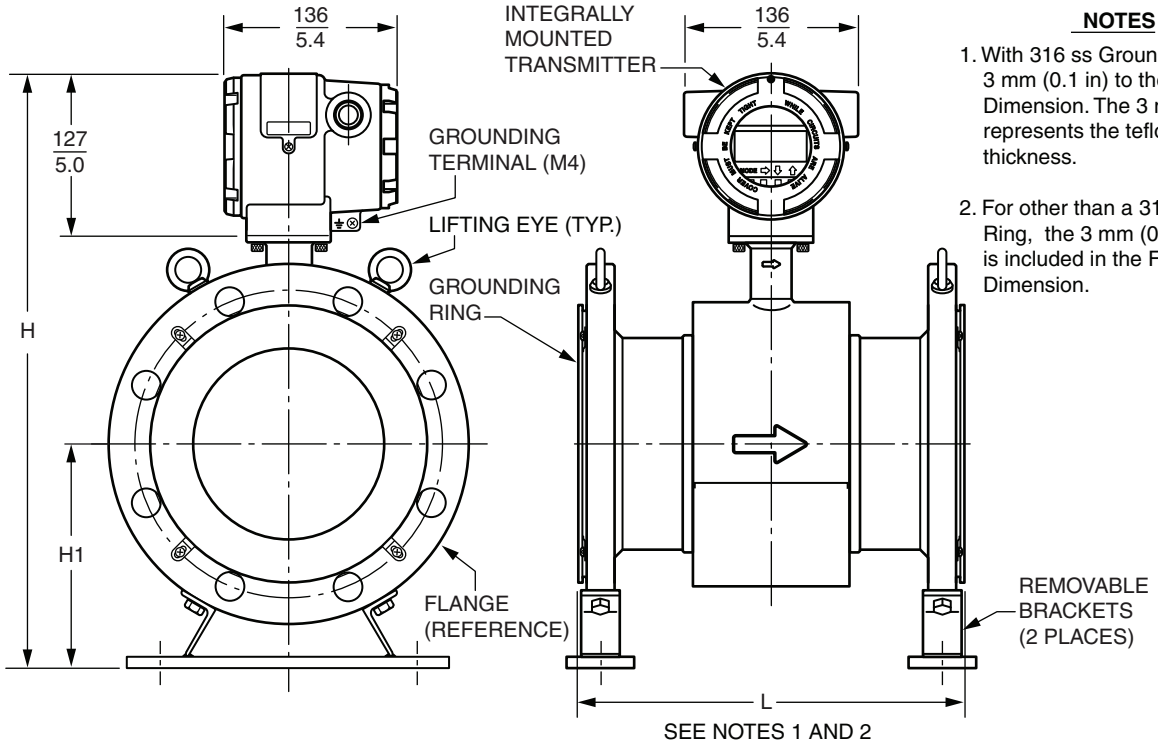
Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
40 mm (1 1/2 in)	L	200 / 7.9	200 / 7.9	200 / 7.9	200 / 7.9
	H	288 / 11.3	305 / 12.0	302 / 11.9	302 / 11.9
	H1	77 / 3.0	94 / 3.7	91 / 3.6	91 / 3.6
50 mm (2 in)	L	200 / 7.9	200 / 7.9	200 / 7.9	200 / 7.9
	H	308 / 12.1	316 / 12.4	316 / 12.4	316 / 12.4
	H1	88 / 3.5	96 / 3.8	96 / 3.8	96 / 3.8

DIMENSIONS – NOMINAL

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
65 mm (2 1/2 in)	L	200 (7.9)	200 (7.9)	200 (7.9)	200 (7.9)
	H	330 (13.0)	338 (13.3)	334 (13.2)	334 (13.2)
	H1	103 (4.1)	111 (4.4)	107 (4.2)	107 (4.2)
80 mm (3 in)	L	200 (7.9)	200 (7.9)	200 (7.9)	200 (7.9)
	H	346 (13.6)	359 (14.1)	354 (13.9)	354 (13.9)
	H1	113 (4.5)	124 (4.9)	119 (4.7)	119 (4.7)
100 mm (4 in)	L	250 (9.8)	250 (9.8)	250 (9.8)	250 (9.8)
	H	379 (14.9)	393 (15.5)	374 (14.7)	382 (15.0)
	H1	131 (5.2)	145 (5.7)	126 (5.0)	134 (5.3)

mm
in

MODEL MAG2IC FLOWMETER WITH INTEGRALLY MOUNTED TRANSMITTER
FLANGED BODY FLOWTUBE - 150 and 200 mm (6 and 8 in) SIZES



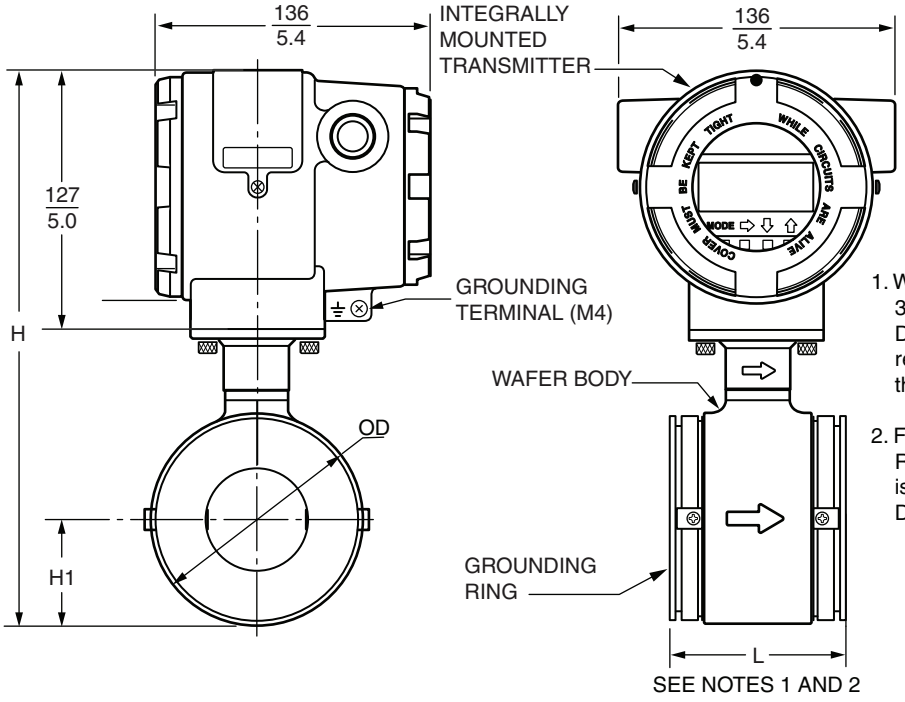
NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
150 mm (6 in)	L	300 / 11.8	300 / 11.8	300 / 11.8	300 / 11.8
	H	461 / 18.2	483 / 19.0	465 / 18.3	473 / 18.6
	H1	174 / 6.9	196 / 7.7	178 / 7.0	186 / 7.3
200 mm (8 in)	L	350 / 13.8	350 / 13.8	350 / 13.8	350 / 13.8
	H	516 / 20.3	537 / 21.1	514 / 20.2	526 / 20.7
	H1	204 / 8.0	225 / 8.9	202 / 8.0	214 / 8.4

mm
in

MODEL MAG2IC FLOWMETER WITH INTEGRALLY MOUNTED TRANSMITTER
WAFER BODY FLOWTUBE - 25 to 100 mm (1 to 4 in) SIZES



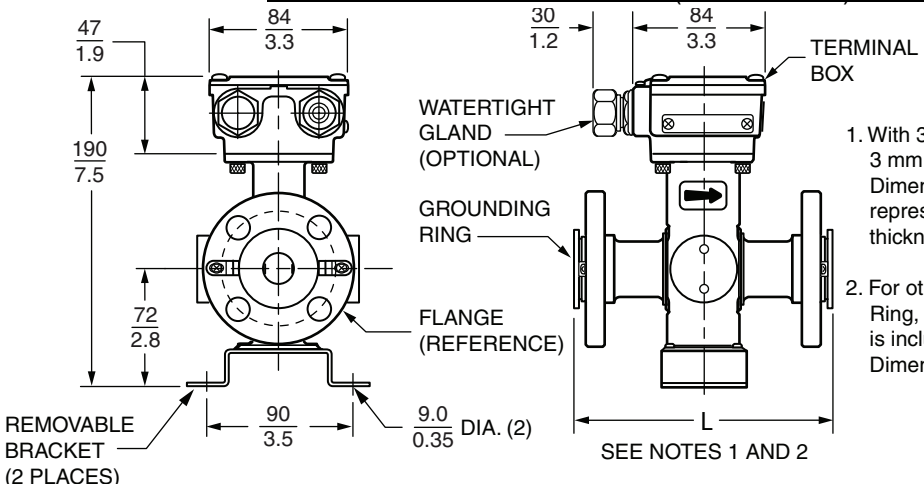
NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Dimension	For Standard Face-to-Face Dimension Code A					
	Nominal Flowtube Size					
	25 mm (1 in)	40 mm (1 1/2 in)	50 mm (2 in)	65 mm (2 1/2 in)	80 mm (3 in)	100 mm (4 in)
L	94 3.7	80 3.1	86 3.4	96 3.8	106 4.2	120 4.7
H	238 9.4	255 10.0	272 10.7	289 11.4	302 11.9	327 12.9
H1	34 1.3	44 1.7	52 2.0	62 2.4	67 2.6	80 3.1
D	68 2.7	87 3.4	104 4.1	124 4.9	134 5.3	159 6.3

mm
in

MODEL MAG2RS REMOTE MOUNTED MAGNETIC FLOWTUBE
FLANGED BODY - 10 and 15 mm (3/8 and 1/2 in) SIZES



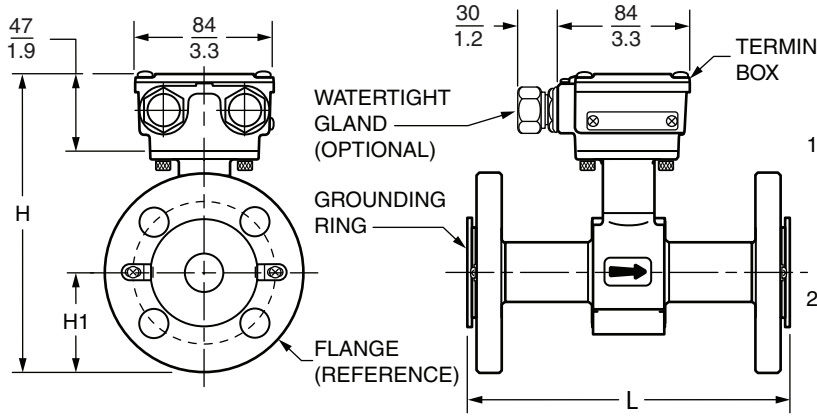
NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
10 mm (3/8 in)	L	160 / 6.3	160 / 6.3	160 / 6.3	160 / 6.3
15 mm (1/2 in)	L	200 / 7.9	200 / 7.9	200 / 7.9	200 / 7.9

mm
in

MODEL MAG2RS REMOTE MOUNTED MAGNETIC FLOWTUBE
FLANGED BODY - 25 mm (1 in) SIZE



SEE NOTES 1 AND 2

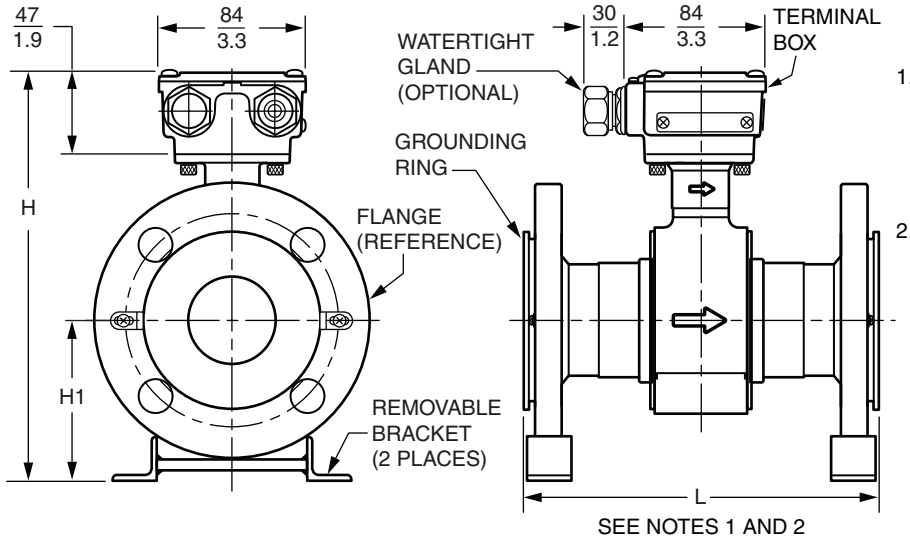
NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
25 mm (1 in)	L	188 / 7.4	186 / 7.3	182 / 7.2	182 / 7.2
	H1	54 / 2.1	62 / 2.4	58 / 2.3	58 / 2.3

mm
in

MODEL MAG2RS REMOTE MOUNTED MAGNETIC FLOWTUBE
FLANGED BODY - 40 to 100 mm (1 1/2 to 4 in) SIZES



NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
40 mm (1 1/2 in)	L	200 / 7.9	200 / 7.9	200 / 7.9	200 / 7.9
	H	208 / 8.2	225 / 8.9	222 / 8.7	222 / 8.7
	H1	77 / 3.0	94 / 3.7	91 / 3.6	91 / 3.6
50 mm (2 in)	L	200 / 7.9	200 / 7.9	200 / 7.9	200 / 7.9
	H	228 / 9.0	236 / 9.3	236 / 9.3	236 / 9.3
	H1	88 / 3.5	96 / 3.8	96 / 3.8	96 / 3.8

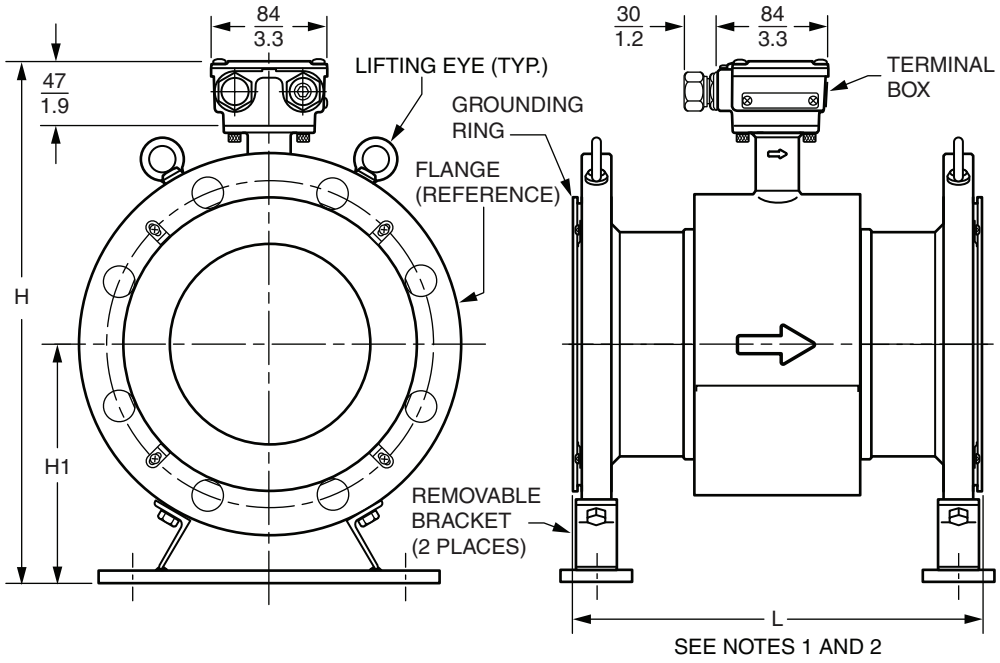
DIMENSIONS – NOMINAL

mm
in

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
65 mm (2 1/2 in)	L	200 7.9	200 7.9	200 7.9	200 7.9
	H	250 9.8	258 10.2	254 9.8	254 9.8
	H1	103 4.1	111 4.4	107 4.2	107 4.2
80 mm (3 in)	L	200 7.9	200 7.9	200 7.9	200 7.9
	H	266 10.5	279 11.0	274 10.8	274 10.8
	H1	113 4.4	124 4.9	119 4.7	119 4.7
100 mm (4 in)	L	250 9.8	250 9.8	250 9.8	250 9.8
	H	299 11.8	313 12.3	294 11.6	302 11.9
	H1	131 5.2	145 5.7	126 5.0	134 5.3

mm
in

MODEL MAG2RS REMOTE MOUNTED MAGNETIC FLOWTUBE
FLANGED BODY - 150 and 200 mm (6 and 8 in) SIZES



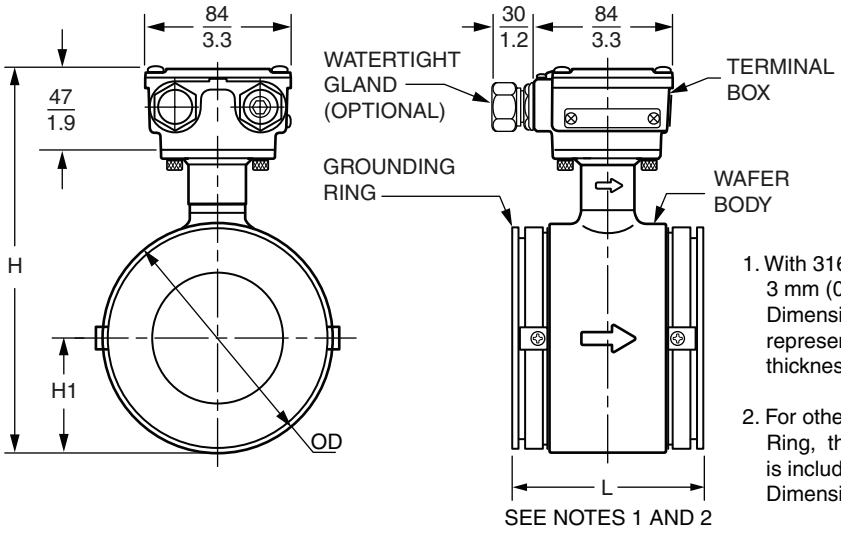
NOTES

1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Nominal Line Size	Dimension	Nominal Dimensions in mm (in)			
		ANSI Flange		DIN Flange	
		Class 150	Class 300	PN 10/16	PN 25
150 mm (6 in)	L	300 / 11.8	300 / 11.8	300 / 11.8	300 / 11.8
	H	381 / 15.0	403 / 15.9	385 / 15.2	393 / 15.5
	H1	174 / 6.9	196 / 7.7	178 / 7.0	186 / 7.3
200 mm (8 in)	L	350 / 13.8	350 / 13.8	350 / 13.8	350 / 13.8
	H	436 / 17.2	457 / 18.0	434 / 17.1	446 / 17.6
	H1	204 / 8.0	225 / 8.9	202 / 8.0	214 / 8.4

mm
in

MODEL MAG2RS REMOTE MOUNTED MAGNETIC FLOWTUBE
WAFER BODY - 25 to 100 mm (1 to 4 in) SIZES



NOTES

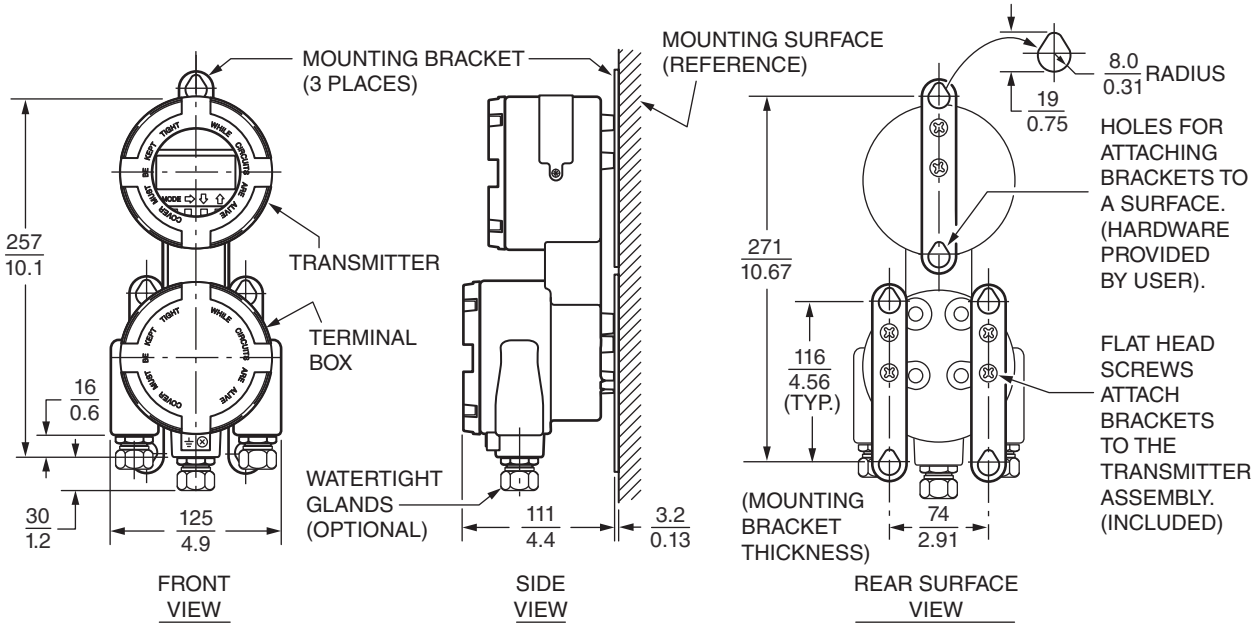
1. With 316 ss Grounding Ring, add 3 mm (0.1 in) to the Face-to-Face Dimension. The 3 mm (0.1 in) represents the teflon gasket thickness.
2. For other than a 316 ss Grounding Ring, the 3 mm (0.1 in) Dimension is included in the Face-to-Face Dimension.

Dimension	For Standard Face-to-Face Dimension Code A					
	Nominal Flowtube Size					
	25 mm (1 in)	40 mm (1 1/2 in)	50 mm (2 in)	65 mm (2 1/2 in)	80 mm (3 in)	100 mm (4 in)
L	94 3.7	80 3.1	86 3.4	96 3.8	106 4.2	120 4.7
H	158 6.2	175 6.9	192 7.6	209 8.2	222 8.2	247 9.7
H1	34 1.3	44 1.7	52 2.0	62 2.4	67 2.6	80 3.1
D	68 2.7	87 3.4	104 4.1	124 4.9	134 5.3	159 6.3

mm
in

MODEL MAG2RT REMOTE MOUNTED TRANSMITTER

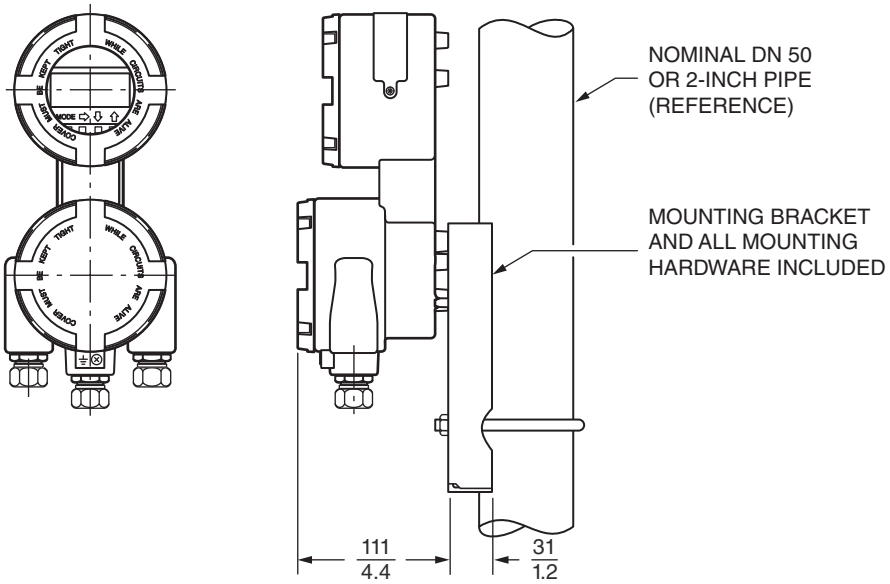
Wall Mounted Configuration



Pipe Mounted Configuration

NOTE

See Figure above for Transmitter Dimensions.



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ORDERING INSTRUCTIONS

1. For Flowmeters with Integrally Mounted Transmitter:
   - Select MAG2IC Model Number.
2. For Flowmeter with Remote Mounted Transmitter:
   - Select MAG2RS Flowtube Model Number (includes Remote Cable if cable is also selected).
   - Select MAG2RT Transmitter Model Number.
3. Process Pressure-Temperature Range (if sizing required).
4. Process Fluid Composition and Conductivity (if sizing required).
5. User Tag Data and Application.

OTHER FOXBORO PRODUCTS

The Foxboro product lines offer a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, temperature, positioning, controlling, and recording. For a list of these offerings, visit our web site at:

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Foxboro®
by Schneider Electric

Invensys Systems, Inc.
38 Neponset Avenue
Foxboro, MA 02035
United States of America
http://www.fielddevices.foxboro.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424
Website: http://support.ips.invensys.com