

- Flowmeter system utilizes a smart microprocessor converter
- System accuracy of  $\pm 0.5\%$  of rate
- Field configurable via integral pushbuttons, eliminates the need for an external handheld device.
- Magnetic wand allows configuration in hazardous locations without opening the converter cover.
- Wide field of applications due to a variety of liner and electrode material options.
- Long term accuracy stability and stable zero point by digital signal processing with pulsed DC excitation.
- One time configuration at start up via EEPROM for field parameter selection.
- Flanged primary connections from 1/2" to 12"
- Reduced commissioning & wiring cost



**Magnetic Flowmeters**  
**COPA-XE™**  
**Series 4000**

## Series 4000

### Magnetic Flowmeter COPA-XE™

The ABB 10DX4311 magmeter is the ideal flowmeter for metering homogeneous liquids with a specific minimum electrical conductivity. The flowmeter's accuracy, lack of moving parts, minimal pressure loss and resistance to abrasion and chemical corrosion make it applicable to a variety of applications. For many years ABB magmeters have been successfully installed in and are the preferred meters for the chemical, pharmaceutical, food, municipal water and waste water industries.

The COPA-XE flowmeter is a compact design where the primary and converter are assembled as one unit. This configuration provides a simple cost saving installation with no need for interconnecting cables between the primary and converter.

The Series 10DX4311 magmeter is a pulsed DC volumetric liquid flow rate detector. The coils are excited with pulsed DC current in order to establish a magnetic field. As a conductive liquid passes through this magnetic field, an electrical voltage is induced in the liquid which is directly proportional to its velocity. This induced voltage is sensed by the electrodes and sent to the converter which digitally processes the signals and converts them into analog and digital output signals.

## Engineering Specifications

**Minimum Liquid Conductivity:** 20µS/cm

**Pressure Limits:** All liners @100°F (38°C) 740 psi (5.10 Mpa.) (Limited by flange rating)

### Vacuum Limits:

Teflon® and Tefzel® Liners:

1/2" to 4" - Full Vacuum to 266°F (130°C)

6" to 12"- 3.0 psia @ 68°F (20°C)

5.8 psia @ 212°F (100°C)

6.7 psia @ 266°F (130°C)

Neoprene, Polyurethane, Rubber: Full Vacuum to 190°F (88°C)

**NOTE: The combined process and ambient temperatures may not exceed 248°F (120°C).**

### Temperature Limits:

Process -

Teflon® and Tefzel®, up to 266°F (130°C)

Polyurethane and Neoprene, up to 190°F (88°C)

175°F (80°C)

Ambient - 4 to 140 °F (-20 to 60°C)

### Vibration Limits:

Maximum allowable = 1.5G at 10-150 Hz

### Power Requirements:

115 / 230 VAC, -15/+10%, 50/60 Hz ±6%

24 VDC -30/+30%, residual ripple <5%

Power Consumption <10 VA (primary and converter)

**Coil Excitation Frequency:** 6-1/4 or 7-1/2 Hz for 50/60 Hz power supply.

## Capacity Table

Table 1

Meter Size		*Cal. Factor	Min. Meas. Range flow velocity = 0 to 1.64 ft/s	Max. Meas. Range flow velocity = 0 to 32.8 ft/s
in.	DN	GPM	GPM	GPM
0.5	15	26	0 to 1.3	0 to 26
0.1	25	52	0 to 2.6	0 to 52
1.5	40	156	0 to 7.8	0 to 156
2.0	50	264	0 to 13.2	0 to 264
3.0	80	793	0 to 39.6	0 to 793
4.0	100	1,057	0 to 52.8	0 to 1,057
6.0	150	2,642	0 to 132	0 to 2,642
8.0	200	4,756	0 to 238	0 to 4,756
10.0	250	7,926	0 to 396	0 to 7,926
12.0	300	10,568	0 to 528	0 to 10,568

**Low Flow Cut-Off:** 0 to 10%, software selectable.

**Damping:** 0.5 to 99.99 seconds, software selectable.

## Standard Configuration

**Current Output:** Selectable between - 0-10, 2-10, 10-20, 4-12-20

0/4-20 mA dc into 0-600 Ω load,

0/2-20 mA dc into 0-1200 Ω load,

0-5 mA dc into 0-2400 Ω load.

**Empty Pipe Detector:** Drives the outputs to a predetermined flow condition when the electrodes are no longer covered with fluid, (0% or 130%) and the Totalizer will stop incrementing.

Minimum fluid conductivity = 50 µS/ cm.

**Scaled Pulse Output (Passive):** Maximum scaled pulse output frequency is 5 kHz. The pulse multiplication factor may be set between 0.001 and 1000. The pulse width is adjustable from 0.064 ms to 2000 ms.

**Isolation:** Current and pulse outputs are galvanically isolated from the input circuit and from one another.

**Contact Output:** The following functions are software selectable

- **System Supervision** - opened or closed at alarm
- **Empty Pipe** - opened or closed at alarm
- **Forward/Reverse Flow**-closed for forward flow
- **Limit Alarm** - opened or closed at alarm
- **Optocoupler, terminals G2 & P7**

$$16V < U_{CEH} < 30V, 0V < U_{CEL} < 2V$$

$$0mA < I_{CEH} < 0.2mA, 2mA < I_{CWL} < 15mA$$

**Contact Input:** The following functions are software selectable:

- **External Output Cut-off** - All output signals are turned off via application of external signal.
- **External Totalizer Reset**- The internal Totalizer value can be reset via application of external signal.
- **Optocoupler, Terminals G2 & XI**  
16V < U < 30V, Ri=2kW

**Zero Return:** Provides constant zero output signal during conditions when false flow signals are possible. Activated by external non-powered contact.

**HART® Protocol Communications:** 1200 Baud using frequency shift keying. Maximum cable length: 5000ft (1500m)

**FOUNDATION Fieldbus:**

This instrument can be configured directly using the buttons on the converter keypad, by using the services integrated in the system or using the National Configurator. The Foundation Fieldbus data link conforms to the standards FF-890/891, as well as FF-902/90.

*Note: If the Foundation Fieldbus option is selected, no other outputs are available.*

**PROFIBUS PA:** This instrument can be configured directly using the buttons on the converter keypad, or by using the configuration and operator software SMART VISION. The instrument can be operated with the PROFIBUS Standard-Ident-No. 9700 or 9740.

*Note: If the Profibus PA option is selected, no other outputs are available.*

**System Accuracy:**

Frequency Output:

Flow > 7% of Cal. Factor = ±0.5% of rate

Flow < 7% of Cal. Factor = ±0.00035 of Cal. Factor

Analog Output::

Same as frequency output but with an additional ±0.1% of span.

**Enclosure Classification:**

IEC 529, IP67 accidental submergence in water up to a depth of 33 feet (10 meters) for up to 48 hours.

**Hazardous Area Approvals:**

FM Class I Division 1, Groups B, C, D

**Housing:**

Epoxy painted cast aluminum

**Electrical Connections:**

Cage-clamp terminals for wiring and 1/2 inch NPT internally threaded conduit fittings.

**Display:**

LCD dot matrix display, 2 lines x 16 digits. The internal flow totalizer integrates in both forward and reverse flow directions. The Class 1, Div. 2 converter housing may be rotated up to 90° and the display can be placed in three different positions in 90° increments.

**Data Security:**

All data is stored in a NV-RAM for a period of more than 10 years without requiring external power. Additional data security is offered by an external serial EEPROM located in the converter. The EEPROM can be transferred to a replacement converter to transfer the primary data and configuration parameters.

**Approximate Shipping Weights**

Meter Size		Meter Weight	
inch	mm	lbs	keg
.5	15	9.5	4.5
1	25	14	6.5
1.5	40	17	7.5
2	50	23	10.5
3	80	31	14
4	100	45	20.5
6	150	110	49.5
8	200	160	72
10	250	225	101.5
12	300	280	126

**ELECTRO-MAGNETIC FLOWMETERS INTEGRAL-XE 10DX4311**

For detailed specifications, refer to Product Specification D-FMP-10DX4311 Product Code D  
Note A: Not available with FM CL1 Div 1 option

Standard Product =

	Code
<b>Electromagnetic Flowmeter Integral 50XE4000</b>	<b>10DX4311C</b>

**1 : Meter Lay Length**

Short Form, Standard	<b>D</b>
Replacement for 10D1419 & 10D1465	<b>E</b>

**2 : Liner Material**

Polyurethane	<b>D</b>
Teflon PTFE	<b>E</b>
Neoprene	<b>L</b>
Tefzel ETFE (1/2 ... 1-1/2 in.)	(Note: 1) <b>N</b>

**3 : Connection Size**

15 mm (1/2 in.) (Teflon or Tefzel liners only)	(Note: 2)	<b>07</b>
25 mm (1 in.) (Teflon or Tefzel liners only)	(Note: 2)	<b>09</b>
40 mm (1-1/2 in.) (Teflon or Tefzel liners only)	(Note: 2)	<b>11</b>
50 mm (2 in.)		<b>12</b>
80 mm (3 in.)		<b>14</b>
100 mm (4 in.)		<b>15</b>
150 mm (6 in.)		<b>17</b>
200 mm (8 in.)		<b>18</b>
250 mm (10 in.)		<b>19</b>
300 mm (12 in.)		<b>20</b>

**4 : Flange Standard Pressure Rating**

ASME Class 150	<b>P</b>
ASME Class 300	<b>Q</b>

**5 : Flange Material**

Carbon Steel, Standard	<b>1</b>
AISI 304 SST (1.4301)	<b>2</b>

**6 : Protector Plate**

Not Required	<b>A</b>
AISI 316 SST (1.4401)	<b>B</b>
Hastelloy C	<b>E</b>

**7 : Electrode Type**

Flush	<b>2</b>
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**8 : Electrode Material**

AISI 316 SST (1.4401)	<b>B</b>
Hastelloy C	<b>D</b>
Titanium	<b>E</b>
Tantalum (Teflon or Tefzel liners only)	(Note: 2) <b>F</b>
Platinum-Iridium (Teflon or Tefzel liners only)	(Note: 2) <b>H</b>

<b>10DX4311C</b>		Code
<b>9 : Grounding Electrode</b>		
None		A
<b>10 : Certification</b>		
General Purpose		A
Explosion Proof FM Cl 1, Div. 1, Groups B, C & D		L
<b>11 : Enclosure Classification</b>		
IEC 529 IP 67 Accidental Submergence, 10 m (33 ft.) of Water for 48 hrs		2
<b>12 : Process Temperature Range</b>		
Standard		1
<b>13 : Excitation Frequency / Line Frequency</b>		
6-1/4 Hz / 50 Hz		1
7-1/2 Hz / 60 Hz, Standard		3
6-1/4 Hz / 24 V DC		6
7-1/2 Hz / 24 V DC		8
30 Hz (24 VDC)		T
30 Hz (60 Hz Line Frequency)		D
<b>14 : Customer Information Language</b>		
English		2
<b>15 : Software Level</b>		
(Specified by ABB)		X
<b>16 : Output Options</b>		
Optocoupler Pulse		3
<b>17 : Measuring Mode</b>		
Continuous Flow Measurement		A
<b>18 : Accessories</b>		
Empty Pipe Detection (Disabled)		A
Empty Pipe Detection (Enabled)		B
HART Protocol & Empty Pipe Detection (Disabled)		C
HART Protocol & Empty Pipe Detection (Enabled)		D
FOUNDATION Fieldbus & Empty Pipe Detection (Disabled)	(Note: 3)	F
PROFIBUS PA & Empty Pipe Detection, Disabled	(Note: 3)	P
<b>19 : Display Board Options</b>		
Display illuminated		B
<b>20 : Power Supply</b>		
230 / 240 V AC 50 / 60 Hz		B
115 / 120 V AC 50 / 60 Hz, Standard		C
24 V DC		H
<b>ACCESSORIES</b>		
Instruction Manual		PN24849A

Note 1: Not available with Meter Lay Length code E

Note 2: Not available with Liner Material code D, L

Note 3: Not available with Certification code L

**Table 10DX4311C-A**  
**Flange Standard Pressure Rating ASME Class 300**

Connection Size
15 mm (1/2 in.) (Teflon or Tefzel liners only)
25 mm (1 in.) (Teflon or Tefzel liners only)
40 mm (1-1/2 in.) (Teflon or Tefzel liners only)
50 mm (2 in.)
80 mm (3 in.)
100 mm (4 in.)
150 mm (6 in.)
200 mm (8 in.)
250 mm (10 in.)
300 mm (12 in.)

**Table 10DX4311C-B**  
**Flange Material AISI 304 SST (1.4301)**

Connection Size
15 mm (1/2 in.) (Teflon or Tefzel liners only)
25 mm (1 in.) (Teflon or Tefzel liners only)
40 mm (1-1/2 in.) (Teflon or Tefzel liners only)
50 mm (2 in.)
80 mm (3 in.)
100 mm (4 in.)
150 mm (6 in.)
200 mm (8 in.)
250 mm (10 in.)
300 mm (12 in.)

**Table 10DX4311C-C**  
**Protector Plate AISI 316 SST (1.4401)**

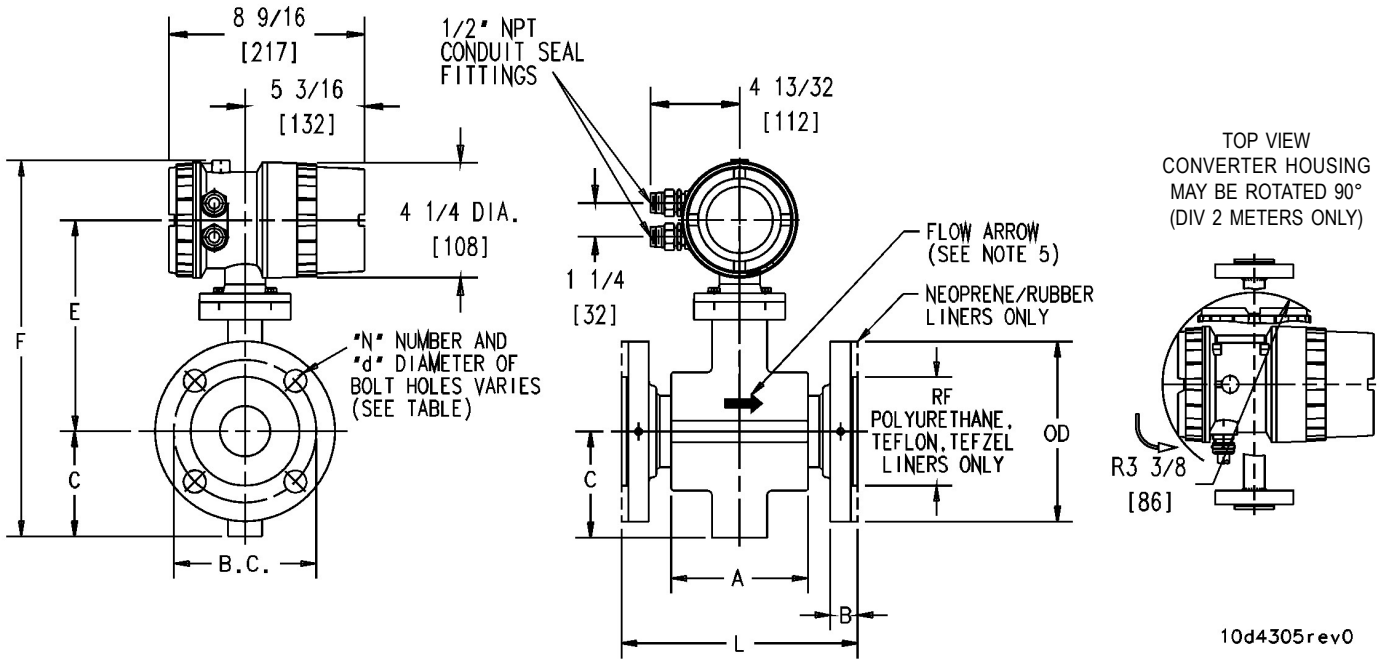
Connection Size
15 mm (1/2 in.) (Teflon or Tefzel liners only)
25 mm (1 in.) (Teflon or Tefzel liners only)
40 mm (1-1/2 in.) (Teflon or Tefzel liners only)
50 mm (2 in.)
80 mm (3 in.)
100 mm (4 in.)
150 mm (6 in.)
200 mm (8 in.)
250 mm (10 in.)
300 mm (12 in.)

**Protector Plate Hastelloy C**

Connection Size
15 mm (1/2 in.) (Teflon or Tefzel liners only)
25 mm (1 in.) (Teflon or Tefzel liners only)
40 mm (1-1/2 in.) (Teflon or Tefzel liners only)
50 mm (2 in.)
80 mm (3 in.)
100 mm (4 in.)
150 mm (6 in.)
200 mm (8 in.)
250 mm (10 in.)
300 mm (12 in.)

DIM	SIZE	1/2 [15]		1 [25]		1-1/2 [40]		2 [50]		3 [80]		4 [100]	
	FLANGE CLASS	150	300	150	300	150	300	150	300	150	300	150	300
MODEL NO.													
L	10DX4311CD	7-7/8 [200]	9 [229]	7-7/8 [200]	9 [229]	7-7/8 [200]	9 [229]	7-7/8 [200]	9 [229]	7-7/8 [200]	9 [229]	9-7/8 [250]	11 [280]
L	10DX4311CE	14 [356]		14 [356]		16 [406]		16 [406]		12 [305]		12 [305]	
L	10DX4311CF	N/A		N/A		N/A		N/A		N/A		N/A	
L	10DX4311CZ	SEE SALES ORDER INFORMATION FOR "L" DIMENSION											
LINER													
RF	POLY/TEFL/TEFZ	1-3/8 [35]		2 [51]		2-7/8 [73]		3-5/8 [92]		5 [127]		6-3/16 [157]	
B	POLY/NEO/RUBBER	N/A		N/A		N/A		15/16 [24]	1-1/16 [27]	1-1/8 [29]	1-5/16 [33]	1-1/8 [29]	1-7/16 [36]
	TEFLON	1/2 [13]	5/8 [16]	11/16 [17]	13/16 [21]	27/32 [21]	31/32 [25]	29/32 [23]	1-1/32 [26]	1-3/32 [27]	1-9/32 [32]	1-3/32 [27]	1-13/32 [35]
	TEFZEL			5/8 [16]	3/4 [19]	3/4 [19]	7/8 [22]	27/32 [21]	31/32 [25]	3/4 [19]	1-1/4 [32]	1-3/32 [27]	1-3/8 [35]
d		5/8 [16]		5/8 [16]	3/4 [19]	5/8 [16]	7/8 [22]	3/4 [19]		3/4 [19]	7/8 [22]	3/4 [19]	7/8 [22]
N		4		4		4		4		4		4	
BC		2-3/8 [60]	2-5/8 [67]	3-1/8 [79]	3-1/2 [89]	3-7/8 [98]	4-1/2 [114]	4-3/4 [121]	5 [127]	6 [152]	6-5/8 [168]	7-1/2 [191]	7-7/8 [200]
OD		3-1/2 [89]	3-3/4 [95]	4-1/4 [108]	4-7/8 [124]	5 [127]	6-1/8 [156]	6 [152]	6-1/2 [165]	7-1/2 [190]	8-1/4 [210]	9 [229]	10 [254]
A		2-15/16 [75]		3-7/16 [87]		3-15/16 [100]		4-9/16 [116]		3-15/16 [100]		5-1/8 [130]	
C		2-7/16 [62]		2-7/8 [73]		3-7/32 [82]		3-17/32 [90]		4-11/32 [110]		5-1/8 [130]	
E		6-17/32 [166]		6-31/32 [177]		7-5/16 [186]		7-21/32 [194]		8-7/16 [214]		9-7/32 [234]	
F		8-31/32 [228]		9-13/32 [239]		9-3/4 [248]		10-3/32 [256]		10-7/8 [276]		11-21/32 [296]	

OUTLINE DIMENSIONS inches (mm)									
DIM	SIZE	6 (150)		8 (200)		10 (250)		12 (300)	
	ANSI FLG CL	150	300	150	300	150	300	150	300
MODEL NO.									
L	10DX4311_D	11-13/16 (300)		13-25/32 (350)		17-23/32 (450)		19-11/16 (500)	
	10DX4311_E	17-23/32 (450)		19-11/16 (500)		21-21/32 (550)		24-13/32 (620)	
	10DX4311_F	NA		NA		NA		18 (457)	
LINER									
RF	NEOPRENE	NA	NA	NA	NA	NA	NA	NA	NA
RF	OTHERS	8-1/2 (216)		10-5/8 (270)		12-3/4 (324)		15 (381)	
B	POLY/NEOP	1-3/16 (30)	1-5/8 (41)	1-5/16 (33)	1-13/16 (46)	1-3/8 (35)	2-1/16 (52)	1-1/2 (38)	2-1/4 (57)
	TEFLON	1-1/8 (29)	1-9/16 (40)	1-9/32 (32)	1-25/32 (44)	1-3/8 (35)	2-1/16 (52)	1-1/2 (38)	2-1/4 (57)
	TEFZEL	1-1/8 (29)	1-9/16 (40)	1-1/4 (32)	1-3/4 (44)	1-5/16 (33)	2 (51)	1-25/64 (35)	2-9/64 (54)
d		7/8 (22)	7/8 (22)	7/8 (22)	1 (25)	1 (25)	1-1/8 (29)	1 (25)	1-1/8 (29)
N		8		12		12		16	
BC		9-1/2 (241)	10-5/8 (270)	11-3/4 (298)	13 (330)	14-1/4 (362)	15-1/4 (387)	17 (432)	17-3/4 (451)
OD		11 (279)	12-1/2 (318)	13-1/2 (343)	15 (381)	16 (406)	17-1/2 (445)	19 (483)	20-1/2 (521)
A		6-11/16 (170)		7-11/16 (195)		9-27/32 (250)		9-27/32 (250)	
C		5-25/32 (147)		7-1/16 (179)		8-5/32 (207)		9-27/32 (250)	
E		9-7/8 (251)		11-3/32 (282)		12-3/16 (310)		13-7/8 (353)	
	DIV 1 ONLY	10-5/8 (270)		11-27/32 (301)		12-15/16 (329)		14-5/8 (372)	
F		18-5/32 (461)		20-19/32 (523)		22-25/32 (579)		26-3/16 (665)	
	DIV 1 ONLY	18-29/32 (480)		21-11/32 (542)		23-17/32 (598)		26-15/16 (684)	
W		12-3/16 (310)		14-3/8 (365)		16-25/32 (426)		20-5/64 (510)	

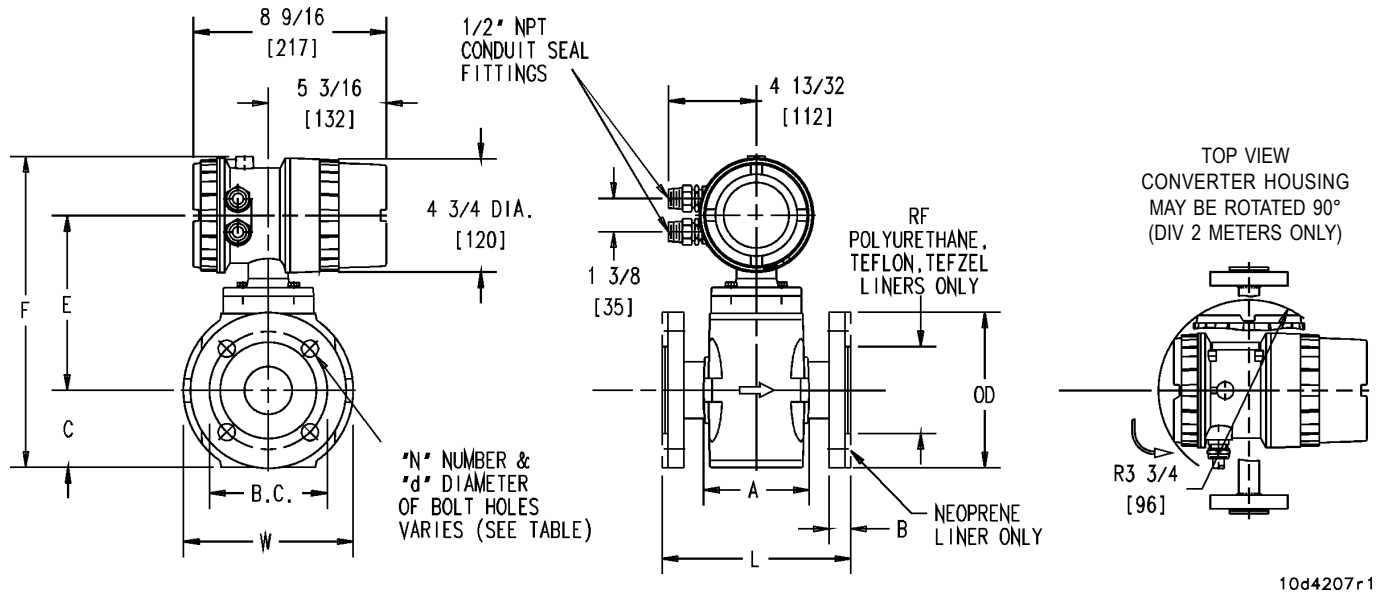


1/2" to 4" ANSI

Note:

- 1) All Dimensions are in inches. Dimensions in brackets [ ] are in millimeters (MM).
- 2) Dimensions are guaranteed only if this print is certified.
- 3) This drawing is third angle projection as shown.
- 4) Flange bolts straddle centerlines.
- 5) Flow must be in same direction as flow arrow.
- 6) Meter must be completely filled with liquid to insure accuracy.
- 7) All dimensions subject to manufacturing tolerances of +/- 1/8 [3].





6" - 12" ANSI

Note:

- 1) All Dimensions are in inches. Dimensions in brackets [ ] are in millimeters (MM).
- 2) Dimensions are guaranteed only if this print is certified.
- 3) This drawing is third angle projection as shown.
- 4) Flange bolts straddle centerlines.
- 5) Flow must be in same direction as flow arrow.
- 6) Meter must be completely filled with liquid to insure accuracy.
- 7) All dimensions subject to manufacturing tolerances of +/- 1/8 [3].

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Notes

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ABB has Sales & Customer Support  
expertise in over 100 countries worldwide

[www.abb.com/instrumentation](http://www.abb.com/instrumentation)

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D-FMP-10DX4311\_7 (US)