

# Electro-Magnetic Flowmeters

## Electromagnetic Sensor

### MagMaster™ Plus MFF

- **Unrivalled, fully traceable flow performance**
  - 0.15% accuracy
- **Operable flow range: 1500:1**
  - ensures more precise revenue measurement
  - superior control of process
  - accurate night-flow measurement
- **Bi-directional system**
- **Pulsed DC technology incorporates benefits of AC systems.**
- **Submersible and buriable**
  - inherently suitable for use in flooded environments
  - eliminates meter vaults and promotes very low installation costs
- **Designed, manufactured and calibrated to internationally accepted standards**
  - ISO 9001/UKAS(NAMAS)/NIST/NATA
  - ensures reliable, maintenance-free operation
- **2-year warranty as standard**
- **Built-in grounding electrode**
  - eliminates requirement for grounding rings
- **8 to 84 inch (200 to 2200 mm) meter sizes. Larger upon request**
- **CalMaster enabled product**
- **NSF approved liner material available**



MagMaster Plus MFF  
Electromagnetic Sensor

## Setting the Standard

MagMaster™ Plus sets new standards for accuracy, reliability and low cost of ownership. This enhanced range, available in sizes 8 in (200 mm) to 84 in (2200 mm), is designed specifically for use on many diverse applications. The MagMaster utilizes pulsed DC technology coupled with the benefits of AC design.

## Unrivalled Flow Performance

MagMaster Plus sets the standard for flow measurement performance. The combination of sensors with ultra-linear magnetics, new technology transmitters and a next generation sensor drive and signal processing system, results in unrivalled flow performance. High accuracy and an operable flow range of 1500 : 1 enables reliable and accurate measurement over the widely varying flow rates which occur in a typical distribution system. Particularly important is that previously unregistered minimal night flow rates can now be accurately metered. In addition, the absence of moving, wearing components and MagMaster's unique design ensure that the calibration remains stable in the long term.

## Submersible and Buriable

All MagMaster sensors have a rugged, robust construction to ensure a long, maintenance-free life. The sensors are, as standard, inherently submersible (IP68, NEMA 6P), thus making them suitable for installation in vaults and metering pits which are liable to become flooded.

A unique feature of MagMaster sensors is that they are buriable. Installation merely involves excavating to the underground pipe, fitting the sensor, cabling back to the converter and then backfilling the hole. No metering vaults or pits are required, and the overall low cost installation is simple and fast.

## Assured Quality

MagMaster Plus is designed and manufactured in accordance with international quality procedures (ISO 9001) and all flowmeters are calibrated on nationally traceable calibration rigs to provide the end user with complete assurance of both quality and performance of the meter. An indication of the quality is the two year warranty which is offered as standard on the MagMaster Plus.

*MagMaster™ is a trademark of ABB Inc.*



**MagMaster Flowmeters**

## GENERAL SPECIFICATION

### Capacity Table

Size		Flow Range (US g/min)	
in.	mm.	Minimum	Maximum
8	200	3.73	4,974
10	250	5.83	7,771
12	300	8.39	11,190
14	350	11.4	15,230
16	400	14.9	19,890
18	450	18.8	25,180
20	500	23.3	31,090
24	600	33.5	44,760
28	700	45.6	60,920
30	750	52.4	69,930
32	800	59.6	79,560
36	900	75.5	100,700
40	1000	93	124,300
42	1050	112	150,400
48	1200	134	179,000
54	1400	182	243,700
58	1500	208	279,700
66	1600	238	318,300
72	1800	302	402,800

Maximum based on 33ft<sup>-1</sup>, but instrument capability in excess of 50ft<sup>-1</sup>

### Environmental Protection (when installed):

Rating:

Sensor with Integral Converter:  
NEMA 4X/IP65

Sensor with Remote Mounted Converter:  
IP68/NEMA 6P (to 33ft (10m) depth) with potted terminal box. (All remote mounted sensors are supplied with potting compound for sealing on site or can be ordered with cable potted and connected to sensor.)

Buriable: 3ft (1m) to 16ft (5m) depth (to top of sensor).

**Accuracy:** For system accuracy information, see specification sheet of appropriate signal converter.

### Materials

Item	Material
Lining	Teflon Unbonded (PTFE), Teflon Bonded (FEP), Elastomer (chlorobutyl rubber), Polyurethane, Neoprene, or NSF 61 approved Elastomer
Electrodes	Stainless Steel 316, Hastelloy 'C', Titanium, Tantalum, or Platinum/Iridium (slurry calibration available for first three)
Flanges	Carbon Steel
Grounding Rings	Stainless Steel 316, 12 inches or less Stainless Steel 304 > 12 inches
Housing	ABS Plastic: up to 24 inches Fabricated Steel (no gaps and painted): 26 to 84 inches
Tube	Lined Stainless Steel 304

### Pressure Limitations:

≤ 1800mm (72"): as flange rating.

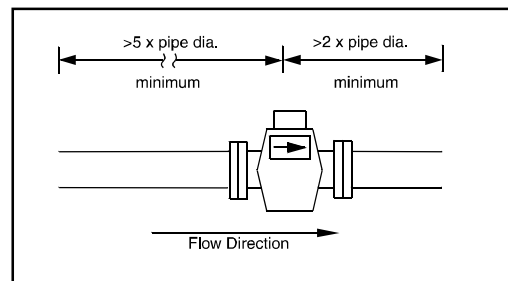
Unbonded PTFE: > 0.5 psi

(Do not use Unbonded PTFE if there is a chance of a vacuum occurring in the pipeline.)

### Recommended Mating Pipe Conditions:

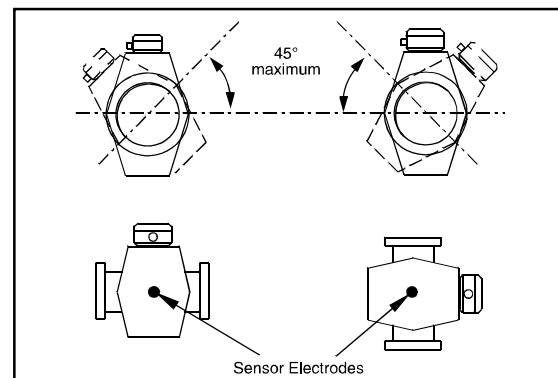
Upstream: 5 to 10 diameters straight pipe depending on performance requirements and upstream disturbance.

Downstream: 2 to 3 diameters straight pipe depending on performance requirements and downstream disturbances.



### Mounting:

Directly into pipeline at any orientation. Electrodes cannot be in vertical plane. Flow must be up if installed in a vertical pipe.

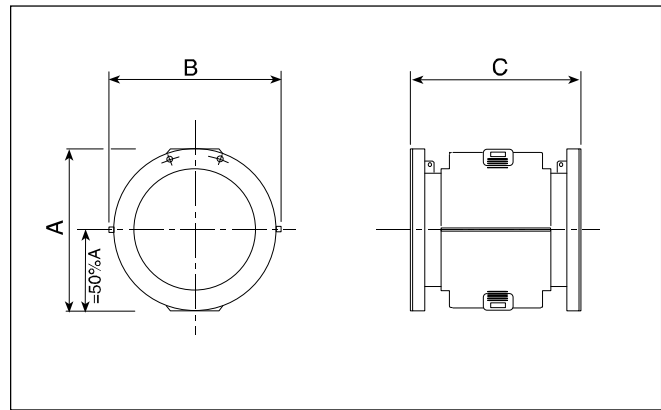


**Transmitter/Sensor Separation:** < 330ft (100m)

## SENSOR DIMENSIONS (nominal)

### 200 to 600 mm (8 to 24in) ANSI Class 150 Flanges

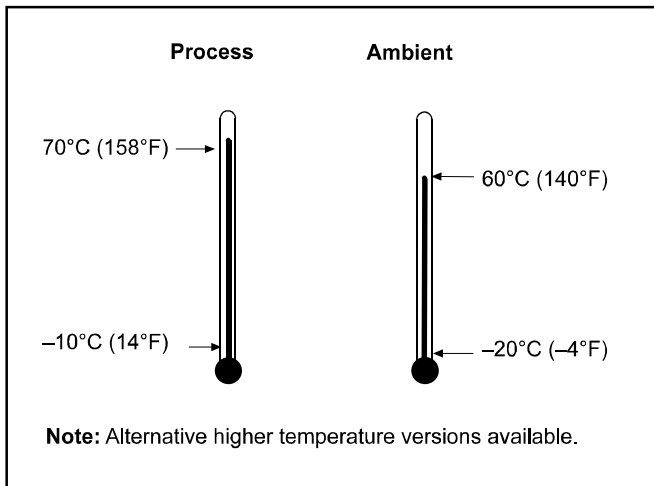
Meter Size in. (mm)	Dimensions in. (mm)			Approx. Weight	
	A	B	C (with liners)	kg	lb
8 (200)	15.6 (396)	15.8 (402)	13.8 (13.8)	37	81
10 (250)	16.9 (430)	17.3 (440)	17.7 (450)	60	132
12 (300)	18.1 (461)	18.9 (480)	19.7 (500)	70	154
14 (350)	20.2 (513)	20.5 (520)	21.7 (550)	100	220
16 (400)	22.4 (570)	22.7 (576)	23.6 (600)	115	253
18 (450)	24.9 (632)	24.7 (627)	27.5 (698)	160	352
20 (500)	27.0 (686)	26.7 (679)	30.2 (768)	217	455
24 (600)	30.4 (772)	30.3 (770)	36.1 (918)	315	693



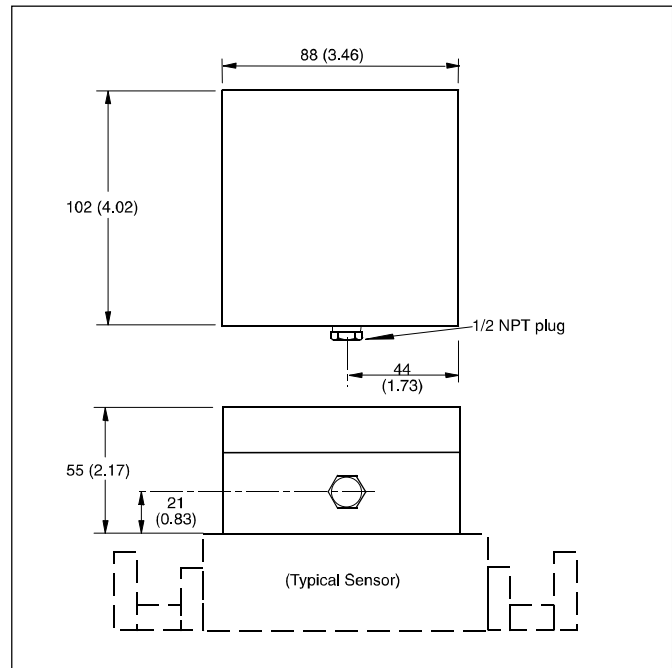
### End Mating Connections:

ANSI Class 150 ( $\leq 24$  inch)  
 ANSI Class 300 ( $\leq 24$  inch)  
 AWWA Class B  
 AWWA Class D

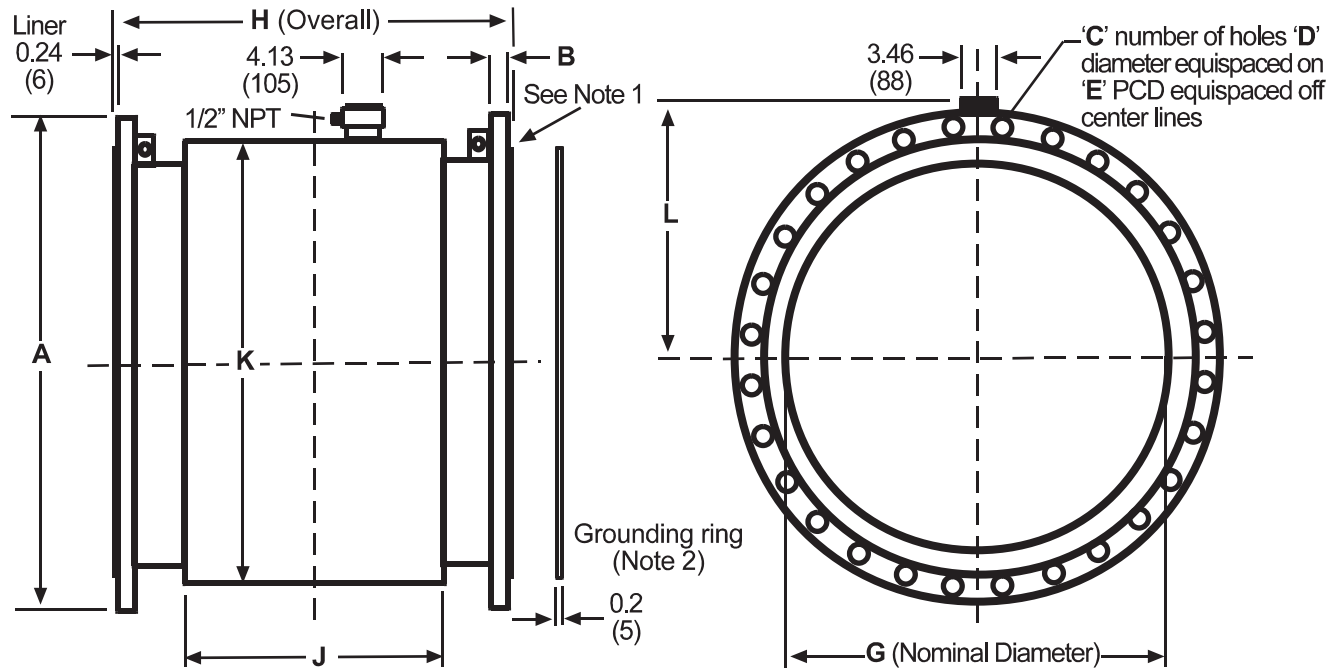
### Temperature Ranges:



### TERMINAL BOX DIMENSIONS (Mounted on Sensor)



### SENSOR DIMENSIONS (nominal)



Notes : 1. Elastomer & Neoprene liners are full face diameter. 2. Add grounding ring to overall length (including gaskets).

Flange Data - Inches (mm)						
Sensor (Nom.)	Flange Type	A	B	C (No. Holes)	D	E (Bolt Circle)
28 (700)	AWWA Class B	36.5 (927)	0.89 (22.5)	28	1.38 (35)	34.0 (863.5)
28 (700)	AWWA Class D	36.5 (927)	1.32 (33.5)	28	1.38 (35)	34.0 (863.5)
30 (750)	AWWA Class B	38.7 (984)	0.89 (22.5)	28	1.38 (35)	36.0 (914.5)
30 (750)	AWWA Class D	38.7 (984)	1.32 (33.5)	28	1.38 (35)	36.0 (914.5)
32 (800)	AWWA Class B	41.7 (1060.5)	0.94 (24)	28	1.61 (41)	38.5 (978)
32 (800)	AWWA Class D	41.7 (1060.5)	1.50 (38)	28	1.61 (41)	38.5 (978)
36 (900)	AWWA Class B	46.0 (1168.5)	1.00 (25.5)	32	1.61 (41)	42.0 (1066)
36 (900)	AWWA Class D	46.0 (1168.5)	1.63 (41.5)	32	1.61 (41)	42.0 (1066)
40 (1000)	AWWA Class B	50.7 (1289)	1.00 (25.5)	36	1.61 (41)	47.2 (1200)
40 (1000)	AWWA Class D	50.7 (1289)	1.63 (41.5)	36	1.61 (41)	47.2 (1200)
42 (1050)	AWWA Class B	53 (1346)	1.14 (29)	36	1.61 (41)	49.5 (1257)
42 (1050)	AWWA Class D	53 (1346)	1.75 (44.5)	36	1.61 (41)	49.5 (1257)
48 (1200)	AWWA Class B	59.5 (1511)	1.26 (32)	44	1.61 (41)	56.0 (1422.5)
48 (1200)	AWWA Class D	59.9 (1511)	1.77 (45)	44	1.61 (41)	56.0 (1422.5)
54 (1400)	AWWA Class B	66.3 (1683)	1.38 (35)	44	1.89 (48)	62.4 (1584)
54 (1400)	AWWA Class D	66.3 (1683)	2.13 (54)	44	1.89 (48)	62.4 (1584)
60 (1500)	AWWA Class B	73.0 (1854)	1.38 (35)	52	1.89 (48)	69.3 (1759)
60 (1500)	AWWA Class D	73.0 (1854)	2.24 (57)	52	1.89 (48)	69.3 (1759)
66 (1600)	AWWA Class B	80.0 (2032)	1.65 (42)	52	1.89 (48)	72.0 (1830.5)
66 (1600)	AWWA Class D	80.0 (2032)	2.50 (63.5)	52	1.89 (48)	72.0 (1830.5)
> 72 (1800)	AWWA Class B	Will Advise				
> 72 (1800)	AWWA Class D	Will Advise				

Dimensions - Inches (mm)			
G (Nominal)	H (Overall)	J	K
28 (700)	27.6 (700)	18.5 (470)	31.6 (803)
30 (750)	30.0 (762)	19.3 (490)	34.0 (864)
32 (800)	31.5 (800)	19.9 (507)	35.6 (905)
36 (900)	35.4 (900)	23.0 (584)	40.4 (1026)
40 (1000)	39.4 (1000)	26.0 (662)	44.4 (1128)
42 (1050)	42.0 (1067)	29.1 (740)	46.4 (1179)
48 (1200)	47.2 (1200)	33.1 (840)	52.4 (1332)
54 (1400)	55.1 (1400)	40.6 (1030)	60.3 (1532)
60 (1500)	60.0 (1524)	44.1 (1120)	64.3 (1634)
66 (1600)	63.0 (1600)	45.4 (1154)	68.3 (1736)
> 72 (1800)	83.9 (2130)	Will Advise	

Approx. Weight	
Size	lb (kg)
28 (700)	945 (430)
30 (750)	945 (430)
32 (800)	945 (430)
36 (900)	1190 (540)
40 (1000)	1585 (720)
42 (1050)	1930 (880)
48 (1200)	2160 (1000)
54 (1400)	3190 (1450)
60 (1500)	3000 (1370)
66 (1600)	4400 (2000)
72 (1800)	5280 (2400)

Note: See previous page for Terminal Box dimensions.

Options (specify as separate item on order)  
 Cable Sensor/Transmitter (List number of feet)  
 Standard STT3350 (for cable pricing see 10D9000)  
 Submersible-Waterproof STT3500 (for cable pricing see 10D9000)

Standard Product=

<b>Magmaster Plus MFF Remote/Integral 8" to 84"</b>	<b>Code</b>
	<b>MFF</b>
<b>1 : Calibrated Bore Size'</b>	
8 in. (200mm)	201
10 in. (250mm)	251
12 in. (300mm)	301
14 in. (350mm)	351
16 in. (400mm)	401
18 in. (450mm)	451
20 in. (500mm)	501
24 in. (600mm)	601
28 in. (700mm)	701
30 in. (750mm)	761
32 in. (800mm)	801
36 in. (900mm)	901
40 in. (1000mm)	102
42 in. (1050mm)	112
48 in. (1200mm)	122
54 in. (1400mm)	142
60 in. (1500mm)	152
66 in. (1600mm)	162
72 in. (1800mm)	182
80 in. (2000mm)	202
84 in. (2200mm)	222
<b>2 : End Connections</b>	
ANSI B 16.5 Class 150, fully rated carbon steel (8 to 24 in. only)	(Note: 1) 3
Flanged ANSI Class 300 compatible, Fully rated, (8 to 24 in. only)	(Note: 1) K
AWWA Class D, fully rated, 28 inch and larger, carbon steel	(Note: 2) V
<b>3 : Lining Materials</b>	
Teflon Bonded FEP ( 8 inches)	(Note: 3) 3
Teflon Bonded FEP ( 10 inches)	(Note: 4) 3
Teflon Bonded FEP ( 12 inches)	(Note: 5) 3
Teflon Bonded FEP ( 14 inches)	(Note: 6) 3
Teflon Bonded FEP ( 16 inches)	(Note: 7) 3
Elastomer (chlorobutyl rubber) (Note A )	4
Polyurethane (8 to 24 in. only)	(Note: 1) 6
Polyurethane (greater than 24 in.)	(Note: 2) 6
Neoprene	8
Teflon Unbonded PTFE ( 8 inches)	(Note: 3) A
Teflon Unbonded PTFE ( 10 inches)	(Note: 4) A
Teflon Unbonded PTFE ( 12 inches)	(Note: 5) A
Teflon Unbonded PTFE ( 14 inches)	(Note: 6) A
Teflon Unbonded PTFE ( 16 inches)	(Note: 7) A
Elastomer NSF61 approved	E
<b>4 : Electrodes</b>	
316 Stainless Steel (Standard)	1
Hastelloy 'C'	2
Titanium	3
Tantalum	4
Platinum / Iridium	5
Tungsten, Carbide Coated (Slurry only)	6
Treated Titanium, Slurry Calibration	8
316 Stainless Steel, Slurry Calibration	A
Hastelloy 'C', Slurry Calibration	B

<b>MFF</b>	<b>Code</b>
<b>5 : Sensor Construction</b>	
General Purpose (non-FM/CSA Approved) (Note B)	<b>1</b>
<b>6 : Options</b>	
None	<b>0</b>
8 in. Grounding Ring (one piece) (Note: 3)	<b>1</b>
10 in. Grounding Ring (one piece) (Note: 4)	<b>1</b>
12 in. Grounding Ring (one piece) (Note: 5)	<b>1</b>
14 in. Grounding Ring (one piece) (Note: 6)	<b>1</b>
16 in. Grounding Ring (one piece) (Note: 7)	<b>1</b>
18 in. Grounding Ring (one piece) (Note: 8)	<b>1</b>
20 in. Grounding Ring (one piece) (Note: 9)	<b>1</b>
24 in. Grounding Ring (one piece) (Note: 10)	<b>1</b>
?24 in. Grounding Ring (one piece) (Note: 2)	<b>1</b>
8 in. Grounding Ring (two piece) (Note: 3)	<b>8</b>
10 in. Grounding Ring (two piece) (Note: 4)	<b>8</b>
12 in. Grounding Ring (two piece) (Note: 5)	<b>8</b>
14 in. Grounding Ring (two piece) (Note: 6)	<b>8</b>
16 in. Grounding Ring (two piece) (Note: 7)	<b>8</b>
18 in. Grounding Ring (two piece) (Note: 8)	<b>8</b>
20 in. Grounding Ring (two piece) (Note: 9)	<b>8</b>
24 in. Grounding Ring (two piece) (Note: 10)	<b>8</b>
?24 in. Grounding Ring (two piece) (Note: 2)	<b>8</b>
<b>7 : Calibration</b>	
Standard 3-point, no pressure test	<b>A</b>
8-point, no pressure test	<b>B</b>
Special, consult Warminster Factory	<b>9</b>
CalMaster 1 Fingerprint w/std 3-point calibration & no pressure test	<b>I</b>
<b>8 : Unused</b>	
Unused	<b>00</b>
<b>9 : Glanding</b>	
Conduit entry: 0.5 in. NPT - order cable and length per OPTIONS	<b>4</b>
Conduit entry: 0.5 in. NPT - cable fitted and potted - order cable and length per OPTIONS (Note: 11)	<b>8</b>
<b>10 : Transmitter Type</b>	
Sensor built for integral mounted MagMaster Converter (? 16 in. only) (Note: 12)	<b>EH</b>
Sensor built for Remote MagMaster converter	<b>ER</b>
Instruction Manual (One copy supplied with order at no charge) IM/MAGMAS	

Note 1: Not available with Calibrated Bore Size' code 701, 761, 801, 901, 102, 112, 122, 142, 152, 162,

Note 2: Not available with Calibrated Bore Size' code 201, 251, 301, 351, 401, 451, 501, 601

Note 3: Not available with Calibrated Bore Size' code 251, 301, 351, 401, 451, 501, 601, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 4: Not available with Calibrated Bore Size' code 201, 301, 351, 401, 451, 501, 601, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 5: Not available with Calibrated Bore Size' code 201, 251, 351, 401, 451, 501, 601, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 6: Not available with Calibrated Bore Size' code 201, 251, 301, 401, 451, 501, 601, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 7: Not available with Calibrated Bore Size' code 201, 251, 301, 351, 451, 501, 601, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 8: Not available with Calibrated Bore Size' code 201, 251, 301, 351, 401, 501, 601, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 9: Not available with Calibrated Bore Size' code 201, 251, 301, 351, 401, 451, 601, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 10: Not available with Calibrated Bore Size' code 201, 251, 301, 351, 401, 451, 501, 701, 761, 801, 901, 102, 112, 122, 142, 152, 162, 182, 202, 222

Note 11: Not available with Lining Materials code A

Note 12: Not available with Calibrated Bore Size' code 451, 501, 601, 701, 761, 801, 901, 102, 112,

Note A: Suitable for potable water (Approved FDA Material) (UK WFBS, United Kingdom Water Fittings Bylaws Scheme)

Note B: All meters in this series are General Purpose. No hazardous area approvals available.

Notes

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

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The Company's policy is one of continuous product  
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