Data Sheet
D-FMP-MagMaster-MFF_1

Field^{IT}
Electro-Magnetic Flowmeters
Electromagnetic Sensor
MagMaster™ Plus MFF

- **Unrivalled, fully traceable flow performance**
  - 0.15% accuracy
- **Operable flow range: 1500:1**
  - insures 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/NAMAS/NIST/NATA
  - insures 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.**

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 the 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. An unrivalled 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, ensures that the calibration remains stable in the long term.

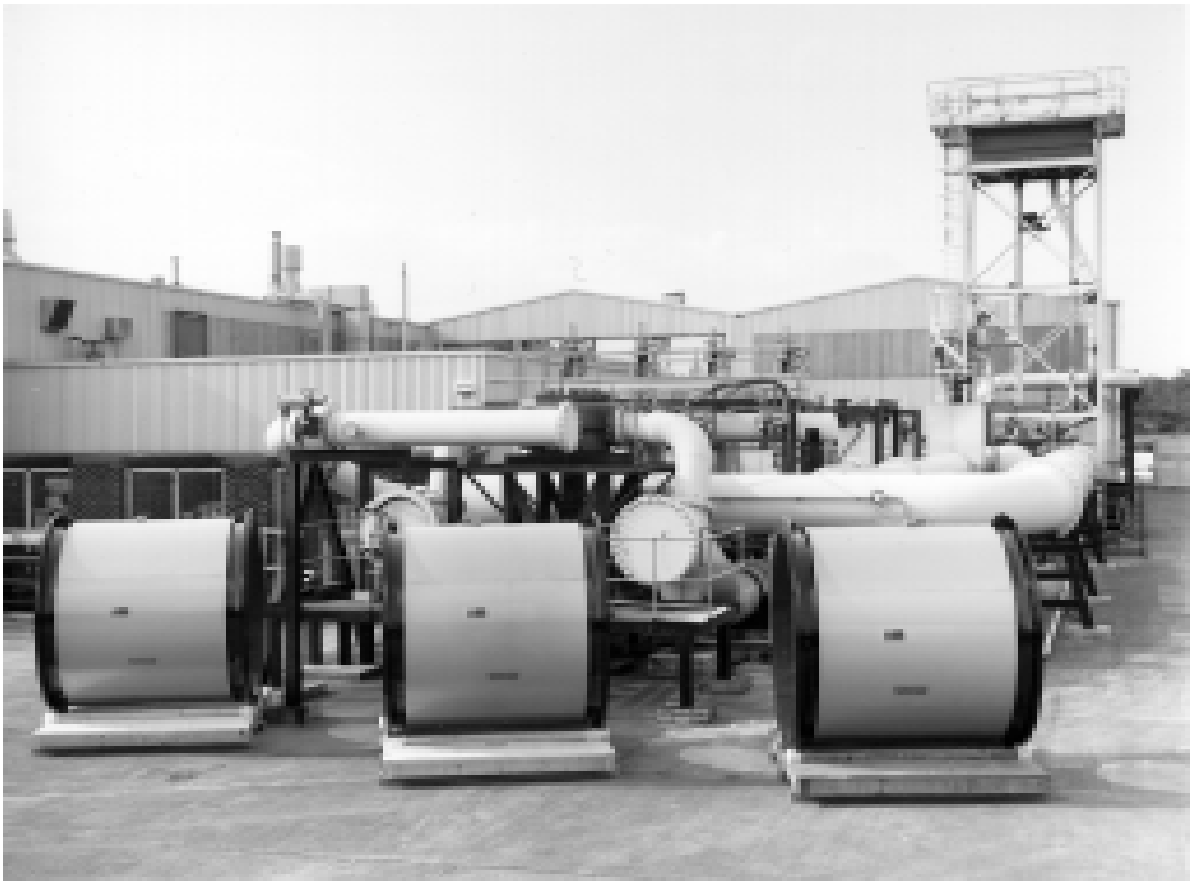
Submersible and Buriable

All MagMaster sensors have a rugged, robust construction to insure a long, maintenance-free life. The sensors are, as standard, inherently submersible (IP68, NEMA 6P), thus insuring suitability 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 transmitter, 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 calibrations 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 Flowmeters

GENERAL SPECIFICATION

Sizes:

Size		Flow Range (US g/min)		Standard Calibrated Range
mm	In	Minimum	Maximum	
200	8	3.73	4974	1500
250	10	5.83	7771	2000
300	12	8.39	11190	3000
350	14	11.4	15230	4000
400	16	14.9	19890	5000
450	18	18.8	25180	6000
500	20	23.3	31090	7500
600	24	33.5	44760	10000
700	28	45.6	60920	
750	30	52.4	69930	
800	32	59.6	79560	
900	36	75.5	100700	
1000	40	93	124300	
1050	42	112	150400	
1200	48	134	179000	
1400	54	182	243700	
1500	58	208	279700	
1600	66	238	318300	
1800	72	302	402800	

Maximum based on $33fts^{-1}$, but instrument capability in excess of $50fts^{-1}$.

Environmental Protection (when installed):
Rating:
Sensor with Integral Transmitter:
NEMA 4X/IP65
Sensor with Remote Mounted Transmitter:
IP68/NEMA 6P (to 10m (33ft) 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: 1m (3ft) to 5m (16ft) depth (to top of sensor).

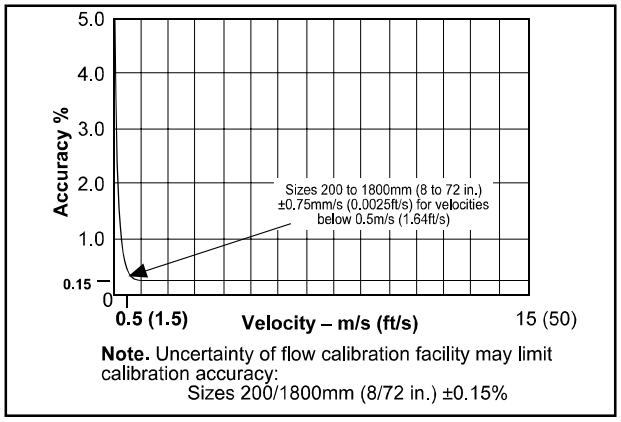
Accuracy (under forward flow reference conditions)
with MagMaster transmitter.

Flanged sensors:
Display, Serial comms, Frequency output:
±0.15% of reading or ±0.0025 ft/sec (0.00075m/s) (whichever is greater) up to a maximum velocity of >49 ft/sec (15m/s). See Figure below.

Analog output:
As Frequency output plus ±0.008mA.

Pressure effect:
Less than 0.15% over the operating range of the instrument.

Temperature effect:
Sensor: <±0.03% of rate per 10°C.



Note. Uncertainty of flow calibration facility may limit calibration accuracy:
Sizes 200/1800mm (8/72 in.) ±0.15%

Power consumption: < 20VA with transmitter.

Conductivity: ≥ 5µS/cm.

Materials:

Item	*Material*
Lining	Teflon (PTFE), Elastomer (chlorobutyl rubber), Neoprene, or Polyurethane
Electrodes	Stainless Steel 316, Hastelloy 'C', Titanium, Tantalum, or Zirconium (slurry calibration for first three)
Flanges	Carbon steel
Grounding Rings	Stainless Steel 316 < or = 12 inches 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

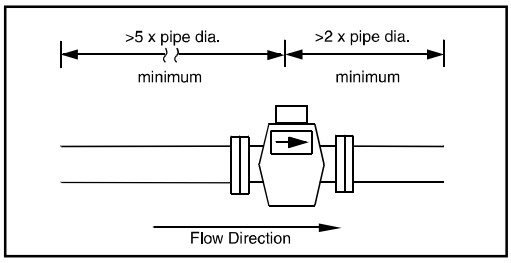
Electrodes:
Non-removable, 316 S.S, Hastelloy C, Titanium, Tantalum and Platinum/Iridium. Treated titanium for pulp and paper applications where concentrations of stock are greater than 5% or liquid contains long fibers regardless of the concentration. Tungsten carbide coated electrodes for high abrasion mining, cement or flyash applications.

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 occuring in the pipeline.)

Recommended Mating Pipe Conditions:

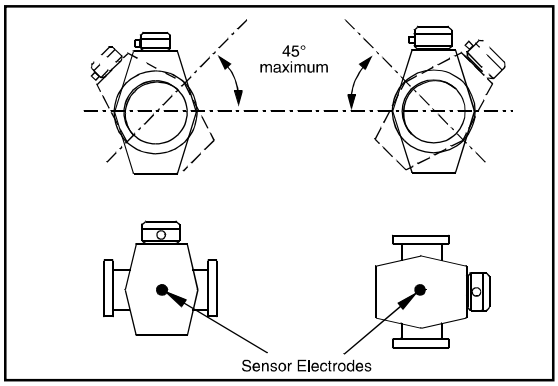
Upstream: 5 to 10 diameters straight pipe depending on performance requirements and upstream disturbance.

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



Mounting:

Directly into pipeline at any attitude. Electrodes can not be in vertical plane. Flow must be up if installed in a vertical pipe.

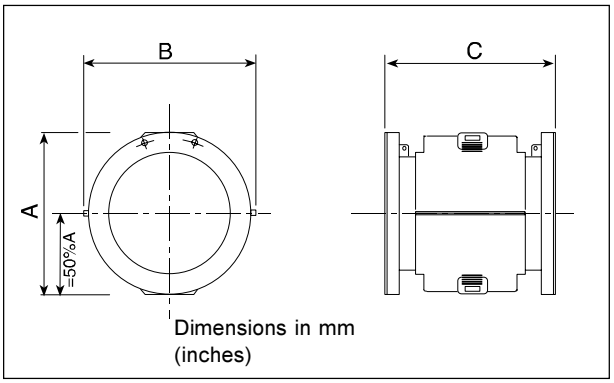


Transmitter/Sensor Separation: < 328ft (100m)

SENSOR DIMENSIONS (nominal)

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

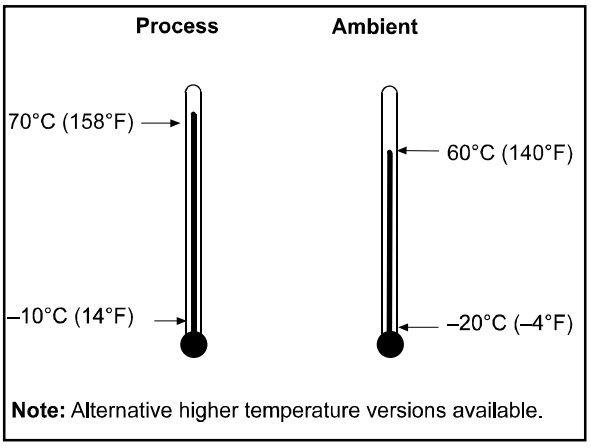
Meter Size mm (in)	*Dimensions mm (in)*			*Approx. Weight*	
	A	*B*	*C (with liners)*	*kg*	*lb*
200 (8)	396 (15.6)	402 (15.8)	350 (13.8)	37	81
250 (10)	430 (16.9)	440 (17.3)	450 (17.7)	60	132
300 (12)	461 (18.1)	480 (18.9)	500 (19.7)	70	154
350 (14)	513 (20.2)	520 (20.5)	550 (21.7)	100	220
400 (16)	570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



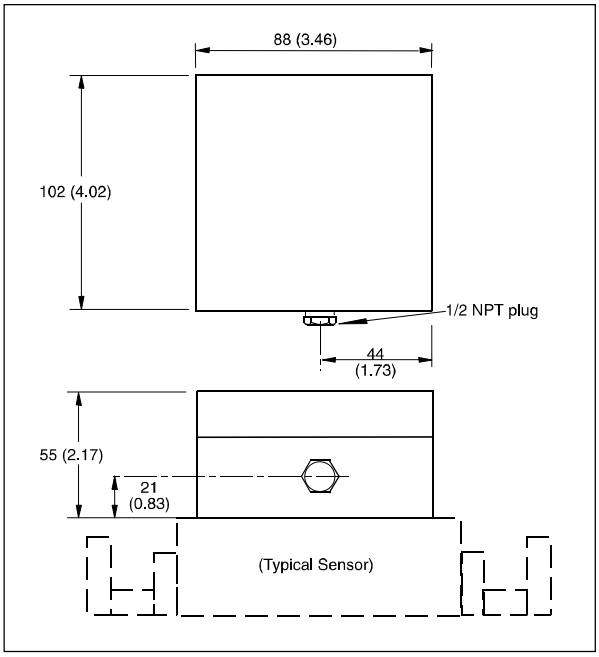
End Mating Connections:

ANSI Class 150 (≤ 24 inch)
ANSI Class 300 (≤ 24 inch)
AWWA Class B
AWWA Class D

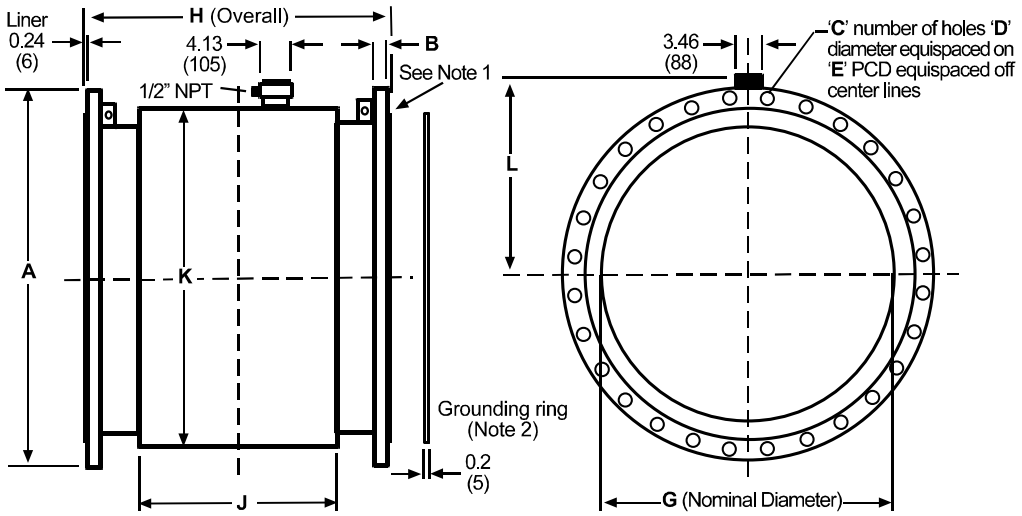
Temperature Ranges:



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	L
28 (700)	27.6 (700)	18.5 (470)	31.6 (803)	20.2 (512)
30 (750)	30.0 (762)	19.3 (490)	34.0 (864)	21.3 (542)
32 (800)	31.5 (800)	19.9 (507)	35.6 (905)	22.2 (563)
36 (900)	35.4 (900)	23.0 (584)	40.4 (1026)	24.6 (624)
40 (1000)	39.4 (1000)	26.0 (662)	44.4 (1128)	26.5 (674)
42 (1050)	42.0 (1067)	29.1 (740)	46.4 (1179)	27.6 (700)
48 (1200)	47.2 (1200)	33.1 (840)	52.4 (1332)	30.5 (776)
54 (1400)	55.1 (1400)	40.6 (1030)	60.3 (1532)	34.5 (876)
60 (1500)	60.0 (1524)	44.1 (1120)	64.3 (1634)	36.5 (926)
66 (1600)	63.0 (1600)	45.4 (1154)	68.3 (1736)	38.6 (980)
> 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.

Model Number Designation

M F __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

03 04 05 06 07 08 09 10 11 12 13 14 15 16 17

Calibrated Bore Size

8 in (200mm)	F201
10 in (250mm)	F251
12 in (300mm)	F301
14 in (350mm)	F351
16 in (400mm)	F401
18 in (450mm)	F451
20 in (500mm)	F501
24 in (600mm)	F601
28 in (700mm)	F701
30 in (750mm)	F761
32 in (800mm)	F801
36 in (900mm)	F901
40 in (1000mm)	F102
42 in (1050mm)	F112
48 in (1200mm)	F122
54 in (1400mm)	F142
60 in (1500mm)	F152
66 in (1600mm)	F162
72 in (1800mm)	F182
80 in (2000mm)	F202
84 in (2200mm)	F222

End Connections

ANSI B 16.5 Class 150, fully rated carbon steel (8 to 72 in. only)	3
Flanged ANSI Class 300 compatible, Fully rated, 8 to 24 inch.	K
AWWA Class B, fully rated, 28 inch and larger, carbon steel (86 psi)	U
AWWA Class D, fully rated, 28 inch and larger, carbon steel (175 psi for ≤ 12 in., 150 psi for > 12 in.)	V

Lining Materials

Elastomer (chlorobutyl rubber) (Note 1)	4
Polyurethane (8 to 48” only)	6
Neoprene	8
Unbonded PTFE (8 to 16 in. only)	A

Bore Size	Unbonded Teflon (PTFE)
8”	1,200
10”	1,200
12”	1,200
14”	2,000
16”	2,000

Electrodes

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

Sensor Construction

General Purpose - Non-FM/CSA approved (Note 2)	1

Options

None	0
Grounding Ring (1)	1
Grounding Ring (2)	8

MF __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

03 04 05 06 07 08 09 10 11 12 13 14 15 16 17

Calibration
- Standard 3-point, with pressure test 1
- 8-point, with pressure test 2
- Special, consult Warminster 9
- CalMaster Fingerprint with 3-point calibration & pressure test ..... J

Unused 00

Glanding
- Conduit entry: 0.5” NPT - order cable and length per OPTIONS 4
- Conduit entry: 0.5” NPT - cable fitted and potted - order cable and length per OPTIONS 8

Transmitter Type
- Sensor built for integral mounted MagMaster transmitter (≤ 16” only) ..... EH
- Sensor built for Remote MagMaster transmitter ..... ER

Instruction Manual *(One copy supplied with order at no charge)* ..... IM/MAGMAS

OPTIONS (specify as separate item on order)

Cable, sensor/transmitter (list number of feet)
- Standard. Can be used with FM/CSA approved instruments. STT3350
- Submersible-Waterproof. Cannot be used with FM/CSA approved instruments. STT3500

Notes:

1. Suitable for potable water (Approved FDA Material) (UK WFBS, United Kingdom Water Fittings Bylaws Scheme)

2. All meters in this series are General Purpose. No hazardous area approval available.

CF = Consult Factory

Notes

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

www.abb.com

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

Printed in USA (05.12.03)

ABB Inc.
125 East County Line Road
Warminster
PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Ltd
Howard Road, St. Neots
Cambridgeshire
PE19 8EU
UK
Tel: +44 (0)1480 475321
Fax: +44 (0)1480 217948

ABB Automation Products GmbH
Dransfelder Str. 2.
37079 Goettingen
Germany
Tel: +49 551 905-0
Fax: +49 551 905-777

D-FMP-MagMaster-MFF_1