

*Specification DataFile***■ Industry Specific design for the water and waste water industries**

- diameters from 15mm to 2200mm  
(1/2 to 88 in.)

**■ Unrivalled, fully traceable flow performance. Bi-directional system. Operable flow range: 1500:1**

Ensures:

- more precise revenue measurement;
- superior control of process;
- accurate night-flow measurement

**■ Submersible and buriable**

- inherently suitable for use in flooded environments;
- eliminates chambers and promotes very low installation costs

**■ Designed, manufactured and calibrated to internationally accepted standards**

- ISO 9001/NAMAS/NIST/NATA ; CENELEC FM; CSA;
- ensures reliable, maintenance-free operation
- 2 year warranty as standard

**■ In-built earthing (grounding) electrode**

- eliminates requirement for earthing (grounding) flanges

**■ Three internal totalizers: forward, reverse, net; forward and reverse flowrates and comprehensive range of outputs : current, pulse, data, HART®**

- single package satisfying all user display requirements;
- ensures compatibility with user's control system requirements.



*MagMaster – bringing unsurpassed flowmetering performance to the Water and Waste Water industries*

MagMaster Water Waste sets new standards for accuracy, reliability and low cost of ownership. This enhanced range, available in sizes 15 to 2200mm (1/2 to 88in.), is designed specifically for use on the many diverse applications encountered in the water and waste water industry.

The specification, features and user benefits offered by this range are based on ABB worldwide experience in this industry and they are all specifically targeted to the industry's requirements.

### Unrivalled Flow Performance

MagMaster 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. 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, MagMaster's unique design and the absence of moving, wearing components, ensures that the calibration remains stable in the long term.

All MagMaster sensors have a rugged, robust construction to ensure a long, maintenance-free life under the arduous conditions experienced in the water and waste industry. The sensors are, as standard, inherently submersible (IP68, NEMA 6P), thus ensuring suitability for installation in chambers and metering pits which are liable to become flooded.

A unique feature of MagMaster sensors is that sizes up to 1600mm (66 in.) 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 chambers or pits are required and the overall low cost installation is simple and fast.

### Comprehensive Features

A wide range of features and user benefits are built into MagMaster as standard:

- bi-directional flow
- integral earthing/grounding electrodes
- liquid sensing
- comprehensive test mode
- universal switch mode power supply (options are available for a.c. and d.c. supplies)
- self-diagnostics
- programmable multiple alarm capability

All of these features ensure that MagMaster fully satisfies the users' requirements.



## Assured Quality

MagMaster 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 in-built quality is the two year warranty which is offered as standard on the MagMaster Water Waste range.



## Fully Featured Transmitters

MagMaster is available with integral or remote transmitters, each being available with a choice of display, configuration and communication options to suit the application. Standard features include forward, reverse and net flow totalizers, flow rate, alarm monitoring and automatic self diagnostics to ensure integrity. All data and values are in customer-defined units of measurement. System compatibility is assured with a choice of current, pulse, serial data and Smart HART® communications.

MagMaster operating parameters may be set via local keypads, remote configurators or computers as appropriate. The software features multi-level password protection capability to prevent inadvertent programs or settings changes. Data is stored in non-volatile memory for 10 year retention.

Additionally the keypad/display format is available in 1/4DIN format for panel mounting in control rooms up to 1km (0.6 miles) from the basic transmitter.

In the non-keypad variant, display data can only be changed using a magnetic wand. No operational parameters can be changed without the use of configurators and appropriate passwords.

## International Approvals

Alternative versions of MagMaster are available for general locations with FM Approval/CSA Certification and for Hazardous Area locations to CENELEC, FM, CSA and SAA Standards. A brief summary of these Hazardous Area versions is given below, covering location of the sensor and transmitter, and the safety designation inside the pipe. No external safety barriers are required.

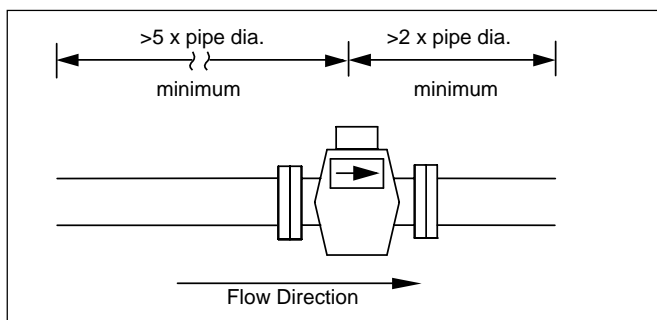
SENSOR	INSIDE PIPE	TRANSMITTER LOCATION
<b>FM &amp; CSA HAZARDOUS AREA APPROVAL – CLASS 1, DIV. 2, GROUPS A B C D</b>		
FM APPROVED	INTRINSICALLY SAFE ELECTRODES	REMOTE ONLY IN HAZARDOUS AREA
CSA CERTIFIED		REMOTE ONLY IN HAZARDOUS AREA
CSA CERTIFIED	NON INCENDIVE	INTEGRAL AND REMOTE IN HAZARDOUS AREA
<b>CENELEC – EEx e m ia IIC T4</b>		
<b>SAA – Ex e m ia IIC T4 HAZARDOUS AREA APPROVED</b>		
ZONE 1	ZONE 0	REMOTE TRANSMITTER IN SAFE AREA

**Sizes**

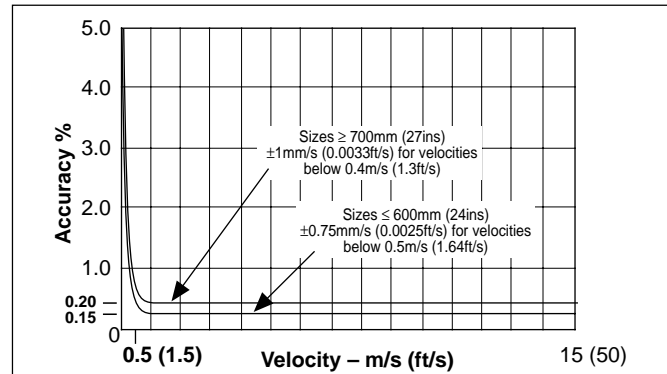
Sizes		Flow Range			
mm	in	Minimum		*Maximum	
		m <sup>3</sup> /h	US g/min	m <sup>3</sup> /h	US g/min
15	0.5	0.005	0.021	6	28
20	0.75	0.009	0.038	11	50
25	1	0.014	0.059	17	77
40	1.5	0.035	0.15	45	197
50	2	0.053	0.23	71	311
65	2.5	0.089	0.40	119	525
80	3	0.136	0.59	181	796
100	4	0.212	0.94	283	1243
150	6	0.477	2.10	640	2797
200	8	0.848	3.73	1130	4974
250	10	1.32	5.83	1770	7771
300	12	1.91	8.39	2540	11190
350	14	2.60	11.4	3460	15230
400	16	3.39	14.9	4520	19890
450	18	4.29	18.8	5730	25180
500	20	5.30	23.3	7070	31090
600	24	7.63	33.5	10180	44760
700	27	10.4	45.6	13850	60920
760	30	11.9	52.4	15900	69930
800	-	13.6	59.6	18100	79560
900	36	16.6	75.5	22900	100700
1000	39	21.2	93	28300	124300
1050	42	25.7	112	34200	150400
1200	48	30.5	134	40700	179000
1400	54	41.6	182	55400	243700
1500	58	47.7	208	63600	279700
1600	66	54.3	238	72400	318300
1800	71	68.7	302	91600	402800
2000	79	85	372	113100	497400
2200	88	102	451	137000	602000

\*Based on 10ms<sup>-1</sup> (33fts<sup>-1</sup>), but instrument capability in excess of 15ms<sup>-1</sup> (50fts<sup>-1</sup>)

**Pipe conditions**



**Accuracy (under forward flow reference conditions)**

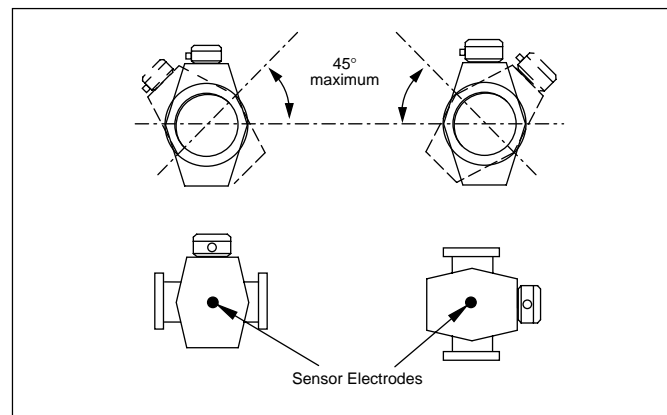


**Note.** Uncertainty of flow calibration facility may limit calibration accuracy:

Sizes 300/600mm (12/24ins) ±0.2%  
 Sizes ≥ 700mm (≥27ins) ±0.25%

- Analog output** Additional < ±0.008mA
- Temperature effect**
  - Transmitter < ±0.08% of reading/10°C
  - Analogue output – Additional < ±0.08% of reading/10°C
  - Sensor < ±0.03% of rate/10°C
- Power supply variation** Negligible
- Pressure effect** < 0.15% over the operating range of the equipment

**Mounting**



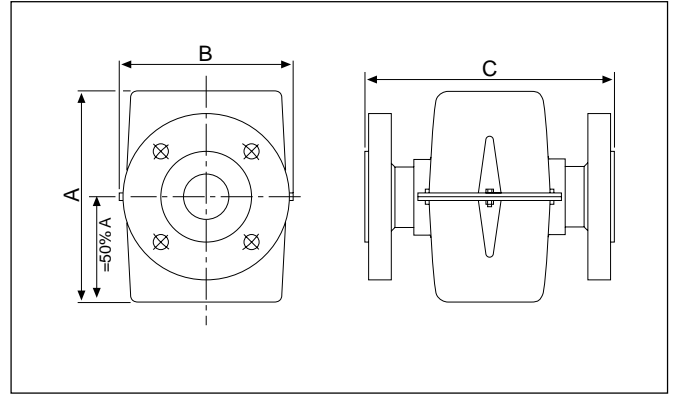
**End Mating Connections**

- 6 bar metric ANSI B16-5 Class 150
- 10 bar metric ANSI/AWWA C207 Class B
- 16 bar metric ANSI/AWWA C207 Class D
- AS2129 Table 'C'
- BS10/AS2129 Table 'D'
- BS10/AS2129 Table 'E'

**Sizes (nominal dimensions)**

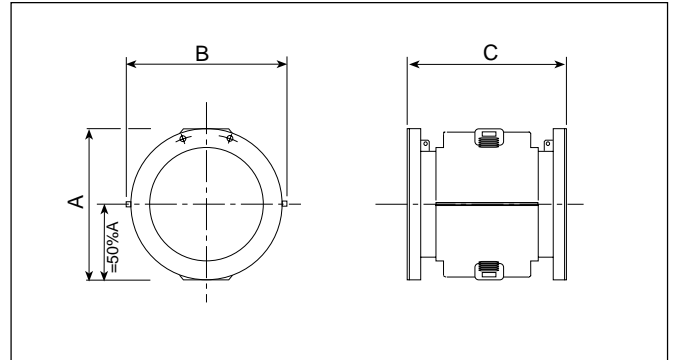
**15 to 150mm (0.5 to 6 in.)**

Meter Size mm (in)	Dimensions mm (in)			Approx. Weight	
	A	B	C	kg	lb
15 (0.5)	174 (6.8)	140 (5.5)	200 (7.9)	7	15
20 (0.75)	174 (6.8)	140 (5.5)	200 (7.9)	7	15
25 (1)	210 (8.3)	176 (7)	200 (7.9)	7	15
40 (1.5)	210 (8.3)	176 (7)	200 (7.9)	9	20
50 (2)	210 (8.3)	176 (7)	200 (7.9)	10	23
65 (2.5)	280 (11.0)	219 (8.6)	200 (7.9)	18	40
80 (3)	280 (11.0)	219 (8.6)	200 (7.9)	18	40
100 (4)	312 (12.3)	230.5 (9.8)	250 (9.8)	24	54
150 (6)	370 (14.6)	281 (11.8)	300 (11.8)	38	84



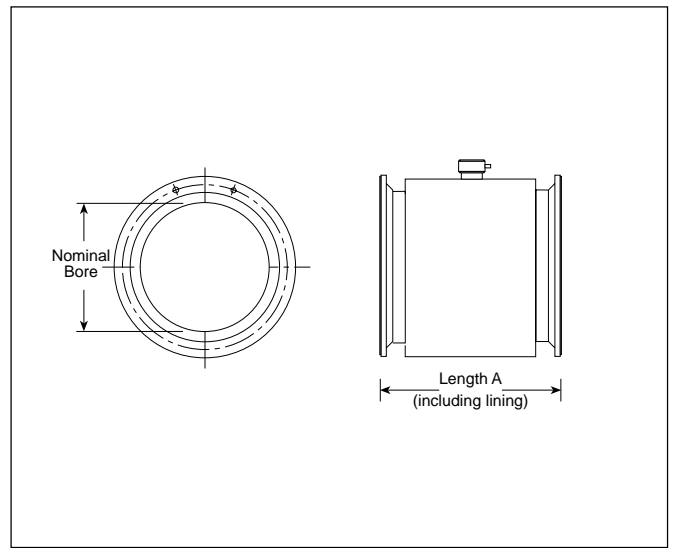
**200 to 600 mm (8 to 24 in.)**

Meter Size mm (in)	Dimensions mm (in)			Approx. Weight	
	A	B	C	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



**700 to 2000 mm (27 to 78 in.)**

Meter Size		Length 'A'		Approx. Weight (16 bar flanges)	
mm	in	mm	in	kg	lb
700	27	700	27.6	430	945
760	30	762	30	430	945
800	-	800	31.5	430	945
900	36	900	35.4	540	1190
1000	39	1000	39.4	720	1585
1050	42	1067	42	880	1930
1200	48	1200	47.2	1000	2160
1400	54	1400	55.1	1450	3190
1500	60	1524	59	1370	3000
1600	66	1600	63	2000	4400
1800	71	2132	83.9	2400	5280
2000	79	2282	89.8	3200	7040



\*Note. Typical Tolerance  $\pm 12\text{mm}$  ( $\pm 0.5$  in)

Note. See page 6 for Terminal Box dimensions and page 9 for Transmitter dimensions.

**Materials of Construction**

<i>Item</i>	<i>Material</i>
Lining	Teflon (PFA, PTFE, and FEP), Elastomer or Neoprene
Electrodes	Stainless steel 316 or Hastelloy 'C'
Flanges	Carbon steel

**Power consumption**

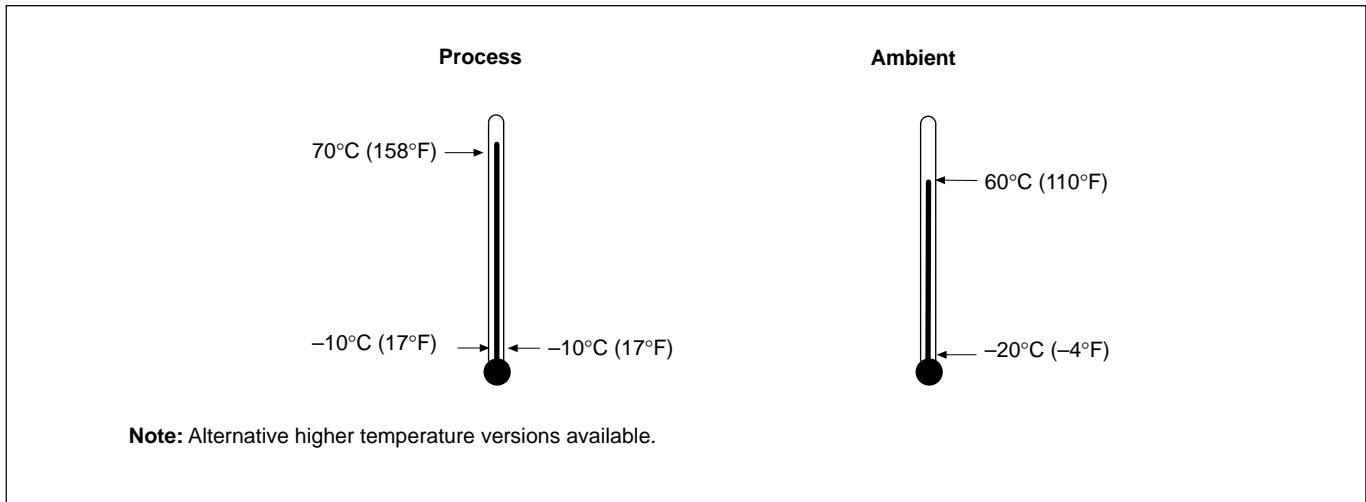
< 20VA

**Conductivity**

≥ 5μS/cm.

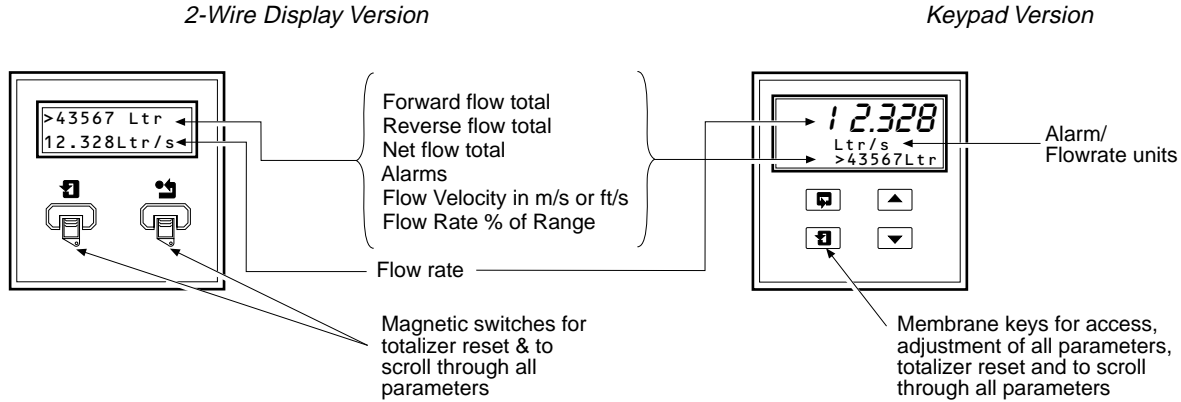
**Note.** See page 5 for Sensor dimensions and page 9 for Transmitter dimensions.

**Temperature Ranges**



# Specification - Transmitter

## Display (optional):

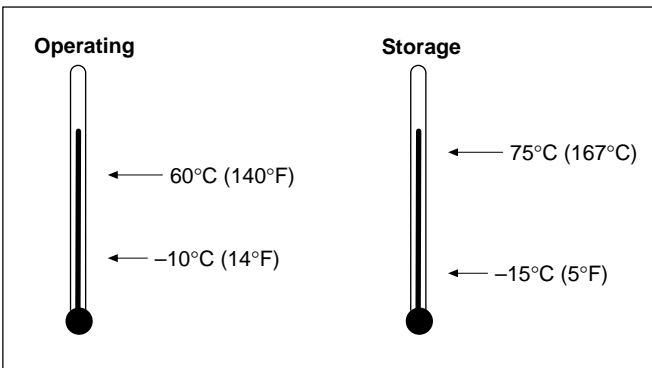


## Programming Options

- Local hand-held configurator
- Integral keypad
- HART®
- Up to 1000m (3280 ft) remote via serial communications and remote 1/4 DIN panel-mounted keypad/display unit

Fully configurable	A choice of engineering parameters in engineering units e.g. flowrate, flow units, all outputs etc.
Liquid sensing	Ensures units read zero on empty pipe
Interchangeability	Transmitter/sensor can be changed without affecting performance
Self diagnostics	Ensures transmitter and sensor integrity
Test mode	Powerful commissioning aid. Exercises all outputs and displays, even without a connected sensor
Multi-lingual	English, French, German, Spanish, Italian, Dutch, plus others on application

## Temperature Ranges



## Power Supply \*

Voltage Type	Voltage Range (V) Absolute rating	Frequency (Hz)	VA
a.c.	85 to 265	47 to 440	< 20
d.c.	11 to 40	-	< 20

\*Power supply fully isolated

**Environmental protection**

IP65/NEMA 4X

**EMC Specification**

Conforms to EMC Directive 89/336/EEC to 10V/m

**Enclosure**

Glass loaded polypropylene, polycarbonate window  
ULVO rated

**Electrical connections**

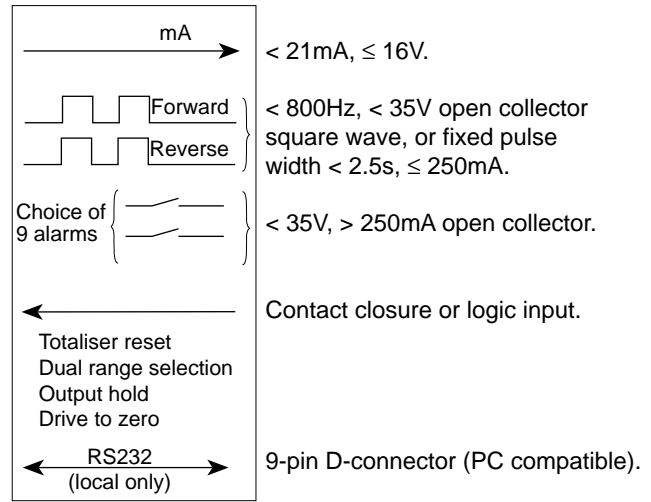
20mm glands, or accepts  
1/2 in. NPT connections

**Sensor Cable**

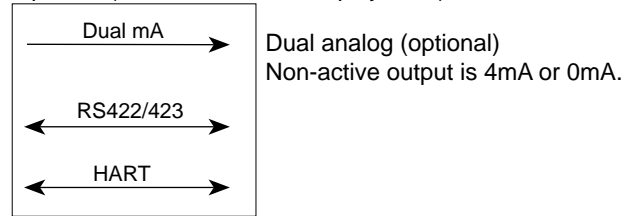
ABB supplied standard and armored versions

**Outputs/Inputs**

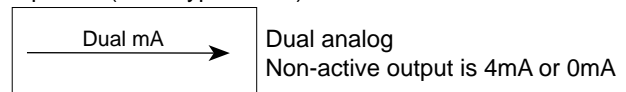
Common



Optional (For Blind & 2-line display units)



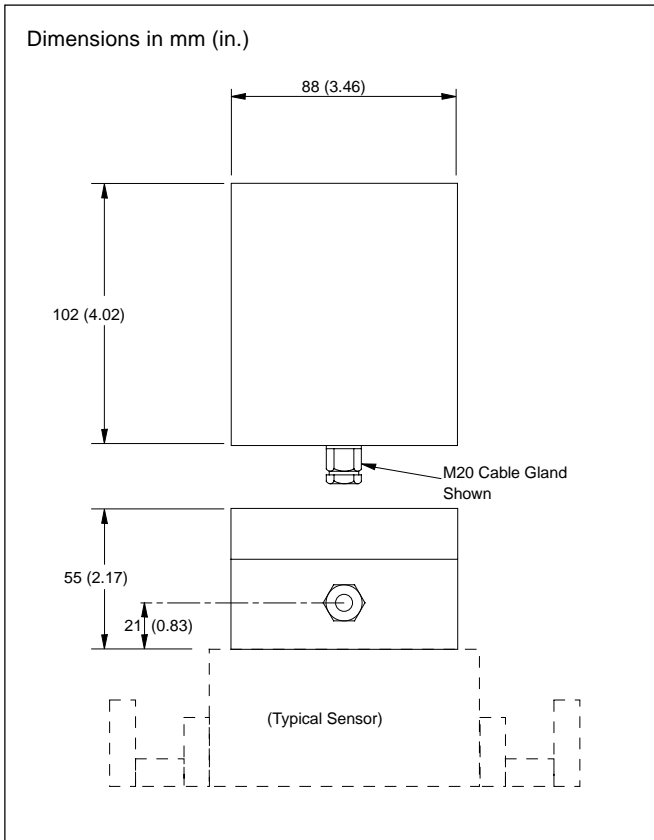
Optional (For Keypad units)



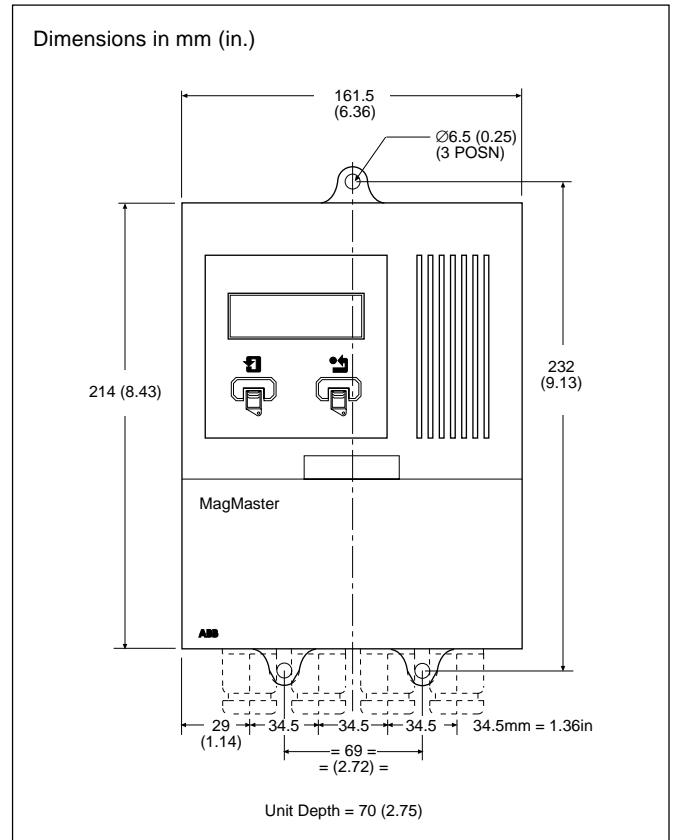
Galvanic separation to 50V d.c. between analog, pulse/alarm and earth/ground.



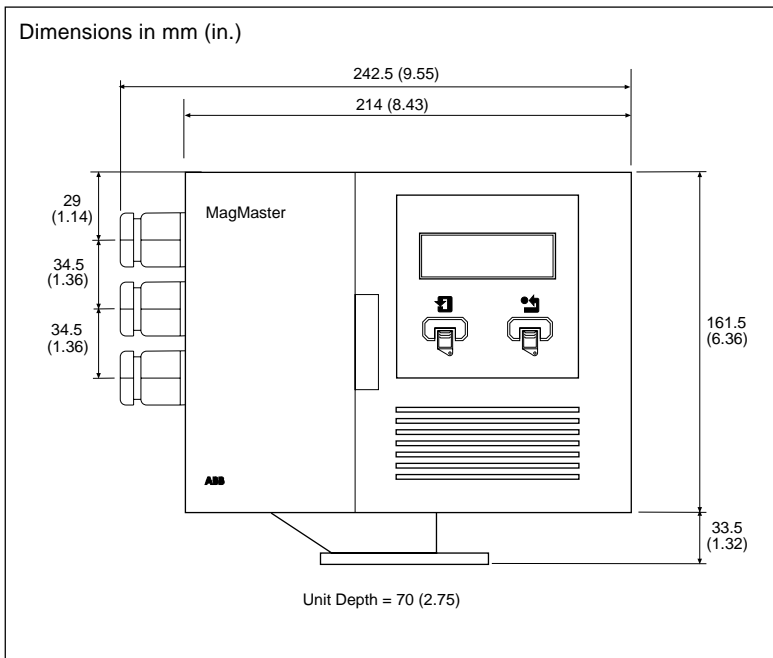
### Terminal Box (mounted on Sensor)



### Remote Mounting Transmitter



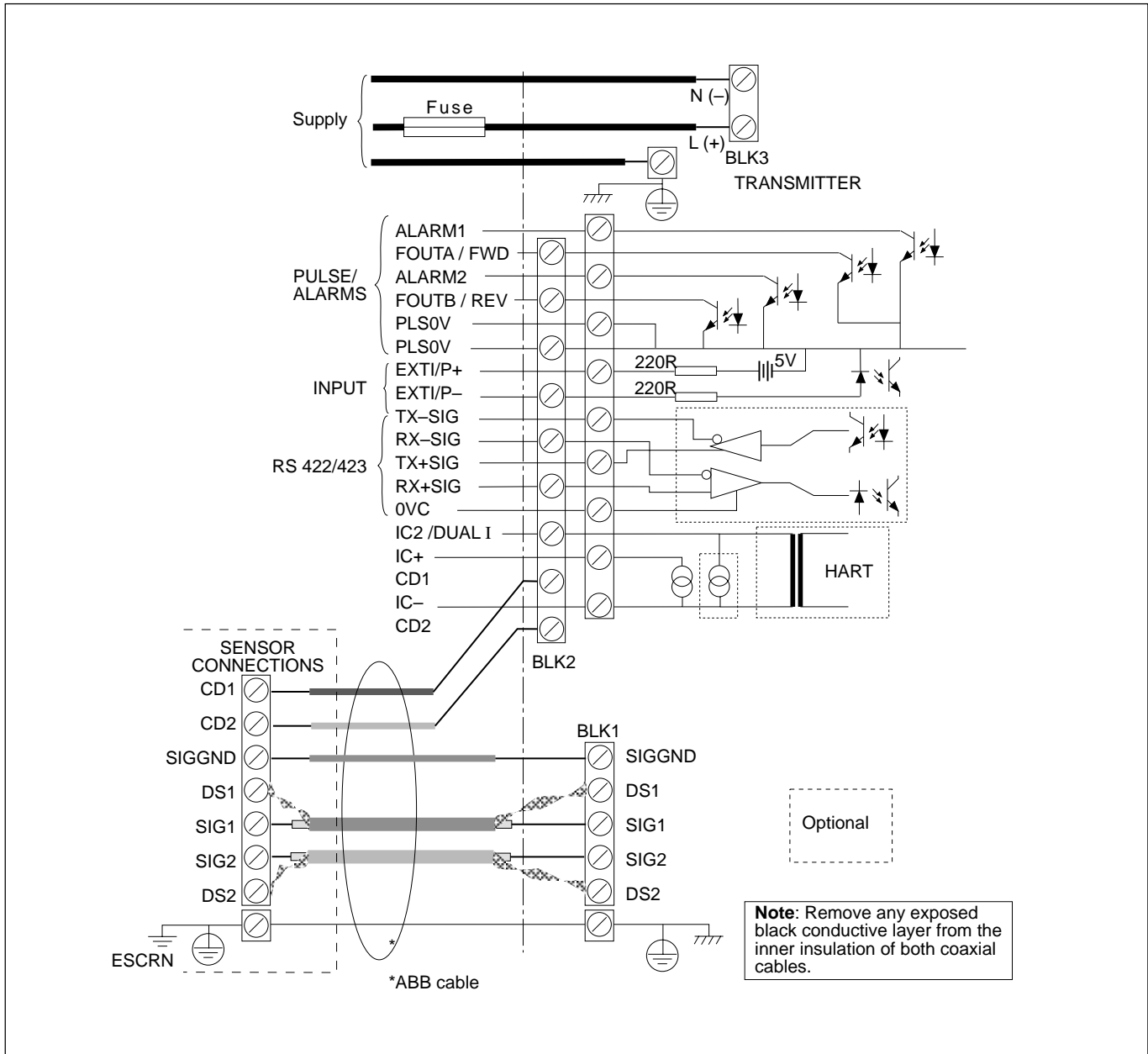
### Integral Transmitter (mounted on Sensor)



**Note.** See page 5 for Sensor dimensions.

Ordering Code MF	XXXX	X	X	X	X	0	X	XX	X	XX
<b>Calibrated Bore</b>										
15mm (1/2 in.)	E150									
20mm (3/4 in.)	E200									
25mm (1 in.)	E250									
40mm (1 1/2 in.)	E400									
50mm (2 in.)	E500									
65mm (2 1/2 in.)	E650									
80mm (3 in.)	E800									
100mm (4 in.)	E101									
150mm (6 in.)	E151									
200mm (8 in.)	F201									
250mm (10 in.)	F251									
300mm (12 in.)	F301									
350mm (14 in.)	F351									
400mm (16 in.)	F401									
450mm (18 in.)	F451									
500mm (20 in.)	F501									
600mm (24 in.)	F601									
700mm (27 in.)	F701									
760mm (30 in.)	F761									
800mm (32 in.)	F801									
900mm (36 in.)	F901									
1000mm (39 in.)	F102									
1050mm (42 in.)	F112									
1200mm (48 in.)	F122									
1400mm (54 in.)	F142									
1500mm (60 in.)	F152									
1600mm (66 in.)	F162									
1800mm (71 in.)	E182									
2000mm (79 in.)	E202									
2200mm (88 in.)	E222									
<b>End Connections – Flanged</b>										
16 bar metric, fully rated		1								
16 bar metric, 10 bar rated 700mm to 2000mm		C								
16 bar metric, 6 bar rated 700mm to 2000mm		B								
10 bar metric, fully rated		5								
6 bar metric, fully rated 700mm to 2000mm		8								
ANSI B 16.5 class 150, fully rated ≤ 24 in.		3								
ANSI/AWWA C207 class B fully rated 27 in. to 66 in.		U								
ANSI/AWWA C207 class D fully rated 27 in. to 66 in.		V								
AS2129 Table C fully rated ≤ 24 in.		F								
AS2129 Table D fully rated ≤ 66 in.		L								
BS10/AS2129 Table E, fully rated ≤ 48 in.		7								
BS10 Table D fully rated ≤ 66 in.		K								
<b>Lining Material</b>										
Bonded PTFE, 200mm (8 in.) to 400mm (16 in.) only		3								
Elastomer (UKWFBS listed) ≥ 50mm (2 in.)		4								
PFA, flanged ≤ 150mm (6 in.)		7								
Neoprene, ≥ 200mm (8 in.)		8								
Unbonded PTFE, 200mm (8 in.) to 400mm (16 in.) only		A								
<b>Electrodes</b>										
316 Stainless Steel							1			
Hastelloy 'C'							2			
<b>Sensor Build Standard</b>										
General							1			
FM/CSA – GENERAL [≤ 150mm (6 in.). Other sizes applied for.]							8			
<b>Calibration</b>										
Standard 3-point, with pressure test								1		
8-point, with pressure test								2		
NAMAS, with pressure test								5		
Standard 3-point, no pressure test								A		
8-point, no pressure test								B		
NAMAS, no pressure test								D		
<b>Cable Length – User specified length in 10m increments (90m maximum).(Must be '00' for conduit entry digit 4).</b>								XX		
<b>Glanding</b>										
20mm Plastic gland (sensor cable fitted and potted)										1
Conduit entry: 0.5 in. NPT (Blanked) – all North American versions (cable length to be '00')										4
20mm Plastic. Cable not fitted.										5
20mm Armor. Cable not fitted.										7
<b>Transmitter</b>										
Sensor-mounted MagMaster Transmitter, ≤ 400mm (24 in.) only										EH
Remote MagMaster Transmitter										ER

		Ordering Code	X	XX	X	X	X	X	X	X	X	X
<b>Glanding</b>	20mm Plastic gland (sensor cable fitted and potted)		1									
	Conduit entry: 1/2 in. NPT (Blanked) – all North American versions		4									
	20mm Plastic. Cable not fitted.		5									
	20mm Armored. Cable not fitted.		7									
<b>Transmitter Type</b>	Sensor mounted MagMaster transmitter			EH								
	Remote MagMaster transmitter			ER								
<b>Power Supply</b>	95V to 240Va.c. nominal, 47 to 440Hz							1				
	11V to 40Vd.c. (Max)							3				
<b>Display</b>	None									0		
	2-Line Display									3		
	3-Line Display with keypad (no RS422/423 or HART)									4		
<b>Output Options</b>	Standard outputs										0	
	Dual current output										1	
	HART communications										2	
	RS423/422										4	
	RS423/422 + dual current										5	
	RS423/422, no local RS232										6	
	RS423/422 + dual current, no local RS232										7	
<b>Transmitter Build Standard</b>	GENERAL										1	
	FM/CSA-GENERAL										3	
<b>Display Orientation</b>	Standard											1
	+90 degrees											2
	+180 degrees											3
	+270 degrees											4
<b>Language</b>	English											1
	French											2
	German											3
	Spanish											4
	Italian											5
	Dutch											6
<b>Labelling</b>	Factory allocated (internal only)											



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

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