

Specification DataFile

- **World's first integrated water measurement system**
 - combines flow, pressure and data logging in a single unit
- **Built in multi-speed, multi-channel, multi-variable logger**
 - provides high precision, high resolution datalogging
- **Field-upgradeable product firmware**
 - ease of replacement/refurbishment
- **Battery-powered**
 - enables remote use
- **Telemetry interface**
 - enables remote access for both download and diagnostics
- **Novel sensor design**
 - improves performance in installations with poor hydraulic conditions and greatly improves low flow performance
- **Compatible with Technolog, Primayer and OSI PI/BVS database systems**
- **Meets ISO 4064 Classes A, B & C and CEN TC92 WG2 with 1000:1 measuring range specification**
 - complies with the very latest regulations



***AquaMaster 'S' –
The next generation electronic,
new technology, water meter for
Bulk Revenue and District Metering***

AquaMaster 'S'

AquaMaster 'S' is the world's first integrated water measurement system combining flow, pressure measurement and data logging in a single unit. AquaMaster 'S' eliminates system interconnection and configuration issues and ensures reliable start up with reduced overall user cost, improved resolution data and superior water system management.

AquaMaster 'S' is the world's first flowmeter with field upgradeable firmware. This gives the user full 'future proofing' as any product enhancements can be downloaded remotely to the existing product.

AquaMaster 'S' is available in sizes 15 to 600mm (0.6 in. to 24 in.). Its outstanding performance, innovative features and user benefits, coupled with the low cost of ownership, ensure that AquaMaster 'S' is the first choice for District Metering, Bulk Revenue, Trunk Mains and Treatment Works applications.

Logger Facility

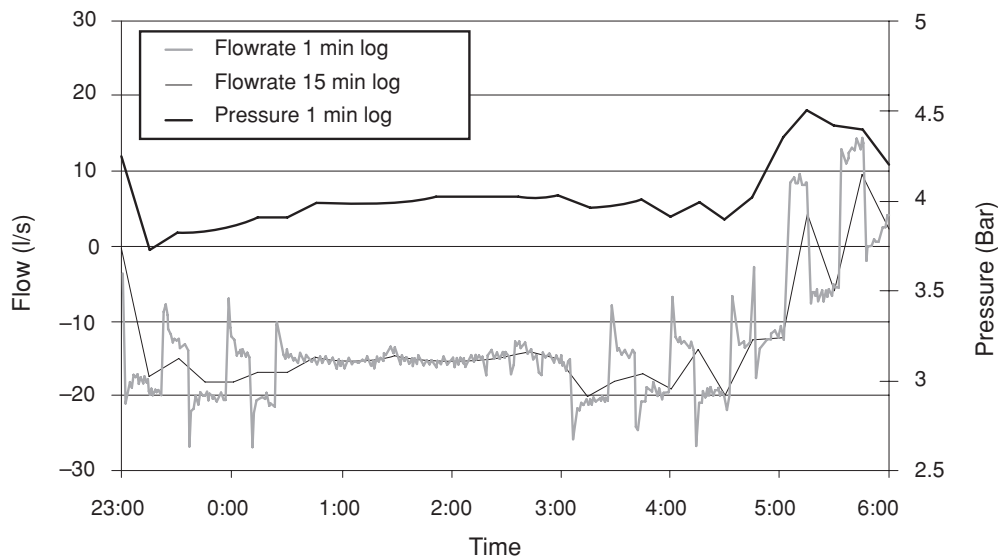
The AquaMaster 'S' display unit also contains a multichannel multivariable logger. The ability of the logger to run at two speeds simultaneously enables the user to investigate, in precise detail, the flow and pressure activity during a period of interest. This logger logs both flow and pressure via a direct digital transfer of data, thereby ensuring optimum accuracy and resolution of measurement. The graph (below) illustrates actual district network measurements showing extra detail captured utilizing the twin loggers. Traditional techniques of counting pulses over a short logging interval leads to 'quantisation' effects corresponding to whole numbers of pulses on logger graphs. AquaMaster 'S' eliminates such effects, averaging digitally over the selected logging interval. Such high resolution data facilitates step testing, leak detection and water network analysis.

AquaMaster 'S' also has on board remote communication ability such as Vodafone VVADS Radiopad, with GSM as a future option and, of course, RS232 which enable the user to both collect data remotely and service the unit without leaving his office. The savings in time and money are significant, as is the gain in peace of mind.

Features and Benefits

- Future proof field-upgradeable firmware
- Comprehensive display
- Built-in multichannel, multivariable logger
- Automatic time synchronisation to facilitate precise network balance with multiple meters
- Logs flow and pressure simultaneously on synchronized time boundaries
- Flow and pressure logged at two different and adjustable time intervals thus providing standard data for operational analysis and high resolution data for step testing and/or retrospective investigation
- Automatically logs total flow every 1 hour for a period of 1 year
- Remote access for configuration and data collection
- 'Fit & Flow' for foolproof installation with no site setup
- Submersible for use in flooded chambers
- Total security:
 - Two user security levels
 - Anti-tamper switch and seals
- Two outputs (forward & reverse pulse, or pulses & direction)
- Alarm output and l.c.d. indicators
- Remote access via telecommunications for checking battery condition and status
- Advanced power management allows over 1 year in which to change a used battery with no interruption to measurements

Flowrate/Pressure Parameters



Immersion or Buriable

In common with other ABB Flowmeters, AquaMaster 'S' can be buried and/or submerged to a depth of 10m (32.5 ft) continuously. Uniquely, however, ABB offers a submersible transmitter, also to IP68 (NEMA 6P) and to 2m (6.5 ft) immersion. This makes installation extremely simple.

Support Software

AquaMaster 'S' is available with a variety of industry standard third party software, (Technolog™ [PMAC], Primayer™ [Primeware], OSI™ Pi database and BVST™ [Wadis]) for downloading, managing, analysis and display of data, either directly from the RS232 port or via telemetry. Separate specification sheets are available describing these systems.

ABB also supply LogMaster, a simple-to-use PC software program which provides local communication to the AquaMaster 'S'. It enables full control and downloading of the on-board datalogger. A file-save facility enables data to be exported in CSV format for charting in Microsoft™ Excel or similar spreadsheets. It supports Vodafone Radiopad remote connection, with an address book, for full remote operation. LogMaster is Windows™ 98 & NT compatible, available in a variety of different languages.

New Performance Standards

Widest flow range, optimum accuracy and long term, stable calibration means that AquaMaster 'S' sets new standards for the water industry.

The performance specification for an a.c.-powered unit and the graph below demonstrates how AquaMaster 'S' significantly exceeds ISO 4064 Class C and gives exceptional 1000:1 (R1000) useable flow rangeability under the new CEN TC92 WG2 standard.

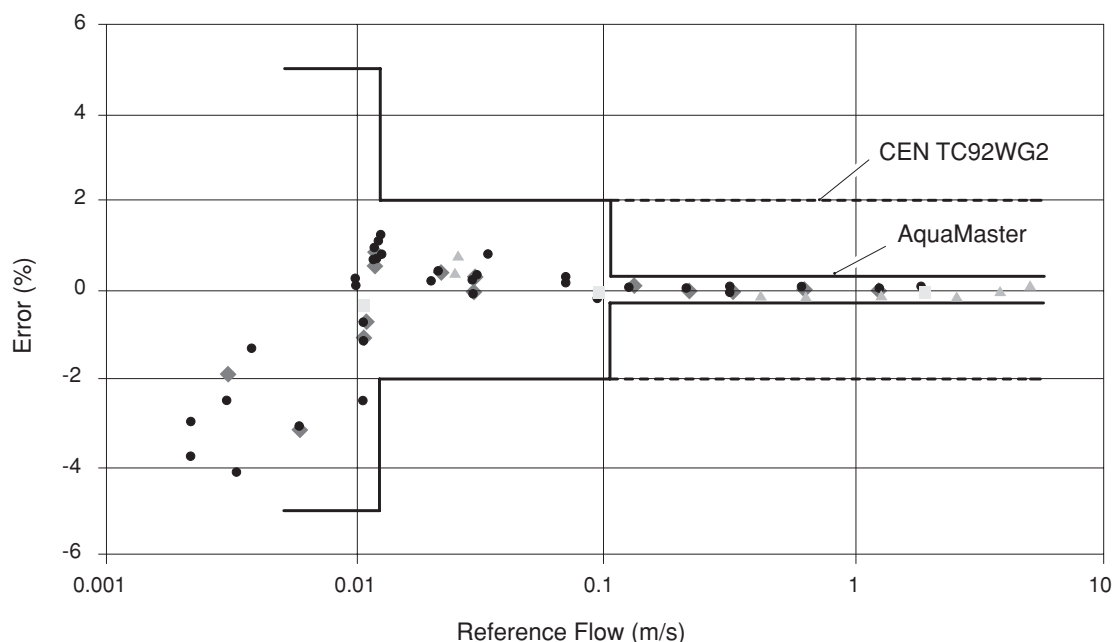
This unique low flowrate capability enables previously unrecordable low flows to be measured.

The sensor's unique hydrodynamic design, with negligible pressure loss, not only extends the low flow range, but flattens the flow profile, reducing sensitivity to upstream and downstream hydraulic disturbances. This means elbows and valves can be bolted directly onto the meter and the performance is usually within ISO 4064 Class C.

Fit & Flow

- No need to match sensor and transmitter
- Fast, reliable operation
- Foolproof, no errors
- Sensor stores all calibration factors, site setting numbers etc.
- Volume totalizer values backed-up every 5 minutes in sensor for total security
- Compatible with earlier AquaMaster sensors, facilitating upgrade
- Adapter available for AquaMag sensors
- All important data stored in triplicate for added security

Performance Standards



Specification

Metric Sizes, Flow Rates and Accuracies (under reference conditions)

Pipe Sizes in millimetres, Flow Rates in cubic metres/hour

DN	Q 4 (m ³ /h)	Q 3 (m ³ /h)	AC Powered Mode				Battery Powered Unit			
			Q 0.25 (m ³ /h)	Q 2 (m ³ /h)	Q 1 (m ³ /h)	R	Q 0.5 (m ³ /h)	Q 2 (m ³ /h)	Q 1 (m ³ /h)	R
15	5	4	0.075	0.010	0	1000	0.23	0.03	0.010	400
20	7.9	6	0.13	0.02	0.01	1000	0.38	0.04	0.016	400
25	13	10	0.18	0.03	0.01	1000	0.53	0.06	0.025	400
40	31	25	1.5	0.06	0.03	1000	1.5	0.16	0.063	400
50	50	40	1.5	0.1	0.04	1000	2.3	0.25	0.1	400
65	79	63	1.9	0.16	0.06	1000	3.8	0.39	0.16	400
80	125	100	2.0	0.25	0.10	1000	6	0.63	0.25	400
100	200	160	3.0	0.4	0.16	1000	9	1	0.4	400
150	500	400	7.5	1	0.4	1000	23	2.5	1	400
200	788	630	12.5	1.58	0.63	1000	38	3.9	1.6	400
250	1250	1000	20	2.5	1.0	1000	60	6.3	2.5	400
300	2000	1600	30	4	1.6	1000	90	10	4	400
350	2000	1600*	80	8	3.2	500	120	25	10	160
400	3125	2500*	100	8	5	500	150	31	13	200
450	4375	3500*	130	13	7	500	195	44	18	200
500	5000	4000*	180	18	8	500	225	63	25	160
600	7875	6300*	250	20	12.6	500	375	79	32	200

Flowrate designations in accordance with CEN/TC92 WG2

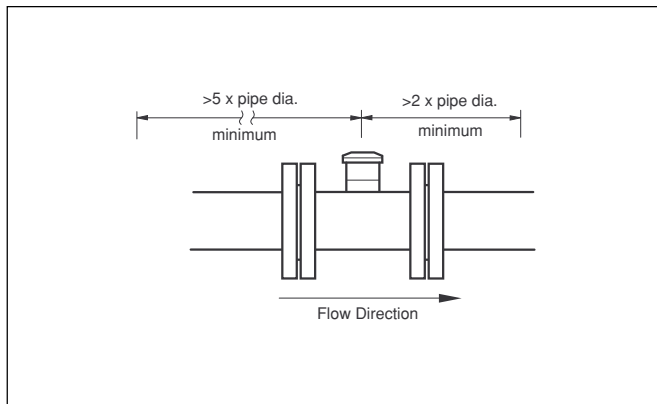
The above specification exceeds ISO 4064 Class C Specification, DN25 – DN300

* Rated for continuous operation at these flowrates. In order to minimize pumping losses, typical flowrates should be half this value.

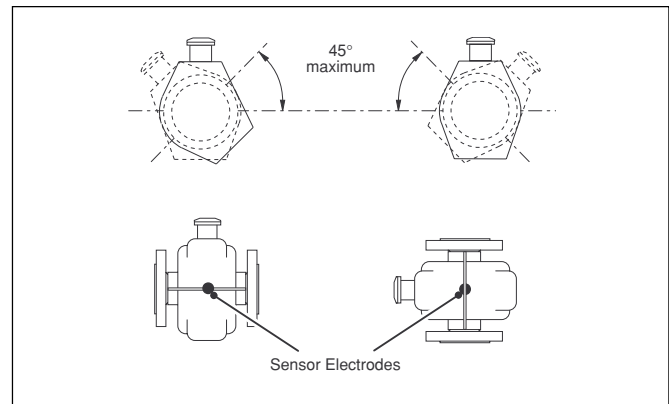
Pressure Loss Class

Flowrate	Pressure Loss (Bar)
Q 3 (CEN)	< 0.63
ISO 4064 Q _{max}	< 0.3
ISO 4064 Q _n	< 0.075
ISO 4064 Q _{n/2}	< .019

Pipe Conditions



Mounting



...Mounting

Wetted Materials

Screw End Meters

Brass & PPS (UKWFBS listed) and
Elastomer (UKWFBS listed)

Flanged meters

Elastomer (UKWFBS Listed)
Electrodes 316L S/S

Pressure Limitations

As Flange Ratings

Conductivity *

50µS/cm

* Note. Use of AquaMaster 'S' below 50µS/cm is possible with increased noise on flow output, particularly at high flow rates.

Pressure System – External Transducer

Pressure Range Absolute

10, 16 bar or 300psi

Connection

Standard quick-fit male probe
MIL style connector

Operating Temp Range

-20 to 70°C (-4 to 158°F)

Accuracy (typical)

±0.4% of range.

Thermal Error Band (typically 100°C [212°F])

±1.5% span

Cable Length

1, 5 or 10m

Electronic Display Unit & Logger

Mounting

Integral with sensor
or
Remote up to 200m (650ft)

Housing

IP68 NEMA 6P Aluminium Alloy with Glass Window
or
IP65 NEMA 4X Plastic

Electrical Connections

20mm glands (plastic or armoured), or accepts
1/2in. NPT threaded or military-style plug & socket

Sensor Cable

ABB Cable supplied as standard
Special cable available on application
SWA cable also available on application

Power Supply

Battery Life @ 0 to 50oC (32 to 122°F)

Type	Voltage Rating (V) Absolute Rating	Frequency (Hz)	VA
a.c.	85 to 265	47 to 440	<10
Battery	3.6 (Lithium)	–	–

1 battery – typically 1.2 Years

2 batteries – typically 3 Years

Operating System

Fully field-upgradeable Flash memory-based firmware

Languages

English
French
German
Spanish
Italian
Dutch
Special Languages available via Windows download program

Alarms

An alarm contact indicates any problems with the measurement or unit power

Pulse / Alarm Outputs

Two bi-directional solid state switches with common isolation ±35V d.c. 50mA

Response Time (programmable)

Minimum 1s (mains powered)
15s (Battery powered)

Serial Data Communication

Local Port – RS232C compatible via
ABB lead (option)
Remote port – RS232C with RI, RTS & CTS
handshaking

Remote Access

RS232 Local Port	✓
RS232 Remote Port (with RI, CTS & RTS signals)	✓
Vodafone™ VVADS Radiopad	✓
GSM	Future Option

Logger Details

	Logger		
	1	2	3
Logger Function	Flow & Pressure	Flow & Pressure	Forward, Reverse & Net Flow Totals
No. of Records	8831	11361	366
Logging Interval	15 to 65500s (adjustable)		24 hours (fixed)
Typical Capacity	3 months @15min.	~7 days @ 1 min.	1 year
Mode	Cyclic	Cyclic	Cyclic
Use ABB LogMaster	✓	✓	✓
Use Technolog (PMAC)	✓	✓	✗
Use Primayer Primeware	✓	✓	✗
Use OSI PI Database/ BVS _Wadis System	✓	✓	✗

...Specification

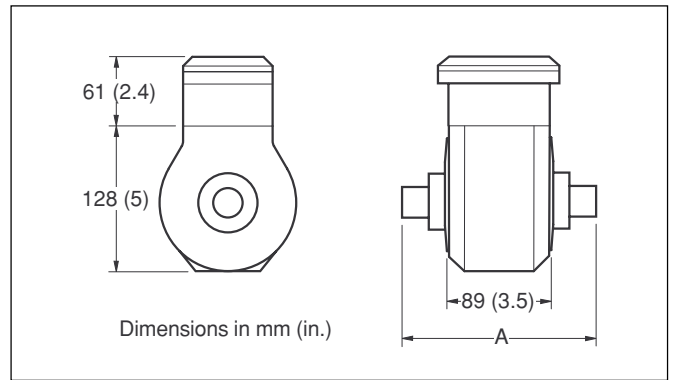
Default Settings Table

Configuration Parameter	Default European	Default North American
Pulse Factor	1	1
Pulse Units	m ³	Ugal
Totalizer Units	m ³	Ugal
Full Scale Flow	ISO 4064 Qn	ISO 4064 Qn
Flow Units	m ³ /h	MUGD
Velocity Units	m/s	ft/s
Tariff Units	m ³	Ugal
Date Format from Country Code	DDMMYY	MMDDYY
Flow Response Time (s)	3	3
Pressure Display Type	Gauge	Gauge
Display Flow Rate	Yes	Yes
Display Forward Total	Yes	Yes
Display Reverse Total	Yes	Yes
Display Net Total	No	No
Display Pressure	Yes (if ordered with Pressure Tx)	Yes (if ordered with Pressure Tx)
Display Date	No	No
Display Velocity	No	No
Pressure Upper Range (bar)	16	16
Logger 1 Interval (s)	900	900
Logger 2 Interval (s)	60	20
Output Option Pulse Forward	Pulses Forward	Pulses Forward
Output Option Pulse Reverse	Pulses Reverse	Pulses Reverse
Profile Factor	1	1
Probe Insertion Factor	1	1

Sensor Specification (nominal dimensions)

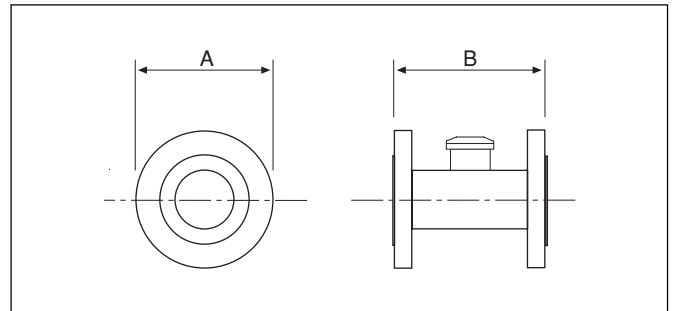
15 to 25mm (0.5 to 1 in.) – Screw Ends

Meter Size		Dimensions mm (in)	Connection	Approx. Weight	
mm	in.	A		kg	lb
15	0.5	119 (4.7)	G 3/4 in. B or 1/4 in. NPT	2.5	5
20	0.75	127 (5)	G 1 in. B or 3/4 in. NPT	2.5	5
25	1.0	127 (5)	G 1 1/4 in. B or 1 in. NPT	2.5	5



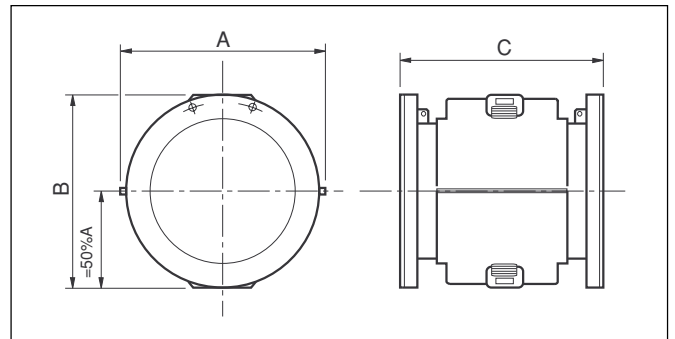
40 to 300mm (1.5 to 12 in.) – Flanged

Meter Size		Dimensions mm (in.)		Approx. Weight	
mm	in.	A	B	kg	lb
40	1.5	176 (7)	200 (7.9)	9	20
50	2	176 (7)	200 (7.9)	10	23
65	2.5	219 (8.6)	200 (7.9)	18	40
80	3	219 (8.6)	200 (7.9)	18	40
100	4	230.5 (9.8)	250 (9.8)	24	54
150	6	281 (11.8)	300 (11.8)	38	84
200	8	402 (15.8)	350 (13.8)	37	81
250	10	440 (17.3)	450 (17.7)	60	132
300	12	480 (18.9)	500 (19.7)	70	154



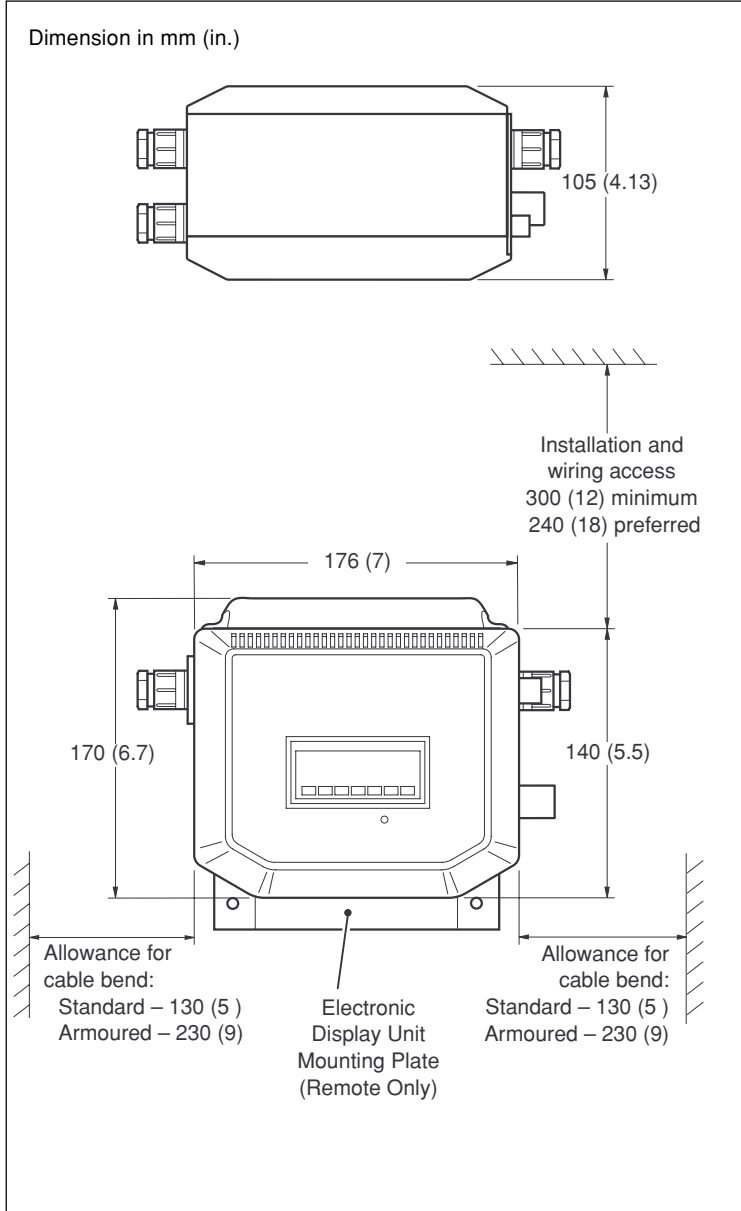
350 to 600mm (14 to 24 in.) – Flanged

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

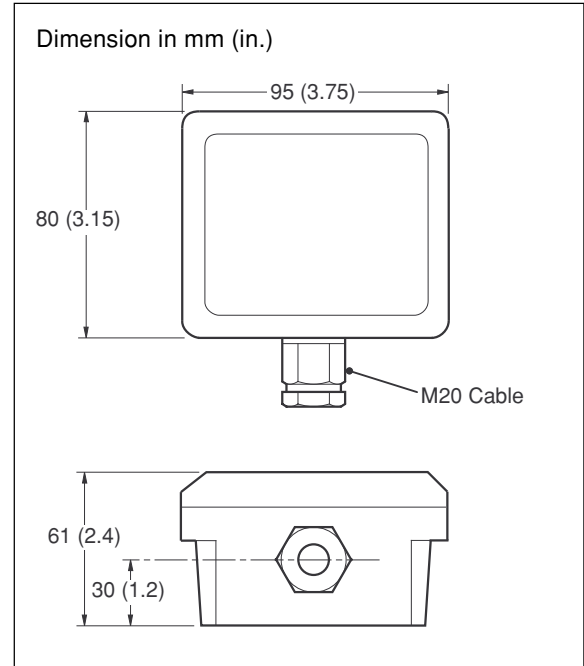


...Specification

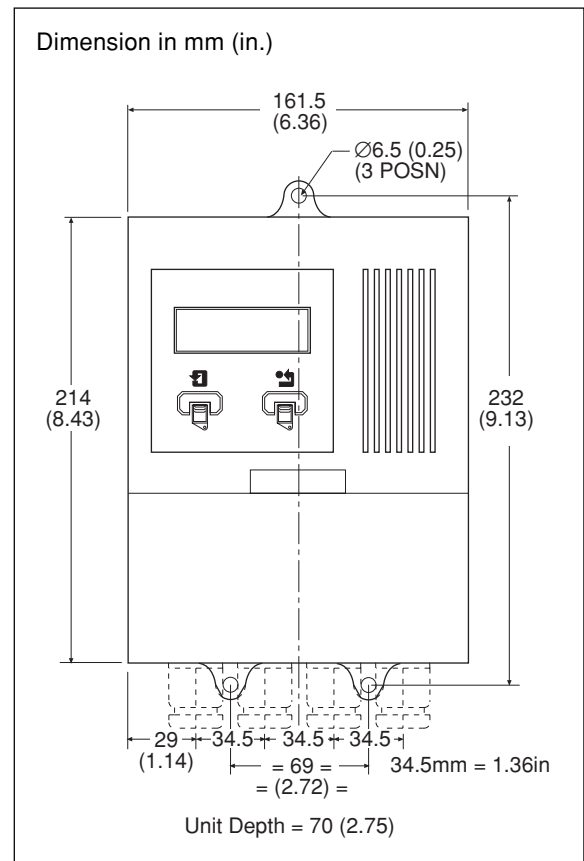
IP68/NEMA6P Electronic Display Unit Dimensions



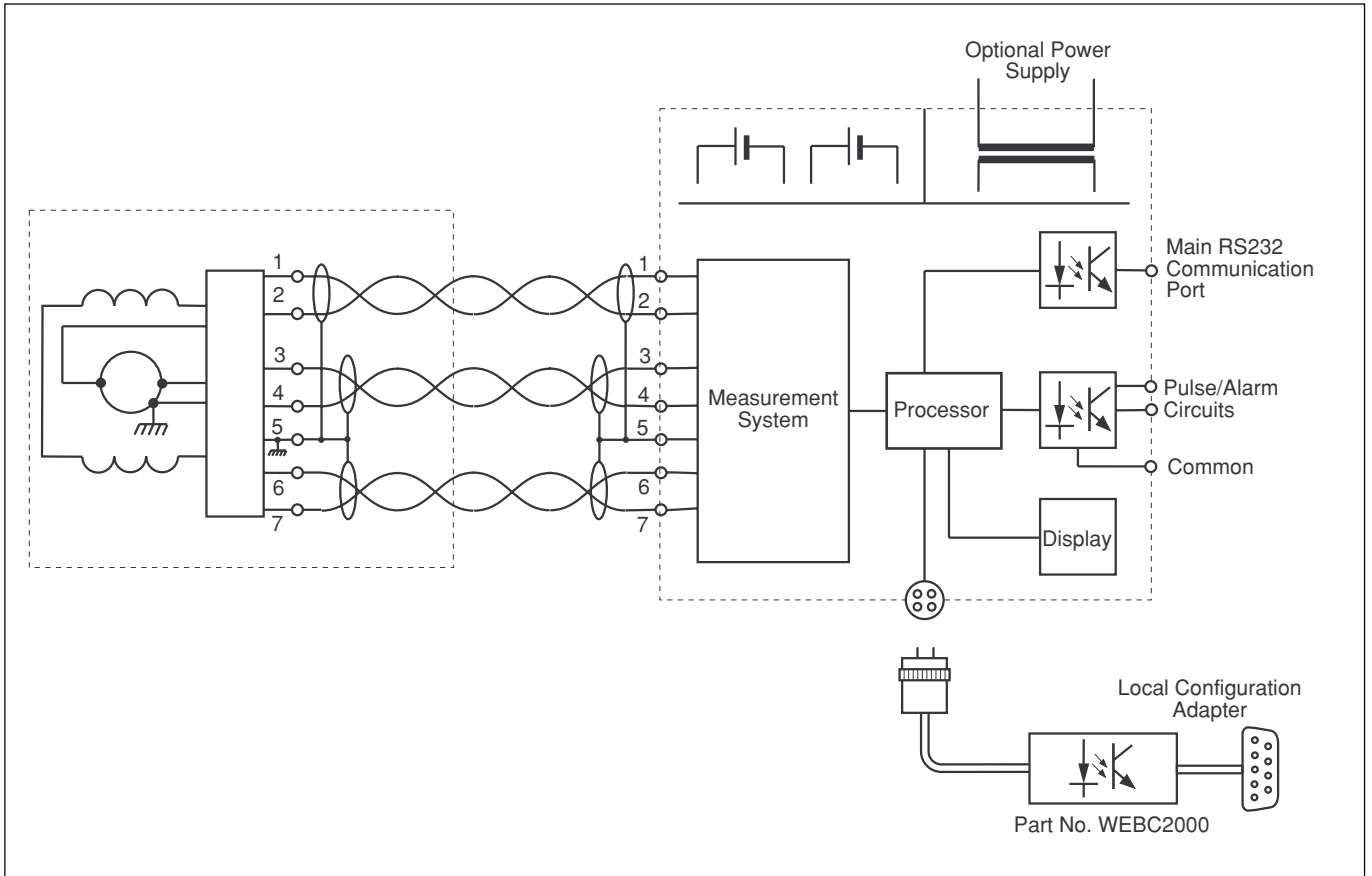
Terminal Box Dimensions – Sensor Mounted



IP65/NEMA4X Electronic Display Unit Dimensions



Connection Information



Licensing, Trademarks and Copyrights

Windows™ is a trademark of the Microsoft Corp.

Ordering Information

Main Code

Additional Code

AquaMaster 'S' Electronic Water Meter System		MM/G A	X	XXXX	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Language																		
Australian		A																
English		G																
French		F																
German		D																
Spanish		E																
Italian		I																
Dutch		H																
USA		U																
Calibrated Bore																		
mm	in.																	
15	5/8			0015														
20	3/4			0020														
25	1			0025														
40	1.5			0040														
50	2			0050														
65	2.5			0065														
80	3			0080														
100	4			0100														
150	6			0150														
200	8			0200														
250	10			0250														
300	12			0300														
350	14			0350														
400	16			0400														
450	18			0450														
500	20			0500														
600	24			0600														
Electronic Display Unit Mounting																		
Integral with Sensor Horizontal Display Sizes 40 to 600mm only (1.5 to 24 in.)																		
Integral with Sensor Vertical Display Sizes 40 to 600mm only (1.5 to 24 in.)																		
Remote from Sensor																		
Power Supply																		
AC																		
AC (with Battery Backup)																		
Battery																		
Options																		
IP68 Electronic Display Unit																		
IP68 Electronic Display Unit + Potting																		
IP68 Electronic Display Unit + Earthing Rings																		
IP68 Electronic Display Unit + Potting + Earthing Rings																		
Cable Length																		
Not Required																		
10m STT4001																		
20m STT4001																		
30m STT4001																		
40m STT4001																		
50m STT4001																		
60m STT4001																		
70m STT4001																		
80m STT4001																		
100m STT4001																		
125m STT4001																		
150m STT4001																		
175m STT4001																		
200m STT4001																		

Main Code

Additional Code

MM/G A	X	XXXX	X	X	X	X
--------	---	------	---	---	---	---

X	X	X	0	X	0	0	X	X	X	X
---	---	---	---	---	---	---	---	---	---	---

Labelling/Construction

ABB UK	0
ABB USA	1

Flange Style/End Connections

AS4087 Class 14 Flanges (40 to 600mm [1.5 to 24 in.] only)	A
AS2129 Table C Flanges (40 to 600mm [1.5 to 24 in.] only)	C
AS2129 Table D Flanges (40 to 600mm [1.5 to 24 in.] only)	D
AS2129 Table E Flanges (40 to 600mm [1.5 to 24 in.] only)	H
ISO7005 PN10 Flanged (40 to 600mm [1.5 to 24 in.] only)	M
ISO7005 PN16 Flanged (40 to 600mm [1.5 to 24 in.] only)	E
ANSI B16.5 Class 150 Flanged (1.5 to 24in. only)	U
BS10 Table D Flanged (40 to 600mm [1.5 to 24 in.] only)	F
BS10 Table E Flanged (40 to 600mm [1.5 to 24 in.] only)	G
JIS B2210, 5k Flanged (40 to 600mm [1.5 to 24 in.] only)	L
JIS B2210, 10k Flanged (40 to 600mm [1.5 to 24 in.] only)	J
Parallel thread to ISO228-1 Class B (15 to 25mm [0.6 to 1 in.] only)	T
Threaded to NPT (⁵ / ₈ to 1 in. only)	Y

Cable Entries

20mm Plastic Glands. Cable not fitted/potted	1
20mm Plastic Glands. Cable fitted/potted	B
¹ / ₂ in NPT(USA only). Cable not fitted/potted	3
20mm Armored. Cable not fitted/potted	2
20mm Armored. Cable fitted/potted	C
MIL Connector (sensor) + 20mm plastic gland (Txer)	5
MIL Connector (sensor) + 19 way MIL connector (Txer)	6

Not Used	0
----------	---

Calibration

1 Point Standard. No Pressure Test	0
1 Point Standard. With Pressure Test	1
3 Point. No Pressure Test	2
3 Point. With Pressure Test	3
NAMAS with Pressure Test (≥250mm [10 in.] only)	4

Not Used	0
----------	---

Not Used	0
----------	---

Comms Option

Not Required	0
Remote Port RS232 C(Mains Powered)	1
Remote Port RS232 C(Battery Powered)	1

Logger

Not Required	0
ABB Logger enabled for ABB Software	1
ABB Logger enabled for ABB & BVS Software	2
ABB Logger enabled for ABB & Technolog Software	3
ABB Logger enabled for ABB & Primayer Software	4

Pressure Transducer/Cable Length

Not Required	0
Remote 1m (3 ft) of Cable	1
Remote 5m (16 ft) of Cable	2
Remote 10m (32 ft) of Cable	3

Pressure Transducer Span (Fit & Flow)

Not Required	0
10 bar	1
16 bar	2
300 psi	3



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

© ABB 2001

Printed in UK (05.01)

SS/AMAS-S Issue 1

ABB Automation Ltd
Oldends Lane, Stonehouse,
Gloucestershire, GL10 3TA
England
Tel: +44 (0)1453-826-661
Fax: +44 (0)1453-827-856

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

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

www.abb.com