

AquaMaster 3 Electromagnetic flowmeter

The high value, precision solution for remote water metering and irrigation applications



Full range of power supply options for lowest cost site preparation and energy usage

- AC mains
- long-life battery
- renewable / solar / wind-power compatible

Optional built in multi-sampling rate, pressure and flow data logger

- integrated, all-in-one solution
- high resolution flow and pressure data logger
- three instruments for the price of one – no need to purchase a separate pressure transmitter or data logger

Wireless communication via optional built in GSM modem

- access and download all logged data remotely
- remote diagnostics
- reduces the requirement for costly and time-consuming site visits

Peace of mind with class leading, fully potted, IP68 electronic package

- zero water ingress, even during flood conditions
- military specification IP68 plug and socket connections
- sealed-for-life = zero maintenance

Compatible with ABB's full range of industry-leading flow sensors

- reduced-bore series for high turn-down applications, for example, leakage detection
- full-bore series for general-purpose water metering and irrigation applications
- all sensors are buriable, eliminating the need for costly chamber construction – a significant site preparation saving

Full range of approvals

- optional MID approval
- optional OIML R049 approval
- NMI approval pending

The next generation commercial water flowmeter

AquaMaster 3, available in sizes 15 to 600 mm (1/2 to 24 in.) with a reduced-bore construction, is the total solution for flow measurement in the water industry. Outstanding performance, innovative features and user benefits, coupled with low cost of ownership ensures that AquaMaster 3 is the first choice for District Metering, Bulk Revenue, Trunk Mains and Treatment Works applications.

AquaMaster 3 is also available in sizes 250 to 600 mm (10 to 24 in.) in full-bore and 40 to 200 mm (1 1/2 to 8 in.) in optimized full-bore construction where minimal pressure loss is essential, such as in irrigation applications.

AquaMaster has been designed specifically for the water industry in response to its stringent demands for enhanced metering capability; enabling ever more efficient and cost-effective operation and compliance with increasing legislative requirements.

Based on our proven technology, AquaMaster 3 is supported by the expertise of ABB – the world's leading flowmeter manufacturer with many pioneering advances in water flow metering over the last decade – for example AquaMag™, MagMaster™, AquaProbe™, WaterMaster™ and CalMaster™. ABB operates nationally- and internationally-accredited flow calibration facilities in the UK, USA, Germany, Australia and India. We also offer comprehensive, locally-based before- and after-sales support and service.

In addition to high measurement performance, AquaMaster 3 offers totalizer readings via the industry-standard inductive pad reader.

Typical applications

- Leakage detection
- Bulk revenue
- District metering
- Trunk mains
- Treatment works
- Irrigation



AquaMaster 3 system

AquaMaster 3 is a new design of mains, renewable energy and battery-powered transmitter. It has a stainless steel housing with a thermoplastic outer and the assembly is sealed-for-life to IP68 as standard. The transmitter incorporates military specification plug & socket connections for all inputs and outputs.

Transmitter

- Comprehensive display
- Rated IP68 (NEMA 6P) for submerged use in flooded chambers
- Resettable or secure totals
- 8 mm (0.31 in.) high displays for totals (exceeds ISO 4064 requirements)
- All connections via plug and socket
- Tamper-resistant and MID approved
- 3 outputs (forward and reverse pulse, or pulses, direction and alarm)

The AquaMaster 3 transmitter provides the most comprehensive range of flow data and information currently available to the water industry. If all the data is not required, the transmitter can be configured so that only the required values are displayed, ensuring simple reading with no superfluous data.

The transmitter can be mounted directly onto the AquaMaster sensor (close-coupled) or remotely from it. For close-coupled meters, the mounting system positions the display so that it is visible from both the top and the side.

The AquaMaster 3's program memory (or firmware) uses reprogrammable flash memory technology that has been enhanced to enable this firmware to be upgraded in the field via a local serial port connection. This future-proofs AquaMaster 3, making enhancements or new features available to installed units.

The AquaMaster 3 transmitter can contain an optional multi-speed, multi-channel, dual-variable logger. The ability of the logger to run at two speeds simultaneously enables the user to investigate, in precise detail, flow and pressure activity during a period of interest. The logger records both flow and pressure via direct digital data transfer, ensuring optimum accuracy and measurement resolution. Traditional techniques of counting pulses over a short logging interval leads to 'quantization' effects corresponding to whole numbers of pulses on logger graphs. AquaMaster 3 eliminates such effects, averaging digitally over the selected logging interval. Such high resolution data facilitates step testing, leak detection and water network analysis.

The AquaMaster's internal loggers feature an advanced automatic time synchronization facility that ensures operation on synchronized time boundaries, irrespective of what logging interval is set. This ensures all flow and pressure data, when combined with data from other meters, is synchronized precisely.

For revenue application, not only is flow and pressure information available; there are also totalizer and tariff loggers, that log all volume totals (forward, reverse, net) and tariff readings totals daily at midnight. The in-built memory of 732 days keeps all records for 2 years. The readings stored are the precise register volumes and are not inferred by pulse integration or other similar techniques.

Access to the loggers and logger configuration is security-protected by user-definable passwords.



AquaMaster 3 transmitter close-coupled to FEV series (optimized) full bore sensor

Remote access via mobile phone technology

- Remote access to logger data over quad-band GSM network by SMS text message
- Remote configuration, status monitoring and preventive maintenance
- Diagnostics and configuration, via standard GSM mobile phone
- Automated metering data reporting via SMS text

Transmitter power options

Mains power with super capacitor back-up

- Mains-only option supplied with a built-in rechargeable super capacitor backup power source
- The super capacitor can operate for up to 5 days without power (depending on operating conditions)
- The super capacitor has recharge cycles greater than 10,000 and with mains power offers continuous SMS operation
- In the event of mains interruption, continuous measurement is maintained and alarms reported via SMS protocols for up to 5 days without power
- No batteries to replace

Battery power for remote locations

- Up to 5-year* battery life
- Manganese alkaline battery pack*
- Site-replaceable battery pack
- The battery can be replaced without loss of logger contents enabling smooth switchover

*Operation at extremes of temperature can significantly shorten battery capacity and life.



Manganese battery pack with 5-year life

AquaMaster 3 is the ideal solution for locations where there is no external power.

Solar and wind power

Utilizes a simple DC (6 to 22 V) connection from sources as small as a 5 W solar panel / wind generator. Wind generators and solar panels are not supplied by ABB.

- No external rechargeable batteries required
- No external regulators
- Very simple installation
- Super capacitor backup

It is now possible to access sun and wind energy power sources. The internal super capacitor can power the transmitter at night or for up to 3 weeks during power interruptions (dependent on operational conditions).

Tariff feature

AquaMaster 3 incorporates a multiple tariff feature where the accumulated flow volume is routed to one of two 8-digit signed tariffs; tariff A or tariff B, depending on time and date. This feature is fully-programmable by the user for time-of-day, day-of-week or date during the year. These user-defined times / days / dates can be combined in a variety of modes to produce the tariff regimes illustrated in the tables below.

Weekly cycle defined

Mode	Tariff A	Tariff B
1	Day time during weekend	Night time at weekend + day and night during
2	Day time during week	Night time during week + day and night during weekend
3	All day times	All night times
4	Night time during weekend	Day time during weekend + day and night during
5	Day and night during weekend	Day and night during week
6	Day time during weekend + night time during	Night time during week + day time during weekend
7	All day times + night time during	Night time during week

Yearly cycle defined

Mode	Tariff A	Tariff B
1	Day time during summer	Night time during summer + day and night during winter
2	Day time during winter	Night time during winter + day and night during summer
3	All day times	All night times
4	Night time during summer	Day time during summer + day and night during winter
5	Day and night during summer	Day and night during winter
6	Day time during winter + night time during summer	Night time during winter + day time during summer
7	All day times + night time during summer	Night time during winter

Easy, low-cost installation

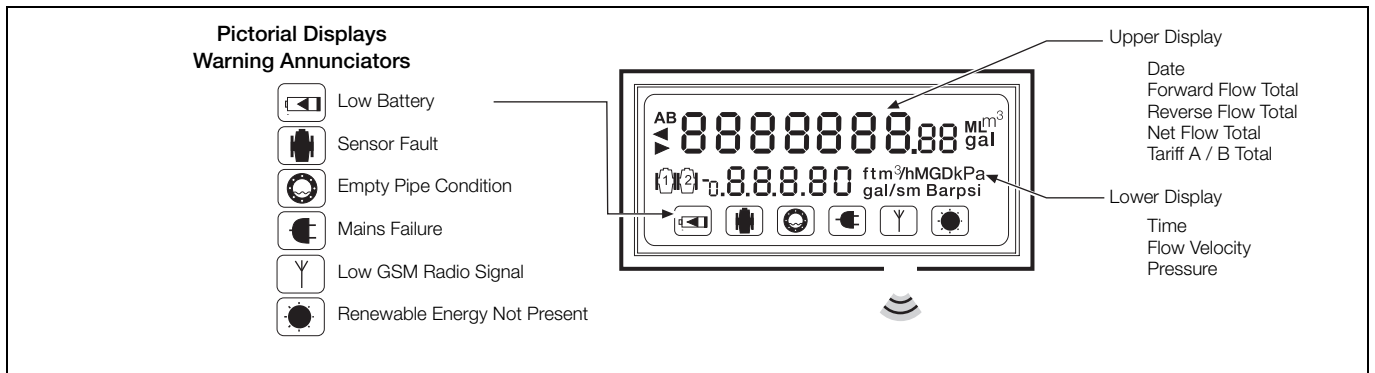
No matter what the location or installation requirements, AquaMaster 3 provides a cost-effective solution. Both the sensor and the transmitter are fully submersible, enabling installation in flooded chambers. In addition, the sensor is buriable, eliminating the need for a chamber.

Installation merely involves excavating to the pipeline, fitting the sensor and back-filling the hole, ensuring very fast, low-cost installation. The associated transmitter is then located in the most convenient position for the user. The elimination of bypasses and ancillary items such as strainers, enables the installation cost to be kept to an absolute minimum.

Installation requirement of zero pipe diameters (OD) upstream and downstream for the reduced-bore version removes concern over where to install a sensor, while delivering the highest performance. These factors, together with the innovative 'Fit and Flow™' system, ensure foolproof installation with total user confidence.

Fit and Flow

- No need to match sensor and transmitter
- Fast, reliable installation
- Foolproof, no errors
- Sensor stores all calibration factors, site settings and serial numbers
- Volume totalizer and tariff values backed-up in sensor for total security
- Multiple, programmable password levels stored for measurement security



AquaMaster 3 Display

New performance standards for flow measurement

With the widest flow range, optimum accuracy and long term stable calibration, AquaMaster 3 sets new performance standards in the water industry.

The reduced-bore (FER) performance is OIML R49 type approved (DN40 to DN300) to the latest Class 1 and Class 2 accuracies with a tighter accuracy above Q 0.5 % and Q 0.25 % (Fig. 1).

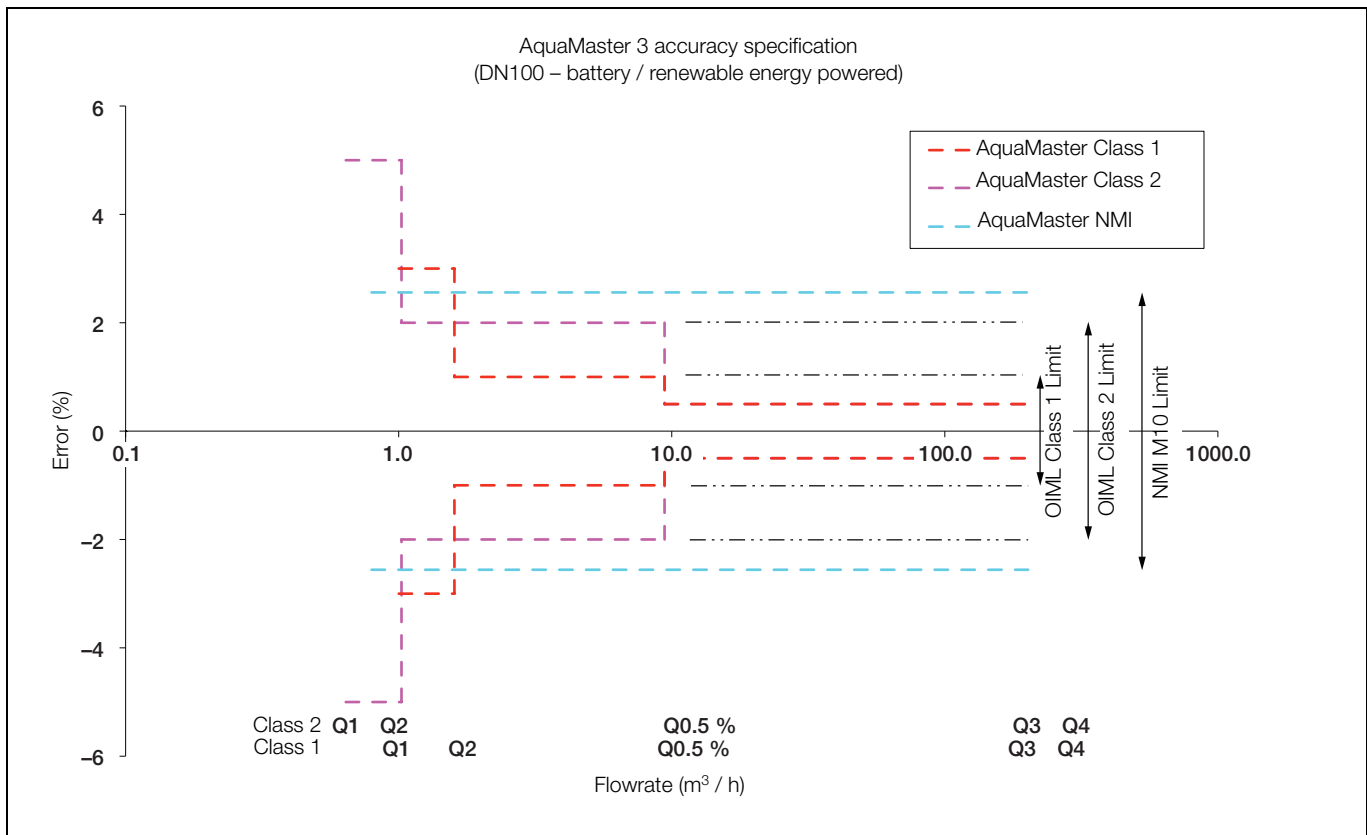
This unique low flow rate capability enables previously unrecordable minimal night flow rates to be metered; particularly important for bulk revenue and district metering applications.

The clear bore of the AquaMaster 3 eliminates the possibility of damage by particulate matter and the absence of moving and wearing components ensures that this unique level of performance is maintained long term.

The unique design of the AquaMaster 3 reduced-bore sensor conditions the flow profile in the measuring section so that distortions in the flow profile, either upstream or downstream, are flattened. The result is excellent in situ meter performance, even with very bad hydraulic installation conditions.

Hydraulic disturbance tests conducted during OIML R49 type approval confirmed a guaranteed accuracy to Class 1 and Class 2, even with flow disturbers bolted directly on the meter, either upstream or downstream at zero pipe diameters.

AquaMaster 3 reduced-bore version has been type examined and conforms to EU Measuring Instrument Directive (MID).



AquaMaster 3 specification to OIML R49 and NMI M10

Specification – flowmeter

Battery- or renewable energy-powered reduced-bore meters (FER) – flow specifications

Size		Q ₄	Q ₃	Q _(0.5%)	Class 2 specification		R	Class 1 specification		R
					Q ₂	Q ₁		Q ₂	Q ₁	
mm	in.	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)		m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	
15	1/2	5.0 (22.01)	4.0 (17.61)	0.24 (1.05)	0.026 (0.110)	0.016 (0.070)	250	0.04 (0.176)	0.025 (0.11)	160
20	3/4	7.9 (34.8)	6.3 (27.74)	0.37 (1.62)	0.04 (0.176)	0.025 (0.110)	250	0.063 (0.277)	0.04 (0.176)	160
25	1	12.5 (55)	10 (44)	0.6 (2.64)	0.064 (0.281)	0.04 (0.176)	250	0.1 (0.44)	0.063 (0.277)	160
40*	1 1/2	31 (138)	25 (110)	1.5 (6.6)	0.16 (0.704)	0.1 (0.44)	250	0.25 (1.10)	0.16 (0.704)	160
50*	2	50 (220)	40 (176)	2.4 (10.56)	0.26 (1.14)	0.16 (0.70)	250	0.4 (1.76)	0.25 (1.10)	160
65	2 1/2	79 (347)	63 (277)	3.7 (16.29)	0.40 (1.76)	0.25 (1.10)	250	0.63 (2.77)	0.4 (1.76)	160
80*	3	125 (550)	100 (440)	5.9 (25.97)	0.64 (2.82)	0.4 (1.76)	250	1.0 (4.40)	0.63 (2.77)	160
100*	4	200 (880)	160 (704)	9.4 (41.38)	1.0 (4.4)	0.64 (2.82)	250	1.6 (7.04)	1.0 (4.40)	160
125	5	200 (880)	160 (704)	9.4 (41.38)	1.0 (4.4)	0.64 (2.82)	250	1.6 (7.04)	1.0 (4.40)	160
150*	6	500 (2200)	400 (1760)	23.5 (103.46)	2.56 (11.27)	1.6 (7.04)	250	4.0 (17.61)	2.5 (11.01)	160
200*	8	788 (3470)	630 (2770)	37 (162.90)	4.0 (17.61)	2.5 (11.01)	250	6.3 (27.74)	3.9 (17.17)	160
250*	10	1250 (5500)	1000 (4400)	60 (260)	6.4 (28.18)	4.0 (17.61)	250	10 (44)	6.3 (27.74)	160
300*	12	2000 (8810)	1600 (7045)	90 (400)	10.2 (44.91)	6.4 (28.18)	250	16 (70.44)	10 (44)	160
350	14	2000 (8810)	1600 (7045)	110 (484.3)	16 (70.44)	10 (44.02)	160	41 (180.5)	25 (110)	63
375	15	2000 (8810)	1600 (7045)	110 (484.3)	16 (70.44)	10 (44.02)	160	41 (180.5)	25 (110)	63
400	16	3125 (13760)	2500 (11007)	170 (750)	25 (110)	15.6 (68.68)	160	63 (277.4)	40 (176)	63
450	18	3125 (13760)	2500 (11007)	170 (750)	25 (110)	15.6 (68.68)	160	63 (277.4)	40 (176)	63
500	20	5000 (22014)	4000 (17610)	270 (1190)	40 (176)	25 (110)	160	100 (440)	63.5 (279)	63
600	24	7875 (34670)	6300 (27740)	420 (1850)	63 (277)	39 (172)	160	160 (704)	100 (440)	63

* OIML R49 version available to Class 1 and Class 2

Note. OIML R49–1 allows Class 1 only for meters with Q₃ ≥ 100 m³ / h. Meters outside this range were tested to Class 1 accuracy and passed.

Battery- or renewable energy-powered full-bore meters (FEF) – flow specifications

Size		Class 2 specification					Class 1 specification			
mm	in.	Q ₄ m ³ / h (Ugal / min)	Q ₃ m ³ / h (Ugal / min)	Q _(0.5%) m ³ / h (Ugal / min)	Q ₂ m ³ / h (Ugal / min)	Q ₁ m ³ / h (Ugal / min)	R	Q ₂ m ³ / h (Ugal / min)	Q ₁ m ³ / h (Ugal / min)	R
250	10	2000 (8810)	1600 (7045)	107 (471)	16 (70.45)	10 (44)		160	26 (114)	
300	12	3125 (13760)	2500 (11007)	167 (735)	25 (110)	15.6 (68.68)	160	40 (176)	25 (110)	100
350	14	5000 (22014)	4000 (17610)	267 (1175)	40 (176)	25 (110)	160	40 (282)	40 (176)	100
375	15	5000 (22014)	4000 (17610)	267 (1175)	40 (176)	25 (110)	160	40 (282)	40 (176)	100
400	16	5000 (22014)	4000 (17610)	267 (1175)	40 (176)	25 (110)	160	40 (282)	40 (176)	100
450	18	7875 (34670)	6300 (27740)	420 (1850)	63 (277)	39 (172)	160	101 (445)	63 (277)	100
500	20	7875 (34670)	6300 (27740)	420 (1850)	63 (277)	39 (172)	160	101 (445)	63 (277)	100
600	24	12500 (55030)	10000 (44030)	667 (2937)	100 (440)	63 (277)	160	160 (704)	100 (440)	100

* OIML R49 version available to Class 1 and Class 2

Battery- or renewable energy-powered optimized full-bore meters (FEV) – flow specifications

Size		Class 2 specification					Class 1 specification			NMI M10 Class 2.5		
mm	in.	Q ₄ m ³ / h (Ugal / min)	Q ₃ m ³ / h (Ugal / min)	Q _(0.5%) m ³ / h (Ugal / min)	Q ₂ m ³ / h (Ugal / min)	Q ₁ m ³ / h (Ugal / min)	R	Q ₂ m ³ / h (Ugal / min)	Q ₁ m ³ / h (Ugal / min)	R	Q ₁ m ³ / h (Ugal / min)	R
40	1½	50 (220)	40 (176)	2.7 (11.89)	0.4 (1.76)	0.25 (1.10)		160	0.64 (2.82)	0.4 (1.76)	100	
50	2	79 (347)	63 (277)	4.2 (18.5)	0.63 (2.77)	0.39 (1.72)	160	1.0 (4.40)	0.63 (2.77)	100	0.50 (2.20)	125
65	2½	125 (550)	100 (440)	6.7 (29.5)	1.0 (4.40)	0.6 (2.64)	160	1.6 (7.04)	1.0 (4.40)	100		
80	3	200 (880)	160 (704)	10.7 (47.11)	1.6 (7.04)	1.0 (4.40)	160	2.6 (11.45)	1.6 (7.04)	100	1.28 (5.64)	125
100	4	313 (1378)	250 (1100)	16.7 (73.53)	2.5 (11.01)	1.6 (7.04)	160	4.0 (17.61)	2.5 (11.01)	100	2.0 (8.81)	125
125	5	313 (1378)	250 (1100)	16.7 (73.53)	2.5 (11.01)	1.6 (7.04)	160	4.0 (17.61)	2.5 (11.01)	100		
150	6	788 (3470)	630 (2774)	42 (185)	6.3 (27.74)	3.9 (17.17)	160	10 (44)	6.3 (27.74)	100	5.0 (22.01)	125
200	8	1250 (5504)	1000 (4403)	67 (2985)	10 (44)	6.0 (26.42)	160	16 (70.45)	10 (44)	100	8.0 (35.22)	125

AC-powered reduced-bore meters (FER) – flow specifications

Size		Q ₄	Q ₃	Q _(0.25%)	Class 2 specification			Class 1 specification		
					Q ₂	Q ₁	R	Q ₂	Q ₁	R
mm	in.	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)		m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	R
15	1/2	5 (22)	4 (18)	0.11 (0.48)	0.010 (0.044)	0.006 (0.026)	630	0.016 (0.070)	0.010 (0.04)	400
20	3/4	7.9 (35)	6.3 (27.74)	0.18 (0.79)	0.016 (0.070)	0.010 (0.044)	630	0.025 (0.11)	0.016 (0.070)	400
25	1	12.5 (55)	10 (44)	0.29 (1.27)	0.025 (0.11)	0.016 (0.070)	630	0.04 (0.176)	0.025 (0.11)	400
40*	1 1/2	31 (138)	25 (110)	1.5 (6.6)	0.063 (0.28)	0.040 (0.176)	630	0.1 (0.44)	0.063 (0.28)	400
50*	2	50 (220)	40 (176)	1.5 (6.6)	0.1 (0.44)	0.063 (0.277)	630	0.16 (0.70)	0.1 (0.44)	400
65	2 1/2	79 (247)	63 (277)	3 (13.2)	0.16 (0.7)	0.1 (0.44)	630	0.25 (1.10)	0.16 (0.70)	400
80*	3	125 (550)	100 (440)	3 (13.2)	0.3 (1.32)	0.16 (0.70)	630	0.4 (1.76)	0.25 (1.10)	400
100*	4	200 (880)	160 (704)	4.6 (20.25)	0.41 (1.8)	0.25 (1.10)	630	0.64 (2.82)	0.4 (1.76)	400
125	5	200 (880)	160 (704)	4.6 (20.25)	0.41 (1.8)	0.25 (1.10)	630	0.64 (2.82)	0.4 (1.76)	400
150*	6	500 (2200)	400 (1760)	11.4 (50.19)	1.0 (4.40)	0.63 (2.77)	630	1.6 (7.04)	1.0 (4.40)	400
200*	8	788 (3470)	630 (2774)	18 (79.25)	1.6 (7.04)	1.0 (4.40)	630	2.5 (11.01)	1.6 (7.04)	400
250*	10	1250 (5504)	1000 (4400)	29 (127.7)	2.5 (11.01)	1.6 (7.04)	630	4.0 (17.61)	2.5 (11.01)	400
300*	12	2000 (8806)	1600 (7045)	46 (202)	4.1 (18.05)	2.5 (11.01)	630	6.4 (28.18)	4.0 (17.61)	400
350	14	2000 (8806)	1600 (7045)	80 (352)	6.4 (28.18)	4.0 (17.61)	400	12.8 (56.35)	8.0 (35.22)	200
375	15	2000 (8806)	1600 (7045)	80 (352)	6.4 (28.18)	4.0 (17.61)	400	12.8 (56.35)	8.0 (35.22)	200
400	16	3125 (13760)	2500 (11007)	125 (550)	10 (44)	6.3 (27.74)	400	20 (88.06)	12.5 (55.04)	200
450	18	3125 (13760)	2500 (11007)	125 (550)	10 (44)	6.3 (27.74)	400	20 (88.06)	12.5 (55.04)	200
500	20	5000 (22014)	4000 (17610)	200 (880)	16 (70.45)	10 (44)	400	32 (140.9)	20 (88.05)	200
600	24	7875 (34670)	6300 (27740)	315 (1387)	25.2 (110.9)	15.8 (69.56)	400	50.4 (221.9)	31.5 (138.7)	200

* OIML R49 version available to Class 1 and Class 2

Note. OIML R49–1 allow Class 1 only for meters with Q₃ ≥ 100 m³ / h. Meters outside this range were tested to Class 1 accuracy and passed.

AC-powered full-bore meters (FEF) – flow specifications

Size		Q ₄	Q ₃	Q _(0.25%)	Class 2 specification			Class 1 specification		
mm	in.	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	R	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	R
250	10	2000 (8806)	1600 (7045)	160 (704)	8.1 (35.66)	5.1 (22.45)	315	13 (57.24)	8 (35.22)	200
300	12	3125 (13760)	2500 (11007)	250 (1100)	12.7 (55.92)	7.9 (34.78)	315	20 (88.06)	12.5 (55.04)	200
350	14	5000 (22014)	4000 (17610)	400 (1761)	20.3 (89.38)	12.7 (55.92)	315	32 (140.9)	20 (88.06)	200
375	15	5000 (22014)	4000 (17610)	400 (1761)	20.3 (89.38)	12.7 (55.92)	315	32 (140.9)	20 (88.06)	200
400	16	5000 (22014)	4000 (17610)	400 (1761)	20.3 (89.38)	12.7 (55.92)	315	32 (140.9)	20 (88.06)	200
450	18	7875 (34670)	6300 (27740)	630 (2774)	32 (140.9)	20 (88.06)	315	50 (220.1)	32 (140.9)	200
500	20	7875 (34670)	6300 (27740)	630 (2774)	32 (140.9)	20 (88.06)	315	50 (220.1)	32 (140.9)	200
600	24	12500 (55030)	10000 (44030)	1000 (4400)	51 (224.5)	32 (140.9)	315	80 (220.1)	50 (220.1)	200

* OIML R49 version available to Class 1 and Class 2

AC-powered optimized full-bore meters (FEV) – flow specifications

Size		Q ₄	Q ₃	Q _(0.25%)	Class 2 specification			Class 1 specification			NMI M10 Class 2.5	
mm	in.	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	R	m ³ / h (Ugal / min)	m ³ / h (Ugal / min)	R	m ³ / h (Ugal / min)	R
40	1½	50 (220)	40 (176)	4 (17.61)	0.2 (0.88)	0.13 (0.57)	315	0.32 (1.41)	0.20 (0.88)	200	0.16 (0.70)	250
50	2	79 (348)	63 (277)	6.3 (27.74)	0.32 (1.41)	0.20 (0.88)	315	0.50 (2.20)	0.32 (1.41)	200	0.25 (1.10)	250
65	2½	125 (550)	100 (440)	10 (44)	0.50 (2.20)	0.32 (1.41)	315	0.80 (3.52)	0.50 (2.20)	200		
80	3	200 (880)	160 (704)	16 (70.45)	0.81 (3.57)	0.51 (2.25)	315	1.30 (5.72)	0.80 (3.52)	200	0.6 (2.64)	250
100	4	313 (1378)	250 (1100)	25 (110)	1.30 (5.72)	0.79 (3.48)	315	2.0 (8.81)	1.25 (5.50)	200	1.0 (4.40)	250
125	5	313 (1378)	250 (1100)	25 (110)	1.30 (5.72)	0.79 (3.48)	315	2.0 (8.81)	1.25 (5.50)	200		
150	6	788 (3470)	630 (2774)	63 (277)	3.2 (14.09)	2.0 (8.81)	315	5.0 (22.01)	3.2 (14.09)	200	2.52 (11.1)	250
200	8	1250 (5504)	1000 (4403)	100 (440)	5.10 (22.45)	3.2 (14.09)	315	8.0 (35.22)	5.0 (22.01)	200	4.0 (17.61)	250

Specification – FER, FEF and FEV sensors

Wetted materials

Screw-end meters

Brass and stainless steel 316L and super-austenitic steel

Flanged meters

Electrodes – stainless steel 316L

Potable water approvals

	WRAS Listed	NSF Approved	ACS	AS / NZS 4020
FER	✓	Pending	✓ (DN40 to 600 only)	✓
FEF	✓	✓	✓	✓
FEV	✓	✓	✗	✓

Pressure limitations

As flange rating

PN25 Max Process Temp 50 °C (122 °F)

PN40 Max Process Temp 40 °C (104 °F)

OIML / MID Approved Meters 16 bar (232 psi)

Pressure equipment directive 97/23/EC

This product is applicable in networks for the supply, distribution and discharge of water and associated equipment and is therefore exempt.

Environmental protection

Rating

IP68 (NEMA 6P) to 10 m (33 ft.)

Buriable (sensor only) to 5 m (16 ft.)

Temperature limitations

Ambient temperature

- Remote transmitter
 - -20 to 70 °C (-4 to 158 °F)
- Close-coupled transmitter
 - -20 to 60 °C (-4 to 140 °F)

Process temperature

- Non-approved
 - -6 to 70 °C (21 to 158 °F)
- OIML R49 T50 approval
 - 0.1 to 50 °C (32 to 122 °F)

Conductivity

>50 µS/cm

End connections

Thread-end connections (FER)

15 mm – ISO 228 G 3/4 in. B 3/4 in. NPSM

20 mm – ISO 228 G 1 in. B 1 in. NPSM

25 mm – ISO 228 G 1 1/4 in. B 1 1/4 in. NPSM

40 to 300 mm (1.5 to 12 in.) flanged (FER)

EN1092-1 / ISO 7005 – PN10, PN16

ANSI B16.5 Class 150

AS 2129 Tables C, D, E and F

AS 4087 PN14, PN16, PN21

JIS to BS2210, 10k

350 to 600 mm (14 to 24 in.) flanged (FER)

EN1092-1 / ISO 7005 – PN10, PN16

AS 4087 PN14, PN16, PN21

AS 2129 Tables C, D

JIS to B2210 5k and 10k

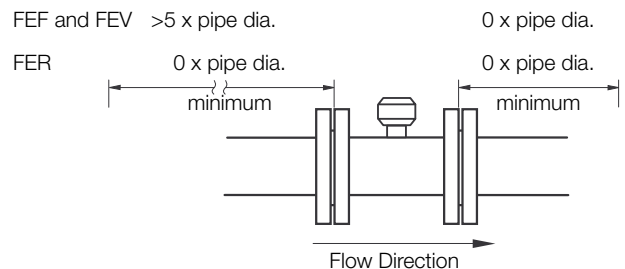
25 to 300 mm (1 to 12 in.) flanged (FEF)

EN1092-1 / ISO 7005 – PN10, PN16

ANSI B16.5 Class 150

AS 4087, PN16

Pipe conditions



Pressure loss

	Flow Rate	Pressure Loss in bar (psi)
FER	Q ₃	<0.63 (9.1)
	Q ₃ / 2	<0.16 (2.3)
FEV	Q ₃	<0.25 (3.6)
FEF	Q ₃	Negligible

OIML R49 approval (FER only)

Size range and flow specification

See specification table

Accuracy class

1 and 2

Environmental class

T50 0.1 °C to 50 °C (32.18 °F to 122 °F)

Pressure loss class

< 0.63 bar

Minimum upstream pipe

0 D

Minimum downstream pipe

0 D

Orientation

Any

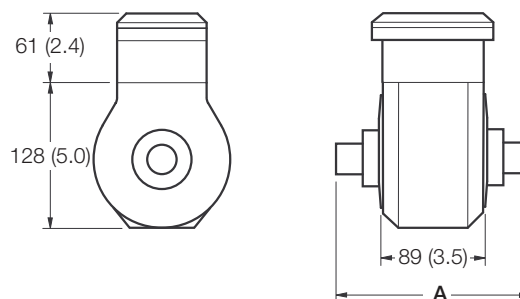
MID Approval

Approved to directive 2004/22/EC

Nominal dimensions

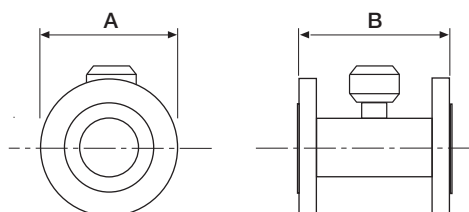
15 to 25 mm (1/2 to 1 in.) – screw ends (FER)

Dimensions in. mm (in.)



Meter Size		Dimensions mm (in.)	Connection	Approx. Weight	
mm	in.	A		kg	lb
15	1/2	119 (4.7)	G 3/4 in. B or 3/4 in. NPSM	2.5	5
20	3/4	127 (5)	G 1 in. B or 1 in. NPSM	2.5	5
25	1	127 (5)	G 1 1/4 in. B or 1 1/4 in. NPSM	2.5	5

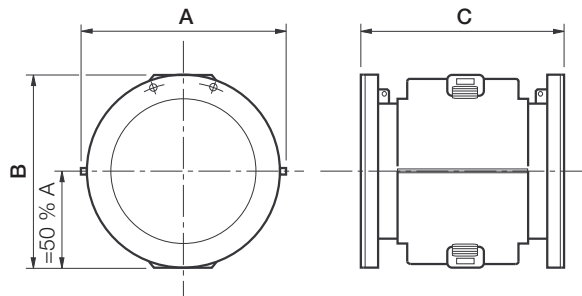
40 to 300 mm (1 1/2 to 12 in.) – flanged (FER)



Meter Size		Dimensions mm (in.)		Approx. Weight	
mm	in.	A	B	kg	lb
40	1 1/2	150 (5.9)	200 (7.9)	11	24
50	2	165 (6.5)	200 (7.9)	12	27
65	2 1/2	219 (8.6)	200 (7.9)	13	29
80	3	200 (7.9)	200 (7.9)	18	40
100	4	220 (8.6)	250 (9.8)	25	55
125	4	220 (8.6)	250 (9.8)	25	55
150	6	285 (11.2)	300 (11.8)	31	68
200	8	340 (13.3)	350 (13.8)	48	106
250	10	405 (15.9)	450 (17.7)	75	165
300	12	460 (18.1)	500 (19.7)	112	247

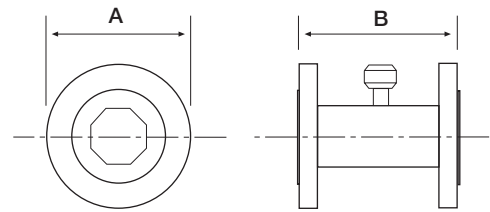
AquaMaster 3
Electromagnetic flowmeter

350 to 600 mm (14 to 24 in.) – flanged (FER)



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
375	15	550 (21.7)	520 (20.5)	550 (21.7)	105	231
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

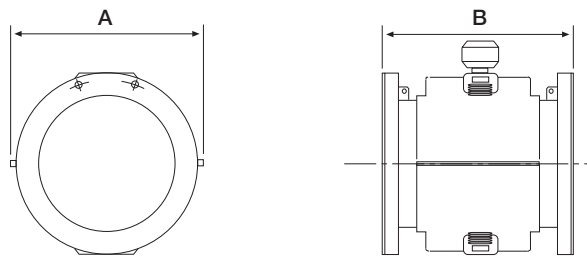
40 to 200 mm (1½ to 8 in.) – optimized full-bore (FEV)



Meter Size		Dimensions mm (in)		Approx. Weight	
mm	in.	A*	B	kg	lb
40	1½	150 (5.9)	200 (7.9)	11	24
50	2	165 (6.5)	200 (7.9)	12	27
65	2½	185 (7.2)	200 (7.9)	14	31
80	3	200 (7.9)	200 (7.9)	15	33
100	4	230 (9.1)	250 (9.8)	18	40
125	5	250 (9.9)	250 (9.8)	21	46
150	6	280 (11.0)	300 (11.8)	31	68
200	8	345 (13.6)	350 (13.8)	48	106

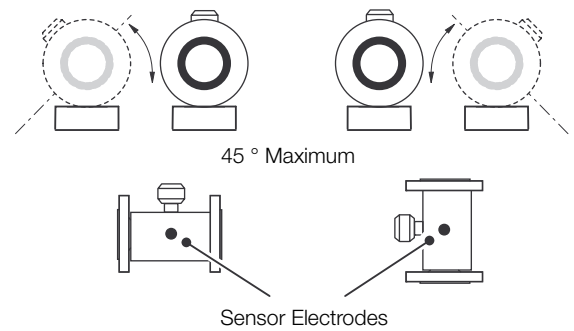
*Dimensions are approximate and vary depending on flange type

250 to 600 mm (10 to 24 in.) – full-bore (FEF)



Meter Size		Dimensions mm (in.)		Approx. Weight	
mm	in.	A	B	kg	lb
250	10	405 (15.9)	450 (17.7)	80	176
300	12	460 (18.1)	500 (19.7)	110	242
350	14	535 (21.1)	550 (21.7)	130	286
375	15	550 (21.7)	550 (21.7)	135	297
400	16	600 (23.6)	600 (23.6)	145	319
450	18	640 (25.2)	698 (27.5)	160	352
500	20	715 (28.1)	768 (30.2)	217	455
600	24	840 (33.1)	918 (36.1)	315	693

Mounting



45 ° Maximum

Sensor Electrodes

Specification – AquaMaster 3 transmitter

Mounting

Directly on sensor (close-coupled)

or

Remote up to 200 m (650 ft)

Housing

IP68 (NEMA 6P), <2 m (6 ft.)

Stainless steel housing in a thermoplastic outer cover with window, encapsulated with polyurethane-based resin.

Electrical connections

IP68 plug and socket, mains cable

Sensor cable

ABB cable supplied as standard

SWA cable available (via adaptor box) on application

Mains supply

85 to 265 V AC @ <3 VA

Connection cable: approx. 3 m (10 ft.)

Mains power failure backup time: approx. 5 days

Renewable power

Solar or wind

Input voltage: 6 to 22 V DC @ <5 W

Note. Renewable energy generators do not operate at maximum capacity, for example, low wind speed, coating of the solar panel, short daylight periods. As a consequence, some installations will require generators with a capacity greater than the specified 5 W minimum.

Max. current: 200 mA

Backup power time up to 3 weeks
(dependent on operating conditions)

External battery pack

IP68 (NEMA 6P)

Manganese alkaline battery life: 0 to 45 °C (32 to 113 °F)
typically 5 years

Battery life is shorter with GSM, depending on how frequently it is used and for what period. For example, used once per day for SMS automated reporting of data logged at 15 minute intervals, the life of a battery pack would be typically reduced by 20 %.

Backup power time

Approximately 1 minute

Pulse and alarm outputs

Three, bidirectional, solid-state switches with common isolation
±35 V DC 50mA

Output 1 – forward only or forward plus reverse pulses

Output 2 – reverse pulses or direction indicator

Output 3 – alarm indicates any problem with measurement or with power

Pulse output – 50 Hz maximum, 50 % nominal duty cycle

Communications options

Serial data communications

Local Port RS232

Note. On battery and renewable energy versions frequent use of the RS232 port considerably reduces battery / standby life.

RS485 MODBUS

MODBUS RTU slave

Baud rates:

1200, 2400, 4800, 9600 or 19200

RS485:

2-wire + ground signalling

Low power shut-off mode after 10 s of inactivity

Encoder interface / scancoder / scanreader (non-logging versions only)

Function – remote reading of totalizer and serial number

■ Connections

- 2-wire for inductive pads
(max. cable length 80 m [260 ft])
- 3-wire for AMR

■ Compatible readers

- Severn Trent Services Smart reader
- ABB or Elster SR100 and SR50
- Logicon Versaprobe
- Itron ERT

■ Compatible inductive pads

- Starpad
- ABB

Telemetry applications (option)

GSM / SMS modem

Mounting:

Internal

Frequency bands:

Quad band: 850 / 900 / 1800 / 1900 MHz

Functions:

SMS auto report of flow and optionally, pressure logger data (typically 1 s or 1 min. average)

SMS report frequency: typically daily

SMS alarm reporting at time of event, for example power loss, limited to 1 per day

SMS flowmeter configuration

SMS flowmeter diagnosis

SMS total / tariff auto report

GSM antenna (option)

Quad band operation:

850 / 900 / 1800 / 1900 MHz

Mounting:

Integral with transmitter or remote.

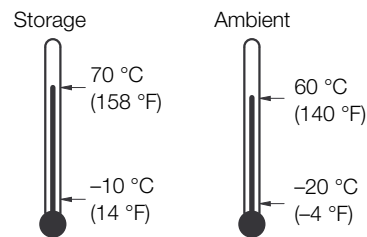
Antenna environmental:

IP66 (NEMA4) waterproof for accidental submersion

Note. The GSM does not operate with integral antenna under water.

General advice is to mount the antenna as high as possible, always outside of any metal enclosure and not under the surface of the ground.

Temperature ranges



Operation outside the ambient temperature limits of 0 to 45 °C (32 to 113 °F) reduces battery capacity and shortens battery life.

Response time (programmable)

Minimum

1 s (mains-powered)

15 s (battery-powered + external renewable energy)

Device languages

English

French

German

Spanish

Italian

Dutch

Pressure system – external transducer (option)

Pressure range

16 bar Abs.

Connection

Standard quick-fit male probe connector via an adapter cable

Operating temperature range

-20 (ambient) to 70 °C (-4 to 158 °F)

Protect the sample and transducer from freezing.

Accuracy (typical)

±0.4 % of range

Thermal error band (typically 100 °C [212 °F])

±1.5 % span

Cable length

5 or 10 m (16 or 33 ft)

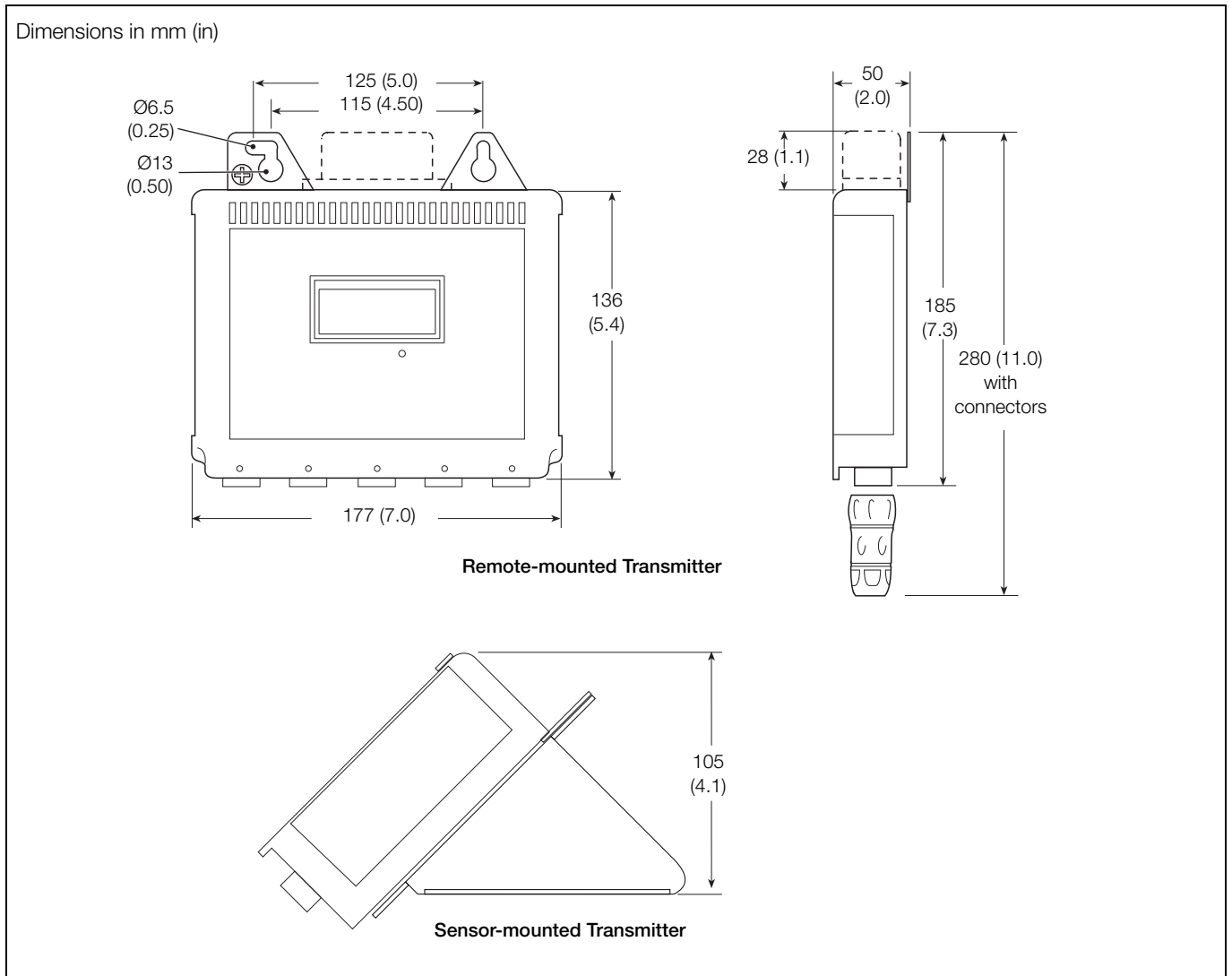
Logger details (option)

	Logger		
	1	2	3
Logger Function	Flow & Pressure	Flow & Pressure	Forward, Reverse, Tariffs & Net Flow Totals
No. of Records	8831	11361	732
Logging Interval	15 to 65500 s (adjustable)		24 hour (fixed)
Typical Capacity	3 months @15 min	7 days (approx.) @ 1 min	2 years

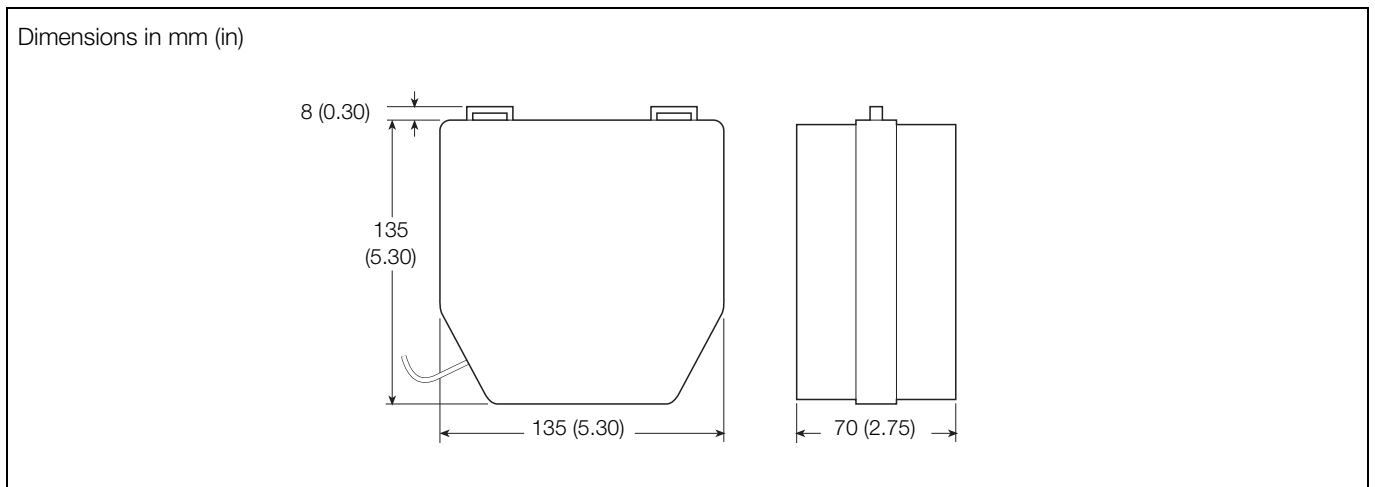
Software availability

Software	Direct RS232	SMS (Text)
ABB AC800M	✘	✔
ABB Generic (for example, LogMaster)	✔	✘
Areal (Topkapi)	✘	✔
AutoChart	✘	✔
EcoTech	✘	✔
HydroComp	✘	✔
Mobile phone text	✘	✔
OSI PI Database or Capula	✔	✘
QTech	✘	✔
Zeepaard	✘	✔
Agua Ambiente Servicios Integrales SA	✘	✔

Overall dimensions



Transmitter dimensions



Battery pack dimensions

Ordering Information

AquaMaster FER reduced-bore sensor flowmeter series

Product coding field number		1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options	
AquaMaster system. Reduced-bore sensor with remote mounted transmitter		FER221																				Add as required – see page 20
AquaMaster system. Reduced-bore sensor with close coupled transmitter		FER251	XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X		
AquaMaster reduced-bore sensor only, close coupled, without transmitter		FER271																				
AquaMaster reduced-bore sensor only, remote mount, without transmitter		FER281																				
Bore diameter																						
DN 15	1/2 in.	015																				
DN 20	3/4 in.	020																				
DN 25	1 in.	025																				
DN 40	1 1/2 in.	040																				
DN 50	2 in.	050																				
DN 65	2 1/2 in.	065																				
DN 80	3 in.	080																				
DN 100	4 in.	100																				
DN 125	5 in.	125																				
DN 150	6 in.	150																				
DN 200	8 in.	200																				
DN 250	10 in.	250																				
DN 300	12 in.	300																				
DN 350	14 in.	350																				
DN 375	15 in.	375																				
DN 400	16 in.	400																				
DN 450	18 in.	450																				
DN 500	20 in.	500																				
DN 600	24 in.	600																				
Liner material																						
Elastomer (40 ... 600mm)																						
PPS (15 ... 25mm)																						
Electrode design																						
Standard																						
Measuring electrodes material																						
Stainless steel 316																						
Super Austenitic steel (1.4529) – 40 ... 600 mm																						
Grounding accessories																						
2 x stainless steel potential equalizing rings																						
Process connection type																						
Flanges ANSI / ASME B16.5 / 16.47 series B Class 150	(40 / 50 / 80 / 100 / 150 ... 300)																					
Flanges AWWA C207 Class E	(40 / 50 / 80)																					
Flanges JIS 7.5K	(80 / 100 / 150 ... 300)																					
Flanges JIS 10K	(40 / 50 / 80 / 100 / 150 ... 300)																					
Flanges AS 4087 PN 21	(50 / 80 / 100 / 150 ... 600)																					
Flanges AS 4087 PN 16	(50 / 80 / 100 / 150 ... 350 / 450 ... 600)																					
Flanges AS 4087 PN 14	(40 / 50 / 80 / 100 / 150 ... 600)																					
Flanges AS 2129 Table F	(40 / 50 / 80 / 100 / 150 ... 600)																					
Flanges AS 2129 Table E	(40 / 50 / 80 / 100 / 125 / 150 ... 600)																					
Flanges AS 2129 Table D	(40 / 50 / 80 / 100 / 150 ... 300)																					
Flanges AS 2129 Table C	(40 / 50 / 80 / 100 / 150 ... 300)																					
ISO 7005 PN 10 EN 1092-1	(40 ... 600)																					
ISO 7005 PN 16 EN 1092-1	(40 ... 600)																					
ISO 7005 PN 40 EN 1092-1	(40)																					
Male thread acc. ISO 228 / DIN 2999 (conical)	(15 ... 25)																					
Male thread acc. NPSM (conical)	(15 ... 25)																					
Process connection material																						
Brass	(15 ... 25)																					
Carbon steel	(40 ... 600)																					
Usage certifications																						
Standard																						

Continued on next page...

AquaMaster FER reduced-bore sensor flowmeter series (Continued)

Product coding field number	1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options					
	See page 18																								
Calibration type											A														
Standard factory calibration											B														
High accuracy factory calibration											N														
Extended range calibration (Class 1)											P														
Extended range calibration (Class 2)																									
Installation temperature range / ambient temperature range												1													
Standard design -20 ... 60 °C (-4 ... 140 °F)																									
Name plate													A												
Adhesive label																									
Signal cable length and type																									
Without signal cable														0											
5 m (16.4 ft)														1											
10 m (32.8 ft)														2											
20 m (65.6 ft)														3											
30 m (98.4 ft)														4											
50 m (164.0 ft)														5											
80 m (262.5 ft)														6											
Others														9											
Explosion protection certification																									
Without																						A			
Protection class transmitter / protection class sensor																									
IP68 (NEMA 6P) / IP68 (NEMA 6P) – cable not fitted and not potted																							5		
IP68 (NEMA 6P) / IP68 (NEMA 6P) – cable fitted and potted																								6	
Cable conduits																									
MIL style																								G	
Power supply																									
Battery powered – battery not fitted																									5
AC + internal back-up																									7
External renewable energy																									8
Input and output signal type																									
MODBUS																									M
Mobile communication																									H
ScanReader																									S
Without (Note. Pulse outputs and RS232 are always present)																									Y
Configuration type / diagnostics type																									
Parameters set to factory defaults																									1

Continued on next page...

AquaMaster FER reduced-bore sensor flowmeter series (Continued)

Product coding field number		1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options
										See page 18					See page 19						
Options – add to order code																					
Transmitter related											Sensor related										
Accessories											Other usage certifications										
Configuration lead RS232											AC										
Standard battery pack											AD										
AC + external battery back-up connector (power supply option 7 only)											AS										
Modbus cable RS485											AT										
Mobile communication											Verification type										
Without											G0										
Integral (850 / 900 / 1800 / 1900 MHz)											G3										
Remote 1 m (850 / 900 / 1800 / 1900 MHz)											G6										
Remote 5 m (850 / 900 / 1800 / 1900 MHz)											G7										
Remote 10 m (850 / 900 / 1800 / 1900 MHz)											G8										
Logger and protocol											Potable water and Food & Beverage approvals										
ABB Logger – Capula / BVS											LP2										
ABB Logger – Hydreka											LP5										
ABB Logger – QTech											LP6										
ABB Logger – Areal Topkai											LP7										
ABB Logger – EcoTech											LP8										
ABB Logger – Autochart I+P											LP9										
ABB Logger – HydroComp											LPA										
ABB Logger – ABB Generic (e.g. LogMaster)											LPB										
ABB Logger – ABB AC800M System											LPC										
ABB Logger – Zeepaard											LPE										
ABB Logger – Agua Ambiente Servicios Integrales SA											LPF										
Not Required / No Logger											LPO										
Others											LPZ										
Documentation language											Pressure transducer										
German (pending)											M1										
Italian (pending)											M2										
Spanish (pending)											M3										
French (pending)											M4										
English											M5										
Pressure span											Pressure transducer										
1000 kPa / 10 bar / 145 psi											PS1										
1600 kPa / 16 bar / 232 psi											PS2										
2000 kPa / 20 bar / 300 psi											PS3										
Without											PS0										
Others											PSZ										

AquaMaster FEF full-bore sensor flowmeter series

Product coding field number	1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options		
AquaMaster system. Full-bore sensor with remote mounted transmitter	FEF221																				Add as required – see page 23	
AquaMaster system. Full-bore sensor with close coupled transmitter	FEF251																					
AquaMaster full-bore sensor only, close coupled, without transmitter	FEF271	XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	X		
AquaMaster full-bore sensor only, remote mount, without transmitter	FEF281																					
Bore diameter																						
DN 250	10 in.	250																				
DN 300	12 in.	300																				
DN 350	14 in.	350																				
DN 375	15 in.	375																				
DN 400	16 in.	400																				
DN 450	18 in.	450																				
DN 500	20 in.	500																				
DN 600	24 in.	600																				
Liner material																						
Elastomer				K																		
Electrode design																						
Standard					1																	
Measuring electrodes material																						
Stainless steel 316																						S
Super Austenitic steel (1.4529) – 250 ... 600 mm																						U
Grounding accessories																						
2 x stainless steel potential equalizing rings																					4	
Process connection type																						
Flanges ANSI / ASME B16.5 / 16.47 series B Class 150	(250 ... 350 / 400 ... 600)																				A1	
Flanges ANSI / ASME B16.5 / 16.47 series B Class 300	(250 ... 350 / 400 ... 600)																				A3	
Flanges JIS 7.5K	(250 ... 350 / 400 ... 600)																				J0	
Flanges JIS 10K	(250 ... 350 / 400 ... 600)																				J1	
Flanges JIS 5K	(250 ... 350 / 400 ... 600)																				J2	
Flanges AS 4087 PN 21	(250 ... 350 / 400 ... 600)																				E0	
Flanges AS 4087 PN 16	(250 ... 600)																				E1	
Flanges AS 4087 PN 14	(250 ... 600)																				E2	
Flanges AS 2129 Table F	(250 ... 350 / 400 ... 600)																				E3	
Flanges AS 2129 Table E	(250 ... 350 / 400 ... 600)																				E4	
Flanges AS 2129 Table D	(250 ... 350 / 400 ... 600)																				E5	
Flanges AS 2129 Table C	(250 ... 600)																				E6	
ISO 7005 PN 10 EN 1092-1	(250 ... 350 / 400 ... 600)																				S1	
ISO 7005 PN 16 EN 1092-1	(250 ... 350 / 400 ... 600)																				S2	
ISO 7005 PN 25 EN 1092-1	(250 ... 350 / 400 ... 600)																				S3	
ISO 7005 PN 40 EN 1092-1	(250 ... 350 / 400 ... 600)																				S4	
Process connection material																						
Carbon steel																					B	
Usage certifications																						
Standard																					1	

Continued on next page...

AquaMaster FEF full-bore sensor flowmeter series (Continued)

Product coding field number	1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options			
See page 21																							
Calibration type																							
Standard factory calibration											A												
High accuracy factory calibration											B												
Extended range calibration (Class 1)											N												
Extended range calibration (Class 2)											P												
Installation temperature range / ambient temperature range																							
Standard design -20 ... 60 °C (-4 ... 140 °F)												1											
Name plate																							
Adhesive label													A										
Signal cable length and type																							
Without signal cable														0									
5 m (16.4 ft)														1									
10 m (32.8 ft)														2									
20 m (65.6 ft)														3									
30 m (98.4 ft)														4									
50 m (164.0 ft)														5									
80 m (262.5 ft)														6									
Others														9									
Explosion protection certification																							
Without																			A				
Protection class transmitter / protection class sensor																							
IP68 (NEMA 6P) / IP68 (NEMA 6P) – cable not fitted and not potted																				5			
IP68 (NEMA 6P) / IP68 (NEMA 6P) – cable fitted and potted																				6			
Cable conduits																							
MIL style																					G		
Power supply																							
Battery powered – battery not fitted																					5		
AC + internal back-up																					7		
External renewable energy																					8		
Input and output signal type																							
MODBUS with RS485																							M
Mobile communication																							H
ScanReader																							S
Without (Note. Pulse outputs and RS232 are always present)																							Y
Configuration type / diagnostics type																							
Parameters set to factory defaults																							1

Continued on next page...

AquaMaster FEF full-bore sensor flowmeter series (Continued)

Product coding field number	1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options
	See page 21										See page 22									
Options – add to order code																				
Transmitter related											Sensor related									
Accessories											Verification type									
Configuration lead RS232											Without fingerprint									
Standard battery pack											CalMaster									
AC + external battery back-up connector (power supply option 7 only)																				
Modbus cable RS485																				
Mobile communication											Potable water and Food & Beverage approvals									
Without											WRAS									
Integral (850 / 900 / 1800 / 1900 MHz)											NSF61									
Remote 1 m (850 / 900 / 1800 / 1900 MHz)											AS4020									
Remote 5 m (850 / 900 / 1800 / 1900 MHz)											ACS									
Remote 10 m (850 / 900 / 1800 / 1900 MHz)																				
Logger and protocol											Pressure transducer									
ABB Logger – Capula / BVS											Remote, no transducer									
ABB Logger – Hydreka											Remote, cable length 5 m (15 ft)									
ABB Logger – QTech											Remote, cable length 10 m (33 ft)									
ABB Logger – Areal Topkai											Remote, cable length 20 m (65 ft)									
ABB Logger – EcoTech											Without									
ABB Logger – Autochart I+P											Others									
ABB Logger – HydroComp																				
ABB Logger – ABB Generic (e.g. LogMaster)																				
ABB Logger – ABB AC800M System																				
ABB Logger – Zeepaard																				
ABB Logger – Agua Ambiente Servicios Integrales SA																				
Not Required / No Logger																				
Others																				
Documentation language																				
German (pending)											M1									
Italian (pending)											M2									
Spanish (pending)											M3									
French (pending)											M4									
English											M5									
Pressure span																				
1000 kPa / 10 bar / 145 psi											PS1									
1600 kPa / 16 bar / 232 psi											PS2									
2000 kPa / 20 bar / 300 psi											PS3									
Without											PS0									
Others											PSZ									

AquaMaster FEV optimized full-bore sensor flowmeter series

Product coding field number	1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options		
AquaMaster system. Optimized full-bore sensor with remote mounted transmitter	FEV221																				Add as required – see page 26	
AquaMaster system. Optimized full-bore sensor with close coupled transmitter	FEV251	XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X			
AquaMaster optimized full-bore sensor only, close coupled, without transmitter	FEV271																					
AquaMaster optimized full-bore sensor only, remote mount, without transmitter	FEV281																					
Bore diameter																						
DN 40	1 1/2 in.	040																				
DN 50	2 in.	050																				
DN 65	2 1/2 in.	065																				
DN 80	3 in.	080																				
DN 100	4 in.	100																				
DN 125	5 in.	125																				
DN 150	6 in.	150																				
DN 200	8 in.	200																				
Liner material																						
Polypropylene			V																			
Electrode design																						
Standard				1																		
Measuring electrodes material																						
Stainless steel 316																						
Super Austenitic steel (1.4529) – 40 ... 200 mmm																						S U
Grounding accessories																						
2 x stainless steel potential equalizing rings																					4	
Process connection type																						
Flanges ANSI / ASME B16.5 / 16.47 series B Class 150																					A1	
Flanges JIS 7.5K	(80 / 100 / 150 / 200)																				J0	
Flanges JIS 10K	(40 / 50 / 80 / 100 / 150 / 200)																				J1	
Flanges AS 4087 PN 21	(50 / 80 / 100 / 150 / 200)																				E0	
Flanges AS 4087 PN 16	(50 / 80 / 100 / 150 / 200)																				E1	
Flanges AS 4087 PN 14	(40 / 50 / 80 / 100 / 150 / 200)																				E2	
Flanges AS 2129 Table F	(40 / 50 / 80 / 100 / 150 / 200)																				E3	
Flanges AS 2129 Table E	(40 / 50 / 80 / 100 / 125 / 150 / 200)																				E4	
Flanges AS 2129 Table D	(40 / 50 / 80 / 100 / 150 / 200)																				E5	
Flanges AS 2129 Table C	(40 / 50 / 80 / 100 / 150 / 200)																				E6	
ISO 7005 PN 10 EN 1092-1																					S1	
ISO 7005 PN 16 EN 1092-1																					S2	
ISO 7005 PN 40 EN 1092-1																					S4	
Process connection material																						
Carbon steel	(40 ... 600)																				B	
Usage certifications																						
Standard																					1	

Continued on next page...

AquaMaster FEV optimized full-bore sensor flowmeter series (Continued)

Product coding field number	1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options						
	See page 24																									
Calibration type											A															
Standard factory calibration											B															
High accuracy factory calibration											N															
Extended range calibration (Class 1)											P															
Extended range calibration (Class 2)											J															
Class 2.5																										
Installation temperature range / ambient temperature range												1														
Standard design																										
-20 ... 60 °C (-4 ... 140 °F)																										
Name plate													A													
Adhesive label																										
Signal cable length and type														0												
Without signal cable														1												
5 m (16.4 ft)														2												
10 m (32.8 ft)														3												
20 m (65.6 ft)														4												
30 m (98.4 ft)														5												
50 m (164.0 ft)														6												
80 m (262.5 ft)														9												
Others																										
Explosion protection certification																										
Without																										
Protection class transmitter / protection class sensor																										
IP68 (NEMA 6P) / IP68 (NEMA 6P) – cable not fitted and not potted																										
IP68 (NEMA 6P) / IP68 (NEMA 6P) – cable fitted and potted																										
Cable conduits																										
MIL style																										
Power supply																										
Battery powered – battery not fitted																										
AC + internal back-up																										
External renewable energy																										
Input and output signal type																										
MODBUS with RS485																										
Mobile communication																										
ScanReader																										
Without (Note. Pulse outputs and RS232 are always present)																										
Configuration type / diagnostics type																										
Parameters set to factory defaults																										

Continued on next page...

AquaMaster FEV optimized full-bore sensor flowmeter series (Continued)

Product coding field number		1,2,3,4,5,6	7,8,9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options											
											See page 24											See page 25										
Options – add to order code																																
Transmitter related											Sensor related																					
Accessories											Other usage certifications																					
Configuration lead RS232											AC																					
Standard battery pack											AD																					
AC + external battery back-up connector (power supply option 7 only)											AS																					
Modbus cable RS485											AT																					
Mobile communication											Verification type																					
Without											G0																					
Integral (850 / 900 / 1800 / 1900 MHz)											G3																					
Remote 1 m (850 / 900 / 1800 / 1900 MHz)											G6																					
Remote 5 m (850 / 900 / 1800 / 1900 MHz)											G7																					
Remote 10 m (850 / 900 / 1800 / 1900 MHz)											G8																					
Logger and protocol											Potable water and Food & Beverage approvals																					
ABB Logger – Capula / BVS											LP2																					
ABB Logger – Hydreka											LP5																					
ABB Logger – QTech											LP6																					
ABB Logger – Areal Topkai											LP7																					
ABB Logger – EcoTech											LP8																					
ABB Logger – Autochart I+P											LP9																					
ABB Logger – HydroComp											LPA																					
ABB Logger – ABB Generic (e.g. LogMaster)											LPB																					
ABB Logger – ABB AC800M System											LPC																					
ABB Logger – Zeepaard											LPE																					
ABB Logger – Agua Ambiente Servicios Integrales SA											LPF																					
Not Required / No Logger											LP0																					
Others											LPZ																					
Documentation language											Pressure transducer																					
German (pending)											M1																					
Italian (pending)											M2																					
Spanish (pending)											M3																					
French (pending)											M4																					
English											M5																					
Pressure span											Pressure transducer																					
1000 kPa / 10 bar / 145 psi											PS1																					
1600 kPa / 16 bar / 232 psi											PS2																					
2000 kPa / 20 bar / 300 psi											PS3																					
Without											PS0																					
Others											PSZ																					

AquaMaster 3 transmitter

		FET2211A0Y5G	X	X	X
Power supply					
Battery			5		
AC + backup			7		
External renewable energy			8		
Input and output signal type					
Mobile radio communication				H	
MODBUS with RS485				M	
ScanReader				S	
Without				Y	
Note. Pulse outputs and RS232 are always present					
Configuration					
Standard					1

Options			
Options – add to order code			
Transmitter related		Sensor related	
Accessories		Other usage certifications	
Configuration lead RS232	AC	MID (Measurement Instrument Directive) – FER2, 40 ... 300 mm sensors only	CM2
Standard battery pack	AD	NMI – FEV sensor only (pending) *	CM3
AC + external battery back-up connector (power supply option 7 only)	AS	* not applicable to 65 or 125 mm sensors	
Modbus cable RS485	AT		
Mobile communication		Pressure transducer	
Without	G0	Remote, no transducer	PT2
Integral (850 / 900 / 1800 / 1900 MHz)	G3	Remote, cable length 5 m (15 ft)	PT4
Remote 1 m (850 / 900 / 1800 / 1900 MHz)	G6	Remote, cable length 10 m (33 ft)	PT5
Remote 5 m (850 / 900 / 1800 / 1900 MHz)	G7	Remote, cable length 20 m (65 ft)	PT6
Remote 10 m (850 / 900 / 1800 / 1900 MHz)	G8	Without	PT0
		Others	PTZ
Logger and protocol			
ABB Logger – Capula / BVS	LP2		
ABB Logger – Hydreka	LP5		
ABB Logger – QTech	LP6		
ABB Logger – Areal Topkai	LP7		
ABB Logger – EcoTech	LP8		
ABB Logger – Autochart I+P	LP9		
ABB Logger – HydroComp	LPA		
ABB Logger – ABB Generic (e.g. LogMaster)	LPB		
ABB Logger – ABB AC800M System	LPC		
ABB Logger – Zeepaard	LPE		
ABB Logger – Agua Ambiente Servicios Integrales SA	LPF		
Not Required / No Logger	LP0		
Others	LPZ		
Documentation language			
German (pending)	M1		
Italian (pending)	M2		
Spanish (pending)	M3		
French (pending)	M4		
English	M5		
Pressure span			
1000 kPa / 10 bar / 145 psi	PS1		
1600 kPa / 16 bar / 232 psi	PS2		
2000 kPa / 20 bar / 300 psi	PS3		
Without	PS0		
Others	PSZ		

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