

---

ABB MEASUREMENT & ANALYTICS | DATA SHEET

# AquaMaster4 FEW4 and FET4

## Electromagnetic flowmeter



# **Measurement made easy**

The ideal flowmeter for potable water distribution networks, revenue metering and irrigation applications

## **Multiple measurement parameters**

- flow rate, flow velocity, volume flow (forward, reverse and net) and pressure (option)

## **Multiple power options**

- battery (with up to 10 years life), solar / wind renewable and AC mains

## **Wide range of sensor styles and size**

- reduced bore DN40 to 600, octagonal bore DN40 to 200, full bore DN250 to 2400 and probe 300 to 1000 mm

## **Ideal for arduous applications**

- IP68 for submersion and up to 5m buriable

## **Verification**

- in situ diagnostics and self checking capabilities

## **Flexible communications**

- pulse, Modbus™ and Sensus™ with wireless interface to mobile smart phone / tablet

## Applications

- Water supply in district / zonal metering area
- Revenue metering
- Leak monitoring in district / zonal metering area
- Survey and flow investigation
- Irrigation and abstraction

## Additional product features

- In-situ diagnostics and self-checking capabilities with OIML R49 type P (optional)
- High and low flowrate alarms
- Backward compatible with legacy AquaMaster sensors
- Drinking water certifications:  
WRAS, NSF, ACS, AS/NZS 4020
- Metrology certifications (pending):  
OIML R49, MID MI-001, NMI R49

## Values to you

- Solution from the masters of flow measurement – in 1988, ABB invented and designed the world's first battery-powered electromagnetic flowmeter for DMA (District Metered Area)
- Invest smartly through 'single box' DMA solution – combining flow, pressure and data-logging
- Have greatest confidence in your billing based on highest accuracy with widest flow range revenue meter
- Get early warnings for leaks or bursts and reduce NRW (Non-Revenue Water) – highest confidence in night line performance
- Have highest confidence in the wet calibration – our flow rigs are certified by various national independent accredited bodies / laboratories all linked by the 'International Laboratory Accreditation Cooperation' (ILAC)
- Fit and flow with factory default settings. Use the ABB Velox Interface mobile smart phone / tablet app to easily change configuration / settings to your preference
- Lowest total cost of ownership (TOTEX) over complete product lifecycle
- Maximum confidence in the health of the flow meter through the use of ABB's SRV500 in-situ verification tool

## Overview

### Multiple power options



2 x internal batteries  
(up to 10 years life)



Solar



Wind



AC mains

### Interactive phone / tablet app – simple and easy



Secured and easy



Contactless



Chart and retrieve data



Offline configuration



Google Play  
Microsoft Store  
Easy firmware update

### Configurable features



In-built logger



Pressure measurement



Self-checking to OIML R49 type P



### Communications options



Pulse output



MODBUS



Sensus protocol

### Multiple sensor options



Reduced bore  
DN40 to 600



Octagonal bore  
DN40 to 200



Full bore  
DN250 to 2400



Probe  
300 to 1000 mm



### Measurement performance



Accuracy up to  $\pm 0.2\%$   
 $\pm 0.5 \text{ mm/s}$  whichever is greater



Range (R) up to R1000

### Drinking water approvals

NSF | WRAS | AS/NZS 4020 | DVGW | ACS

### Wide environmental conditions



IP68 to 10 m  
and up to 5 m  
buriable



-20 to 60 °C



Comparable to  
DIN ISO 12944  
Corrosion resistance

### Product type approvals (pending)

OIML R49 for accuracy class 1 and 2, MID MI-001,  
NMI R49 and NMI 10 and PAC for China

### Calibration rig approvals

ISO 17025 | UKAS | NATA | SIMT | NIST traceable

## Why is AquaMaster4 your first choice for distribution networks and revenue metering applications?

Your challenge	Our offering	Advantages for you
Do you have confidence in your revenue meter and therefore in your water balance table?	<p>AquaMaster4 offers highest accuracy with a wide flow range. Our 0D upstream and downstream reduced bore sensor is virtually insensitive to hydraulic disturbances as it conditions the upstream fluid flow profile within the sensor's central measuring zone giving superior performance; especially during the night when the flow rate is low.</p> 	Increase in revenue for authorized water consumption and early warnings on leaks (non-revenue water)
Do you want to reduce the cost for commissioning and interacting with the product?	<p>The AquaMaster4's in-built Data Logger runs at high speed, logging at a fast rate giving the user total flexibility to download (typically 15 minutes) logged data; then investigate, in precise detail, flow and pressure activity during a period of interest at even higher time resolution.</p> <p>Such high resolution data facilitates step testing, leakage detection and water network analysis. The in-built logger delivers accuracies which are not possible when using an external data logger.</p> 	
Do you want to have the lowest operational expenditure throughout the lifecycle of the product?	<p>A free app (Velox Interface) is available for use with Android and Windows™ smartphones and tablets. This supports simple configuration changes to made on your touchscreen color phone / tablet. Just touch to upload, then configure offline, touch again to update the AquaMaster4 configuration.</p> <p>The logger contents can be downloaded as a file in industry-standard CSV format in the same manner. To ensure the product remains up-to-date with the latest features and enhancements, the firmware is updated using the Velox Interface app.</p> <p>'Fit-and-Flow' data storage inside AquaMaster4 eliminates the need to match a remote sensor with a transmitter in the field. On initial installation, the self-configuration sequence replicates all calibration factors, meter size and serial numbers, together with customer site-specific settings, into the transmitter automatically, eliminating the opportunity for error.</p>	Increase productivity of your staff / contractor and eliminate poor quality through human error
	<p>Using two standard off-the-shelf 'D' lithium cells, the AquaMaster4 can be operated for up to 10 years.</p> <p>Using a simple DC (6 to 32 V) connection from sources as small as a 5 W solar panel / wind generator, AquaMaster4 can be operated with green energy sources.</p> <p>There is no longer any need for bespoke cables and laptops to connect to each transmitter.</p> 	Lower cost of ownership
	<p>In-situ self checking of flowmeter health enables the user to meet regulatory / technical requirements. In 1995 ABB invented and designed the world's first in-situ verification system for electromagnetic flowmeters. Building on ABB's fingerprint philosophy, each flow meter is verification tested before shipping from the factory. SRV500 enables the operator to choose whether to either use the factory fingerprint or, after product commissioning, to create a new fingerprint based on real site conditions.</p> 	Simplifies compliance to ISO 9001 traceability without any additional effort

## ...Overview

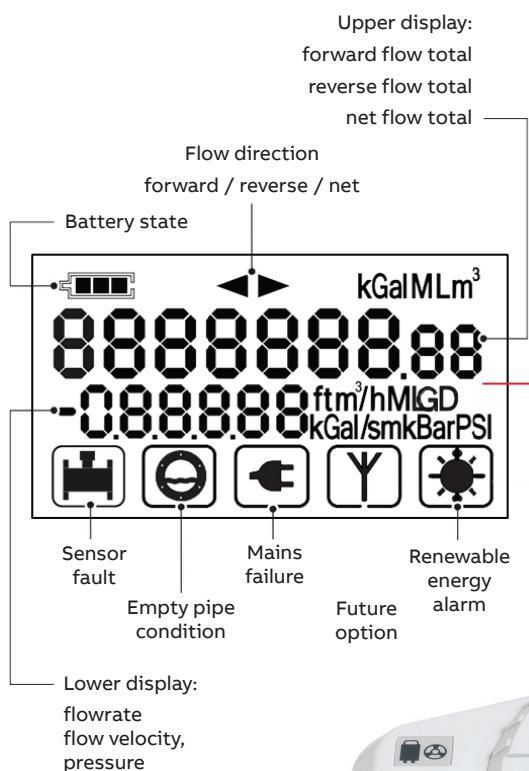
### Protective cover with wire to the contactless coupler

The removable cover protects the transmitter display from accidental impact damage



### Wall-mount contactless coupler

The wall mount coupler allows users to communicate easily using a mobile phone / tablet when the transmitter is located in inaccessible places (for example, a pit)



### Contactless communication

Interacting with the transmitter is easily achieved with an Android / Microsoft smart phone / tablet over NFC

### IP68 connectors

IP68 rated as standard, the transmitter can be fully-submerged for up to 2 meters

### Anti-tamper seal

Secured against any tampering, meeting MID MI-001 regulations

### Battery enclosure

Enclosure for 2 off-the-shelf standard lithium batteries

**Range of flange options**

ISO 7005, DIN, EN 1092-1 PN10 / PN16 / PN25 / PN40  
 ANSI / ASME B16.5 / 16.47 series B  
 Class 150 / Class 300  
 AWWA C207 Class B / D / E  
 AS 4087 PN16  
 AS2129 Table E  
 JIS 7.5K / 10K / 5K

**IP68, NEMA 6P**

All sensor types are, as standard, inherently submersible thus ensuring suitability for installation in chambers and metering pits that are prone to flooding

**Sensor memory**

The sensor stores all calibration factors, site settings and serial numbers enabling users to fit-and-flow

**Drinking water approvals**

NSF | WRAS | AS/NZS 4020 | DVGW | ACS

**EN ISO 12944 C4 grade comparable corrosion resistance**

Zinc-based primed with =70 µm (optional 300 µm) thick paint coat will give long lasting corrosion resistance even in arduous applications

**Upstream and downstream pipe length**

Reduced bore DN40 to 600 requires 0D upstream and downstream  
 Octagonal bore DN40 to 200 requires 5D upstream and 0D downstream

Full bore DN250 to 2400 requires 5D upstream and 2D downstream

**Available in both integral and remote form****IP68, NEMA 6P**

All sensor types are, as standard, inherently submersible thus ensuring suitability for installation in chambers and metering pits that are prone to flooding

**Sensor memory**

The sensor stores all calibration factors, site settings and serial numbers enabling users to fit-and-flow

**Material selected to last**

The sensor body material enables it to be used in rugged applications

**Hot tap capability**

The sensor construction enables installation with no interruption to water supply

## Calibration in ABB flow laboratory



Figure 1 ABB calibration rig – certificated by ISO, UKAS, NATA, SIMT and NIST traceable

ABB's flow calibration facilities are certified by various national independent accredited bodies / laboratories and these are all linked by the 'International Laboratory Accreditation Cooperation' (ILAC7).

Flowmeters in ABB's facilities can be calibrated by one of the following methods:

- gravimetric (using weigh scales)
- volumetric (using the meter prover)
- comparison (using reference meters)

Additionally, ABB's laboratories are checked against each other and against external accredited laboratories using transfer standard meters.

### Gravimetric

In this method, the flowmeter is calibrated in a pipeline, with water being pumped through it from a sump. A diverter valve situated downstream directs the flow from the meter either back to the sump or to a tank of sufficient capacity attached to a highly accurate weighing system.

### Volumetric

There are two main methods of volumetric calibration:

- Fixed volume volumetric tank method
  - This method works in a similar way to the gravimetric method, except that the flow from the meter is diverted into a tank of known volumetric capacity. This eliminates the need for a weighing system or to calculate the volume of water from its weight.

### • Fixed volume ball meter prover

- In this method, the diverter valve directs the flow from the meter into a meter prover. The prover is a precisely manufactured section of pipe containing a sphere that is three percent larger in diameter than the pipe. Two detector switches are situated in the pipe at a fixed distance apart. The volume of water that is contained in the pipe between the switches is known as the calibrated volume.

### Comparison

In this method, the flowmeter under calibration is installed in a pipeline in series with a reference, or master, flowmeter with a known calibration. Once the flow of water through both meters is stable, a timer is started and the outputs of both meters are simultaneously monitored. After a set period, the timer is stopped. Using the data from the calibration run enables the average flowrate of the meter under test to be compared with the master meter, with the difference being the error.

### Advantages of ABB's calibration rig

ABB has one of the largest calibration facilities in the world, capable of pumping  $2.5 \text{ m}^3/\text{s}$ , enabling larger meters to be calibrated at high flowrates.

All of ABB calibration facilities are continuously pumped enabling a flowmeter to be calibrated at a steady flowrate (for example, over 300 or 600 seconds; or longer if required), to reduce a meter's random uncertainty errors during calibration.

ABB's high turndown flowmeters (those with a high R number) can be calibrated over an extended flow range, guaranteeing accurate flowmeter performance over its full operating range.

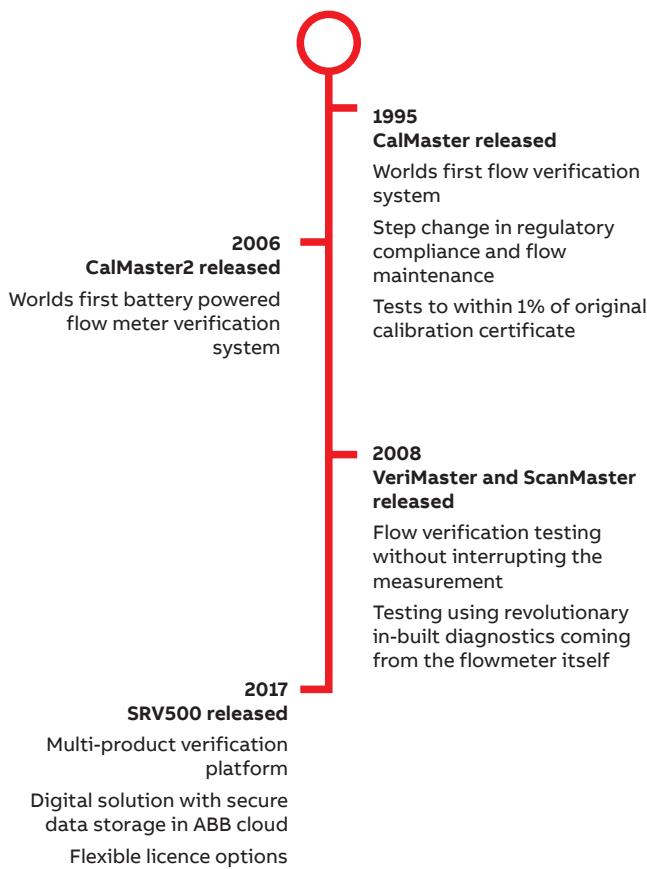
## Verification

### What is verification?

Verification is the inspection and testing of a product to establish that it meets regulatory / technical requirements. Industrial instrumentation is robust, very reliable and designed to operate for many years with minimal maintenance. In today's competitive environment customers are looking for ways to maximize their profitability, regular product verifications is one way to ensure processes continuously operate at their peak.

### The ABB verification story

Customers in the water and process industries have been able to save large sums of money thanks to ABB's innovations in product verification over the last two decades.



### Introducing SRV500

The next generation verification tool suite for use with ABB's complete range of active electronic flow meters. Download the software for free and use the instrument-specific test routine to provide the best possible check of product health, without stopping your process.

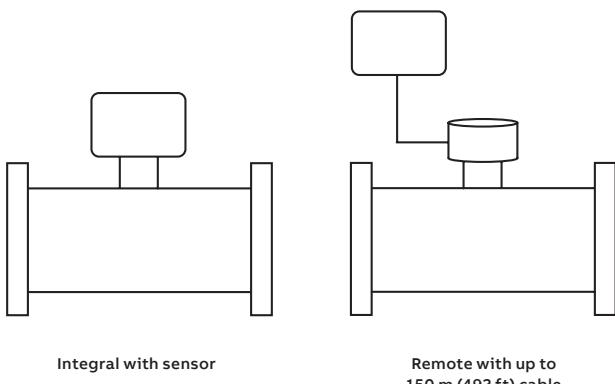
SRV500 verifies the condition and performance of the flow meter under test. With the licensed software version, test reports can be generated and stored locally for further analysis. SRV500 also analyzes the product internal diagnostics and compares the results with historical measurements.

SRV500 enables the operator to choose whether to use either the factory fingerprint or to create a new fingerprint based on real site conditions after product commissioning. All verifications performed in the field can then be compared with the fingerprint data and previous tests to ensure flow meter performance has not degraded.



## Specification – transmitter

### Mounting on flow sensor



### Power supply



#### Battery power

2 lithium thionyl chloride 'D' batteries

**Note.** The following batteries work with the product:

- SAFT LS33600 \*
- Eve ER34615 \*
- GB Cell ER34615
- cT-energy ER34615
- OmniCel ER34615
- GEBC ER34615
- LiYa ER34615
- Fanzo ER34615H

\* Preferred

#### Nominal battery life

Sensor style	Size	Integral mount transmitter	Remote mount transmitter
Reduced bore	DN40 to 80	10.5 years	8 years
	DN100 to 300	7 years	5.5 years
	DN350 to 600	6 years	5 years
Octagonal bore	DN40 to 200	10.5 years	8 years
Full bore	DN250 to 600	6 years	5 years
	DN700 to 2400	2.5 years	2 years
Probe	300 to 1000 mm	10.5 years	8 years

Test conditions:

- acquisition = 15 seconds
- pulse output = 2 Hz @ 5 ms
- alarm output on = 25 %
- logger rate = 1 minute
- with pressure
- integral verification self check = 15 minutes
- ambient temperature = 20 °C

Battery capacity and life are significantly shortened:

- when the operating environment temperature ranges between -20 and 0 °C or 50 and 70 °C (-4° and 32 °F or 122 and 158 °F)
- when data acquisition is less than 15 seconds
- when pulse output width > 5 ms and output frequency is set high
- with extended NFC interface use
- Class 1 / 0.2 % factory calibration (RDF in ordering code) and Class 2/Class 1 calibration to OIML R49 options (RCM and RCN in ordering code)

#### Mains supply (option – remote only)

- 95 to 240 V AC, 50 / 60 Hz, 3 VA
- Mains connection cable: approx. 3 m (9.8 ft)

#### Internal backup power time for:

- DN40 to 200: 16 days
- DN250 to 600: 6 days
- DN700 to 2400: 3 days

#### Renewable power (option)

- Solar or wind
- Input voltage: 6 to 32 V DC @ 5 W
- Max. current: 200 mA

#### Internal backup time for:

- DN40 to 200: 48 days
- DN250 to 600: 18 days
- DN700 to 2400: 9 days

**Note.** Renewable energy generators do not operate at maximum capacity. For example, low wind speeds, dirty solar panels and shorter daylight periods all reduce capacity. Consequently, some installations may require generators with a capacity greater than the specified 5 W minimum.

### Inputs

- IP68 connectors, mains cable (remote only)
- Sensor cable (remote only). ABB sensor cable supplied as standard. SWA cable available (via adapter box) on application
- Pressure transducer connection (option)

### Configuration / User interface

ABB Velox Interface app on a compatible tablet or smartphone. Operating systems of smartphone or tablet are Android (Kit Kat or newer) and Windows (10 mobile or newer). Functions of Velox Interface include configuration, diagnostics, logger data retrieval and transmitter flash update.

## Outputs

- Pulse / Alarm
- RS485 Modbus
- Sensus protocol

### Pulse outputs (option)

- Output 1: forward pulses
- Output 2: reverse pulses
- +35 V @ 20 mA solid state, unipolar
- Isolated with one common, shared with alarm output max. ±50 V to earth
- 50 Hz max., programmable pulse width, default 2 ms \*

\* Increasing pulse width beyond 2 ms at frequencies greater than 10 Hz reduces battery life

### Modbus interface (option)

- Modbus RTU over 2-wire EIA-485
- Supported baud rates: 9600 and 19200
- Max. devices on bus segment: 32
- Max. response time, 1 registered read: 60 ms
- Max. response time, 1 registered write: 600 ms

### Alarm outputs (option)

- Indicates any problem with measurement, power supply or flowrate alarm
- Bi-directional, solid state
- +35 V @ 50 mA
- Isolated with one common, shared with pulse outputs

### Automatic meter reading (AMR)

3-wire Sensus compatible

## Logger

Logger function	Flow and pressure	Forward, reverse, and net flow totals
No. of records	45871	3120
Logging interval *	15 seconds 30 seconds 1 minute 5 minutes 15 minutes (selectable)	24 hours (fixed)
Logger capacity	31 days @ 1 minute 477 days @ 15 minutes	8 years

\* Based on a default 15 second measurement rate when operating on battery or renewable power

Retrieval of logger data file via smartphone / tablet – see

### Configuration / User interface

#### on page 10

### Logger data file format

- .csv for easy import into databases / spreadsheets
- Time-stamped records with flow, pressure and totalizers in user-configured units of measurement

### Response time (programmable)

- >0.1 second (mains-powered)
- 15 seconds (battery-powered + external renewable energy)

## Environmental and operating conditions

### Ingress rating

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

### Submerged

9 months accrued time

### Humidity

0 to 100 %

### Temperature ranges

Storage: -20 to 60 °C (-4 to 140 °F)

Ambient: -20 to 60 °C (-4 to 140 °F)

## Transmitter vibration

### IEC 60068-2-6 (2007)

Vibration level 2g

## Options and certifications

### Compatible sensor styles



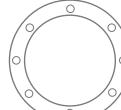
Reduced bore

DN40 to 600



Octagonal bore

DN40 to 200



Full bore

DN250 to 2400



Probe

300 to 1000 mm

### External pressure transducer (option)

10, 20 and 40 bar absolute

### Backward compatibility (option)

- Full compatibility with legacy AquaMaster remote sensors. Plugs directly into AquaMaster4 with no specific configuration required.

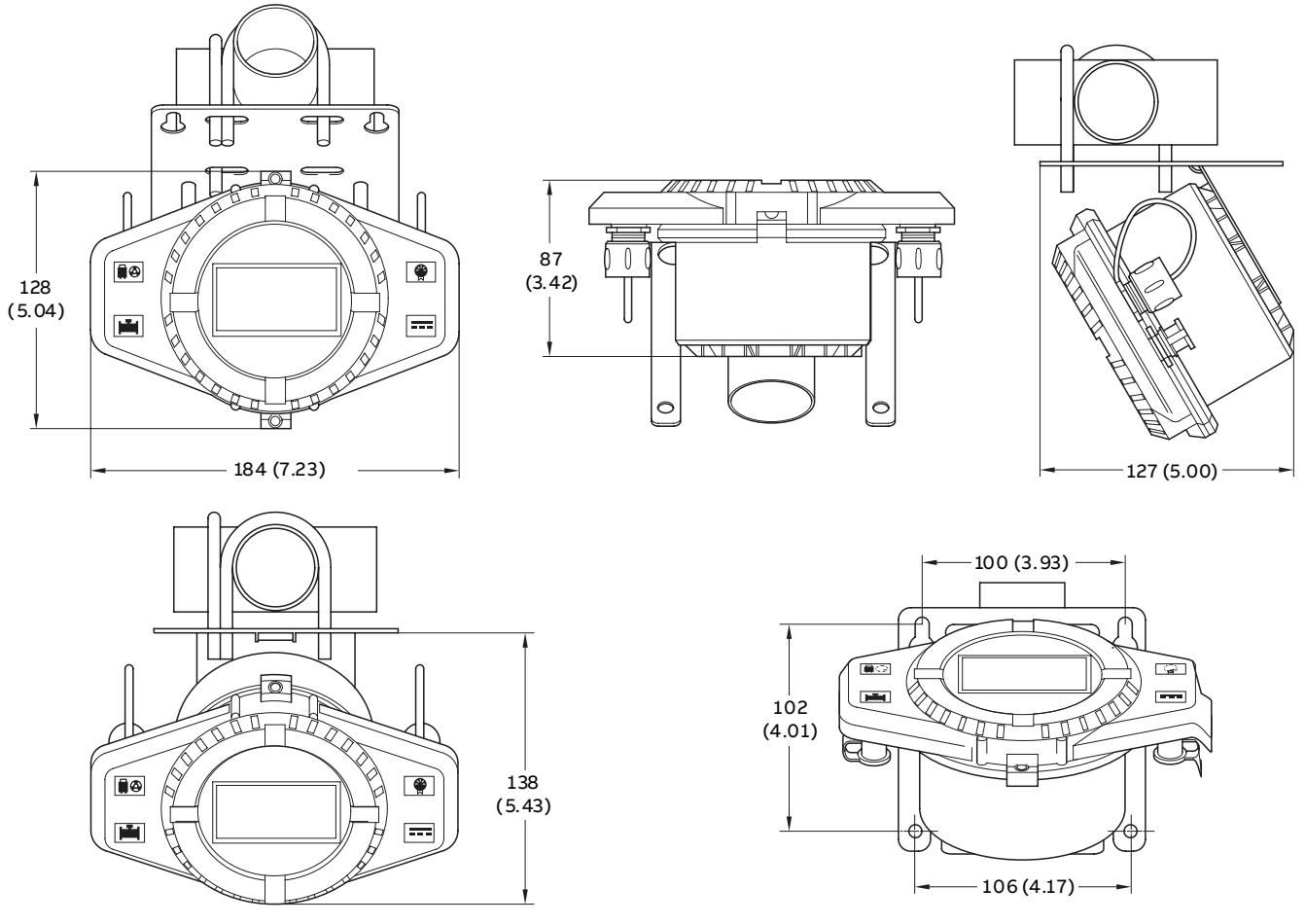
### MID / Tamper detection (option) (approval pending)

- Switch selectable inside the tamper-evident, seal-protected enclosure
- Prevents changes to meter configuration that affect the meter / output accuracy

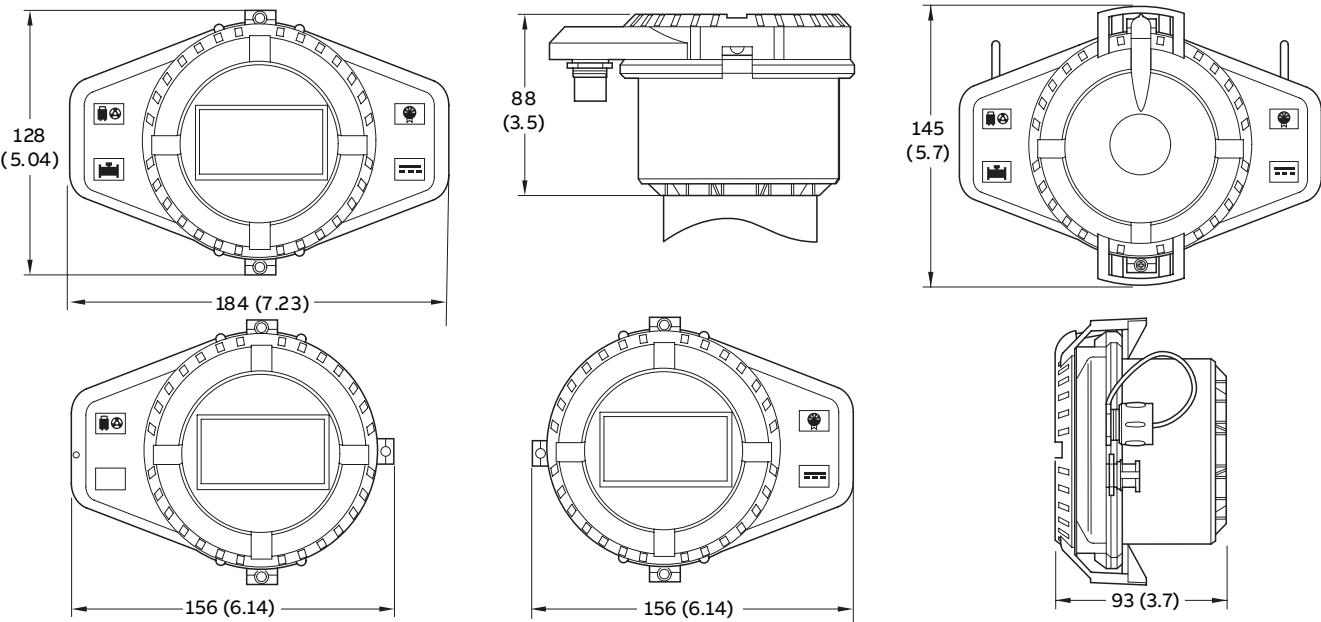
## ...Specification – transmitter

### Dimensions

Dimensions in mm (in)



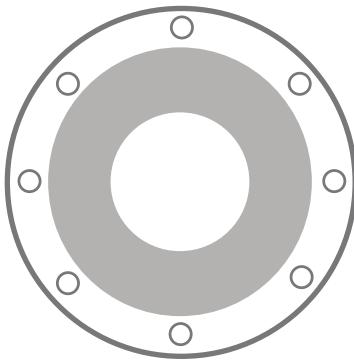
Wall- / Pipe-mount remote transmitter



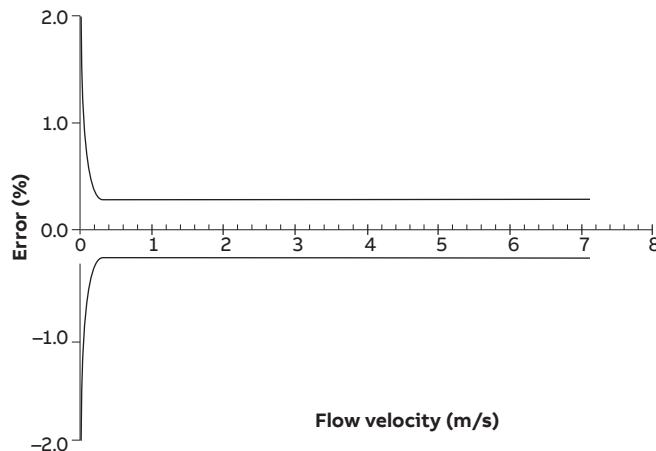
Integral transmitter

Transmitter with NFC aerial cover

## Specification – reduced bore sensor



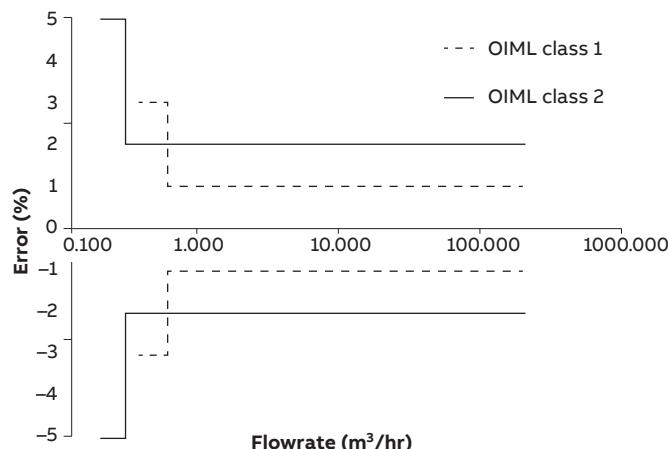
### Measurement accuracy



DN	Mains powered		Battery / Renewable energy powered	
	Class 2	Class 1	Class 2	Class 1
40 to 600	±0.5 or ±0.4 %	±0.2 %	±0.5 or ±0.4 %	±0.2 %

\* Whichever is the greater

### Metrological performance to OIML R49 (pending)



DN	in	Q3 ( $\text{m}^3/\text{h}$ )	Mains powered		Battery / Renewable energy powered	
			Class 2 (R = 1000)	Class 1 (R = 500)	Class 2 (R = 400)	Class 1 (R = 160)
			Q1 ( $\text{m}^3/\text{h}$ )	Q1 ( $\text{m}^3/\text{h}$ )	Q1 ( $\text{m}^3/\text{h}$ )	Q1 ( $\text{m}^3/\text{h}$ )
40	1½	25	0.03	0.05	0.06	0.16
50	2	40	0.04	0.08	0.10	0.25
65	2½	63	0.06	0.13	0.16	0.39
80	3	100	0.10	0.20	0.25	0.63
100	4	160	0.16	0.32	0.40	1
125	5	160	0.16	0.32	0.40	1
150	6	400	0.40	0.80	1	2.50
200	8	630	0.63	1.26	1.58	3.94
250	10	1000	1	2	2.50	6.25
300	12	1600	1.60	3.20	4	10
350	14	1600	1.60	3.20	4	10
400	16	2500	2.50	5	6.25	15.63
450	18	2500	2.50	5	6.25	15.63
500	20	4000	4	8	10	25
600	24	6300	6.30	12.60	15.75	39.38

$$Q2 = 1.6 * Q1$$

$$Q4 = 1.25 * Q3$$

DN	in	Q3 (US gal/ min)	Mains powered		Battery / Renewable energy powered	
			Class 2 (R = 1000)	Class 1 (R = 500)	Class 2 (R = 400)	Class 1 (R = 160)
			Q1 (US gal/ min)	Q1 (US gal/ min)	Q1 (US gal/ min)	Q1 (US gal/ min)
40	1½	110	0.11	0.22	0.28	0.69
50	2	176	0.18	0.35	0.44	1.10
65	2½	277	0.28	0.55	0.69	1.73
80	3	440	0.44	0.88	1.10	2.75
100	4	704	0.70	1	1.76	4.40
125	5	704	0.70	1	1.76	4.40
150	6	1761	1.76	3.52	4.40	11
200	8	2774	3	6	6.93	17.34
250	10	4403	4.40	8.81	11	27.52
300	12	7045	7	14	17.61	44
350	14	7045	7	14	17.61	44
400	16	11007	11	22	27.52	68.79
450	18	11007	11	22	27.52	68.79
500	20	17611	17.61	35.22	44	110
600	24	27738	28	55	69	173

$$Q2 = 1.6 * Q1$$

$$Q4 = 1.25 * Q3$$

## ...Specification – reduced bore sensor

### Bore sizes and flange types

#### Bore size range

DN40 to 600

#### Flanges to standards

ASME

AWWA

ISO 7005 EN1092-1

DIN

AS4087

AS2129

JIS

#### Pressure limitations for flanges

As per flange rating

#### 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.

#### Bore and flange material

- DN40 to 300: SG iron
- DN350 to 600: carbon steel
- All sizes coated with light gray 2-pack epoxy (RAL9002)
- Primer: Interpon PZ660 zinc-based system, 70 microns thick
- Top coat: Interpon 610 light gray polyester powder coating (RAL 9002), up to 150 microns thick, comparable to EN ISO 12944 grade C4
- As a special requirements: 2-pack epoxy primer / finish @ 300 µm DFT

#### Terminal box for remote sensors

Polycarbonate

### Environmental and process conditions

#### Ingress rating

- IP68 (NEMA 6P) to 10 m (33 ft)
- For buriable applications: 1 m < sensor depth ≤ 5 m

#### Temperature ranges

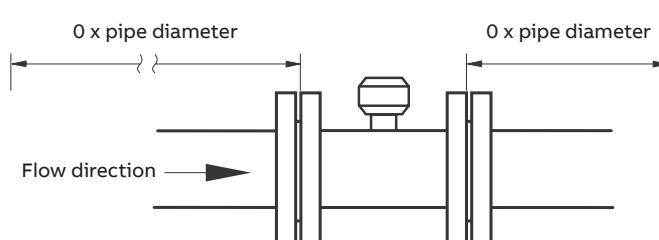
Ambient: -20 to 70 °C (-4 to 158°F)

Process: -6 to 70 °C (21 to 158 °F)

#### Conductivity

>20 µS/cm

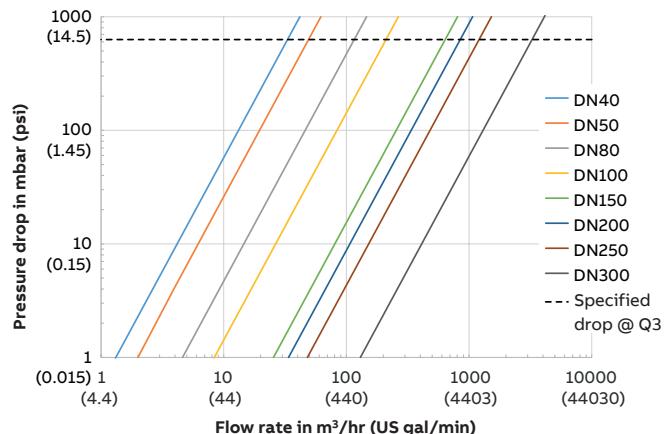
#### Upstream and downstream pipe conditions



### Pressure loss

Flow rate	Pressure loss in bar (psi)
$Q_3$	<0.63 (9.1)
$Q_3 / 2$	<0.16 (2.3)

### Reduced bore sensor pressure drop (typical)



### Potable water approvals for wetted parts

WRAS

ACS

DVGW W270

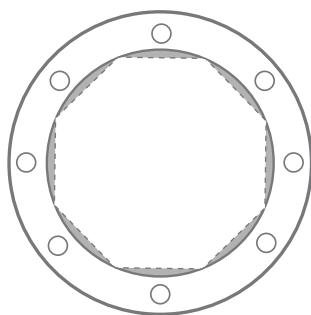
NSF – 61

AZ/NZ 4020

### Metrological certifications (pending)

- OIML R49 for accuracy class 1 and 2 and environmental class T50 0.1 to 50 °C (32.18 to 122 °F)
- MID MI-001
- NMI R49 and NMI 10 for Australia
- PAC for China

## Specification – full bore sensor



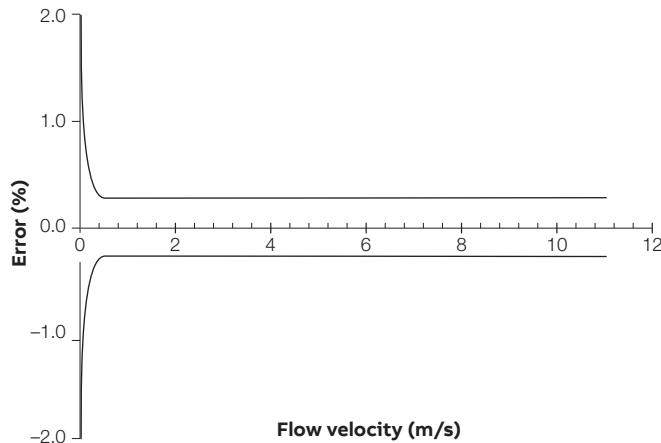
DN40 to 200

Octagonal bore, polypropylene liner

DN250 to 2400

Full bore, elastomer or hard rubber liner

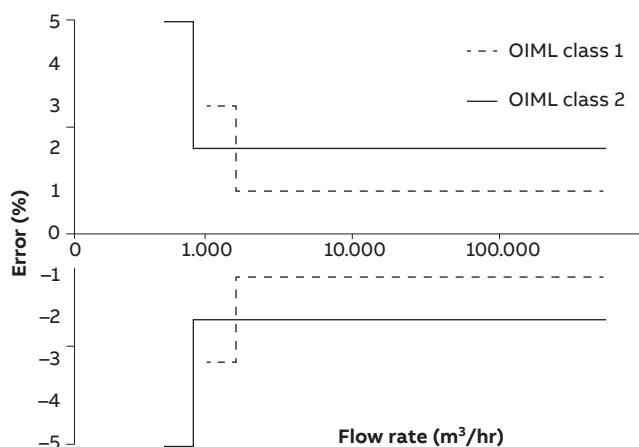
### Measurement accuracy



DN	Mains powered		Battery / Renewable energy powered	
	Class 2 ±0.5 or ±0.4 %	Class 1 ±0.2 %	Class 2 ±0.5 or ±0.4 %	Class 1 ±0.2 %
40 to 600	±2 mm/s *	±1 mm/s *	±4 mm/s *	±2 mm/s *
700 to 2400	±4 mm/s *	±2 mm/s *	±6 mm/s *	±3 mm/s *

\* whichever is the greater

### Metrological performance to OIML R49 (pending)



DN	in	Q3 (m³/h)	Mains powered		Battery / Renewable energy powered	
			Class 2 (R = 500)	Class 1 (R = 250)	Class 2 (R = 250)	Class 1 (R = 125)
40	1½	40	0.08	0.16	0.16	0.32
50	2	63	0.13	0.25	0.25	0.50
65	2½	100	0.20	0.40	0.40	0.80
80	3	160	0.32	0.64	0.64	1.28
100	4	250	0.50	1	1	2
125	5	250	0.80	1	1.60	3.20
150	6	630	1.26	2.52	2.52	5.04
200	8	1000	2	4	4	8
250	10	1600	3.20	6.40	6.40	12.80
300	12	2500	5	10	10	20
350	14	4000	8	16	16	32
400	16	4000	8	16	16	32
450	18	6300	12.60	25.20	25.20	50.40
500	20	6300	12.60	25.20	25.20	50.40
600	24	10000	20	40	40	80
			Class 2 (R = 315)	Class 1 (R = 160)	Class 2 (R = 160)	Class 1 (R = 80)
700	28	16000	50.79	100	100	200
760	30	16000	50.79	100	100	200
800	32	16000	50.79	100	100	200
900	36	25000	79.37	156.20	156.25	312
1000	40	25000	79.37	156.20	156.25	312
1050	42	25000	79.37	156.20	156.25	312
1100	44	40000	126.98	250	250	500
1200	48	40000	126.98	250	250	500
1400	54	63000	200.00	393.70	393.75	787
1500	56	63000	200.00	393.70	393.75	787
1600	60	63000	200.00	393.70	393.75	787
1800	64	100000	317.46	625	625	1250
2000	66	100000	317.46	625	625	1250
2200	72	160000	507.94	1000	1000	2000
2400	78	160000	507.94	1000	1000	2000

Q2 = 1.6 \* Q1

Q4 = 1.25 \* Q3

## ...Specification – full bore sensor

### ...Metrological performance to OIML R49 (pending)

DN	in	Q3 (US gal/ min)	Mains powered		Battery / Renewable energy powered	
			Class 2 (R = 500)	Class 1 (R = 250)	Class 2 (R = 250)	Class 1 (R = 125)
			Q1 (US gal/ min)	Q1 (US gal/ min)	Q1 (US gal/ min)	Q1 (US gal/ min)
40	1½	176	0.35	0.70	0.55	1.10
50	2	277	0.55	1.11	0.70	1.41
65	2½	440	0.88	1.76	1.11	2.22
80	3	704	1.41	2.82	1.76	3.52
100	4	1101	2.20	4	2.82	5.64
125	5	1761	3.52	4	4.40	8.81
150	6	2774	5.55	11.10	7.04	14.09
200	8	4403	9	18	11.10	22.19
250	10	7045	14.09	28.18	17.61	35.22
300	12	11007	22	44	28.18	56.36
350	14	17611	35	70	44.03	88.06
400	16	17611	35	70	70.45	141
450	18	27738	55.48	110.95	70.45	141
500	20	27738	55.48	110.95	111	222
600	24	44029	88	176	111	222
<hr/>						
			Class 2 (R = 315)	Class 1 (R = 160)	Class 2 (R = 160)	Class 1 (R = 80)
700	28	70446	224	440	176	352
760	30	70446	224	440	440	881
800	32	70446	224	440	440	881
900	36	110072	349	688	440	881
1000	40	110072	349	688	688	1374
1050	42	110072	349	688	688	1374
1100	44	176115	559	1101	688	1374
1200	48	277381	881	1733	1101	2201
1400	54	277381	881	1733	1734	3465
1500	56	277381	881	1733	1734	3465
1600	60	440287	1398	2752	1734	3465
1800	64	440287	1398	2752	2752	5504
2000	66	704459	2236	4403	2752	5504
2200	72	704459	2236	4403	4403	8806
2400	78	160000	507.94	1000	1000	2000

Q2 = 1.6 \* Q1

Q4 = 1.25 \* Q3

### Bore sizes and flange types

#### Bore size range

DN40 to 2400

#### Flanges to standards

ASME

AWWA

ISO 7005 EN1092-1

DIN

AS4087

AS2129

JIS

#### Pressure limitations for flanges

As per flange rating

PN25 max. process temperature 50 °C (122 °F)

PN40 max. process temperature 40 °C (104 °F)

#### 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.

#### Bore and flange material

- DN40 to 300: SG iron
- DN350 to 2400: carbon steel
- All sizes coated with light gray 2-pack epoxy (RAL9002)
- Primer: Interpon PZ660 zinc-based system, 70 microns thick
- Top coat: Interpon 610 light gray polyester powder coating (RAL 9002), up to 150 microns thick, comparable to EN ISO 12944 grade C4
- As a special requirements: 2-pack epoxy primer / finish @ 300 µm DFT

#### Terminal box for remote sensors

Polycarbonate

## Environmental and process conditions

### Ingress rating

- IP68 (NEMA 6P) to 10 m (33 ft)
- For buriable applications (DN40 to 200, octagonal bore, polypropylene liner and DN450 to 2400, full bore, rubber liner):  $1 \text{ m} < \text{sensor depth} \leq 5 \text{ m}$

### Temperature ranges

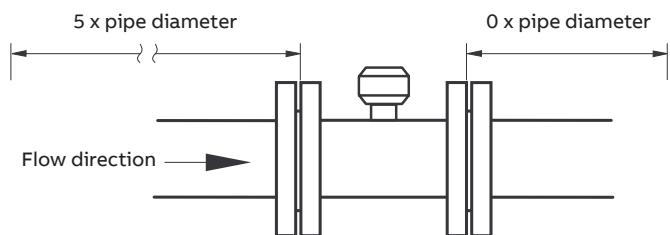
Ambient: -20 to 70 °C (-4 to 158°F)

Liner material	Bore size	Process temperature	
		Minimum	Maximum
Polypropylene	DN40 to 200	-6 °C (21 °F)	70 °C (158 °F)
Elastomer	DN250 to 600	-5 °C (23 °F)	50 °C (122 °F)
Hard rubber	DN250 to 2400	-10 °C (14 °F)	80 °C (176 °F)

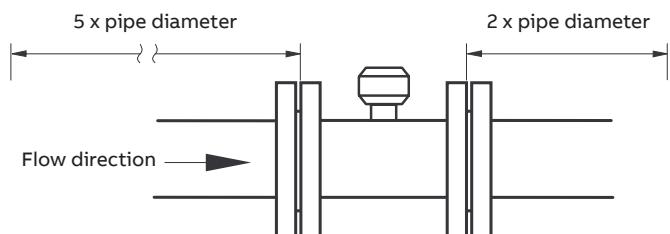
### Conductivity

>20 µS/cm

### Upstream and downstream pipe conditions (octagonal bore DN40 to 200)



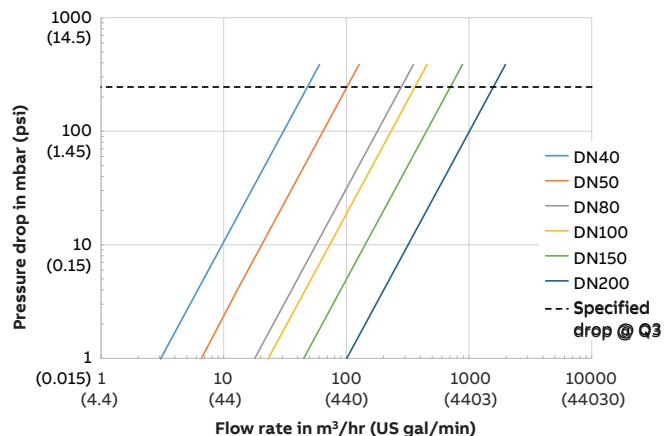
### Upstream and downstream pipe conditions (full bore DN250 to 2400)



### Pressure loss

Flow rate	Pressure loss in bar (psi)
$Q_3$	<0.25 bar (3.6 psi) for octagonal bore sensors
$Q_3$	Negligible for full bore sensors

### Octagonal bore sensor pressure drop (typical)



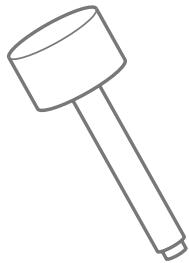
### Potable water approvals for wetted parts

WRAS  
ACS  
DVGW W270  
NSF – 61  
AZ/NZ 4020

### Metrological certifications (pending)

- OIML R49 for accuracy class 1 and 2 and environmental class T50 0.1 to 50 °C (32.18 to 122 °F)
- MID MI-001
- NMI R49 and NMI 10 for Australia
- PAC for China

## Specification – insertion flowmeter



### Mounting

#### Integral transmitter

On probe sensor

#### Remote transmitter

Off probe sensor

### Insertion details

#### Size range

300 to 1000 mm (12 to 40 in)

#### Pipe sizes

200 to 8000 mm (8 to 320 in) nominal bore

#### Pressure limitations

20 bar (295 psi) absolute

#### 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.

#### Sensor body material

316L stainless steel

#### Sensor tip material

PEEK

#### Terminal box material for remote sensors

Polycarbonate

#### Threaded connection

1 in BSP

1 in NPT

1½ in BSP

#### Pressure tapping provision

¼ in BSP

### Environmental and process conditions

#### Ingress rating

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

#### Temperature ranges

Ambient: -20 to 60 °C (-4 to 140 °F)

Process: 0 to 60 °C (32 to 140 °F)

#### Conductivity

>50 µS/cm

### Metrological performance and certifications

#### Velocity accuracy

±2 % of rate or ±2 mm/s (±0.08 in/s)

whichever is the greater

#### Volume accuracy

Refer to ISO 7145-1982 (BS 1042 section 2.2) for details

#### Flow condition

Fully developed profile in accordance with ISO 7145-1982 (BS1042 section 2.2.)

#### Maximum flow

The maximum velocity depends upon the actual insertion length. Typical insertion lengths are 0.125 and 0.5 x pipe diameter. Figure 2 is a guide\* to the maximum allowable velocity for different insertion lengths.

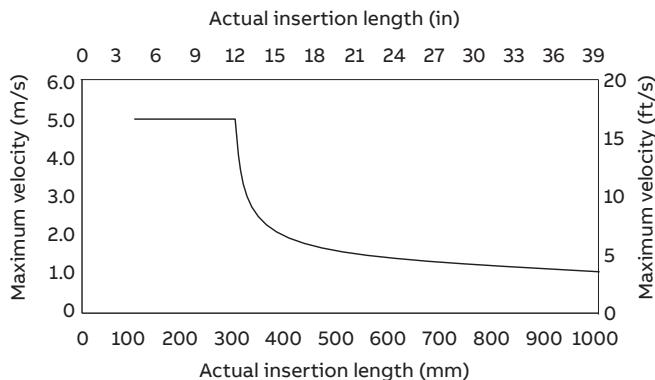


Figure 2 Maximum allowable velocity for different insertion lengths

#### Potable water approvals for wetted parts

WRAS

\* Figure 2 is intended as a guide only. Factors that influence the maximum insertion length into the pipe include: flow sensor mounting components (for example, standoffs, bushes and valves) pipeline vibration, fluid vibration and pump noise.

## Specification – pressure transducer (option)

### Ingress protection

IP68 to 10 m (33 ft)

### Wetted parts

303L stainless steel, Viton® and 96 % alumina

### Process temperature range

-10 to 50 °C (14 to 122 °F) (protect transducer from frost)

### Ambient temperature range

-20 to 70 °C (-4 to 158 °F)

### Pressure range (specify when ordering)

20 and 40 bar absolute

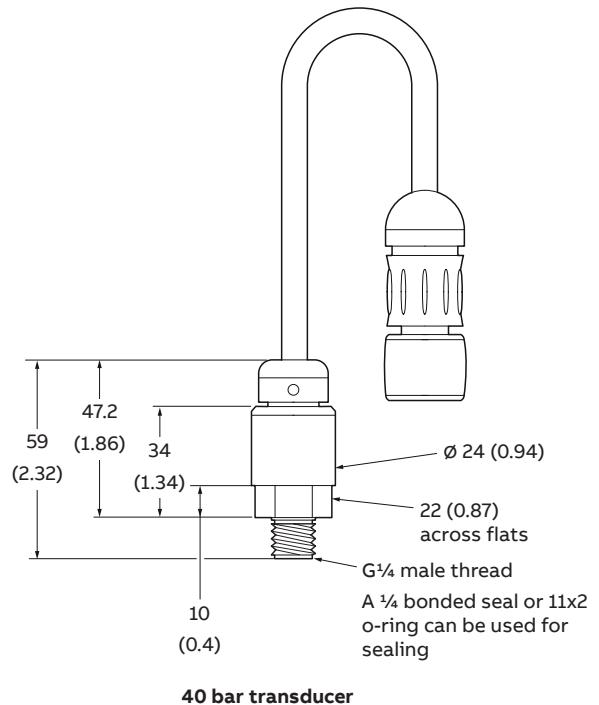
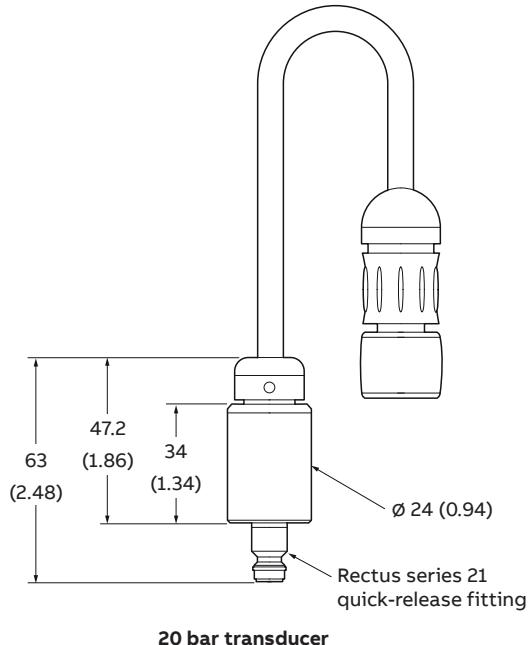
### Accuracy (typical)

- < ±0.1 % of span + thermal errors
- Thermal zero shift < 0.01 % span/°C
- Thermal span shift < ±0.015 %/°C

### Dimensions

Dimensions in mm (in)

All dimensions nominal



## Dimensions – sensors

R-style sensor – DN40 to 300 (1½ to 12 in)

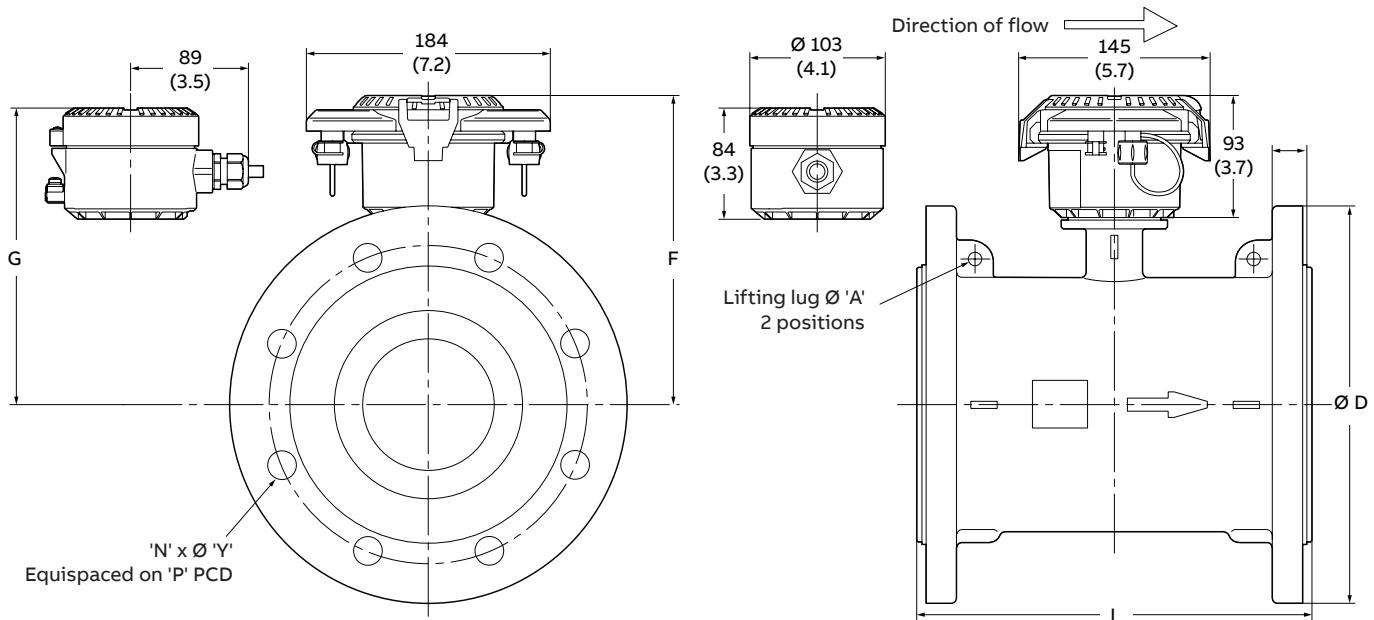


Figure 3 R-style sensor – DN40 to 300 (1½ to 12 in)

Sensor size	Flange		Dimensions in mm (in)									Approx weight kg (lbs)	
	Standard	Class	Flange OD	No. holes	Bolt hole dia	Bolt hole PCD	Sensor length	Trans. height	T. Box height	Lifting lug	INT	REM	
DN40 (1½ in)	EN 1092	PN 10, 16, 25	150		19 (.75)	110 (4.3)		158	149		13	12	
	ASME B16.5	CL150	(5.9)		15.7 (.62)	98		(6.2)	(5.9)		(29)	(27)	
	AS 2129	Table E	135 (5.3)	4	14 (.55)	(3.9)	200			N/A			
	5K	120 (4.7)			15 (.59)	95 (3.7)	(7.9)	154	144		11	8	
	JIS B2220	10K	140 (5.5)		19 (.75)	105 (4.2)		(6.1)	(5.7)		(24)	(18)	
DN50 (2 in)	EN 1092	PN 10, 16, 25	165		19	125 (4.9)			153		15	14	
	ASME B16.5	CL150	(6.5)		(.75)	121 (4.8)			(6.0)		(32)	(30)	
	AS 2129	Table E	150	4	18	114	200	162		N/A			
	AS 4087	PN 16	(5.9)		(.71)	(4.5)	(7.9)	(6.4)	152		12	9	
	JIS B2220	5K	130 (5.1)		15 (.59)	105 (4.1)			(6.0)		(26)	(20)	
DN65 (2½ in)	EN 1092	PN 10, 16	185	4	19	145					19	18	
		PN 25	(7.3)	8	(.75)	(5.7)					(42)	(40)	
	ASME B16.5	CL150			20 (.79)	140 (5.5)							
	AS 2129	Table E	165		18	127	200			N/A			
	AS 4087	PN 16	(6.5)	4	(.71)	(5.0)	(7.9)	168	158		14	11	
DN80 (3 in)		5K	155 (6.1)		15 (.59)	130 (5.1)					(31)	(24)	
	JIS B2220	10K	175 (6.9)		19 (.75)	140 (5.5)							
	EN 1092	PN 10, 16, 25	200	8	19 (.75)	160 (6.3)		181	172		21	20	
	ASME B16.5	CL150	(7.9)		20 (.79)	152 (6.0)		(7.1)	(6.8)		(47)	(44)	
	AS 2129	Table E	185	4	18	146	200			N/A			
	AS 4087	PN 16	(7.3)		(.71)	(5.8)	(7.9)	174	165		17	14	
	JIS B2220	5K	180 (7.1)		19	145 (5.7)					(37)	(31)	
		10K	185 (7.3)	8	(.75)	150 (5.9)							

Table 1 R-style sensor – DN40 to 80 (1½ to 3 in)

Sensor size	Flange		Dimensions in mm (in)									Approx weight kg (lbs)	
	Standard	Class	Flange OD	No. holes	Bolt hole dia	Bolt hole PCD	Sensor length	Trans. height	T. Box height	Lifting lug	INT	REM	
		D	N	Y	P	L	F	G	A				
DN100 (4 in)	EN 1092	PN 10, 16	235		19 (.75)	180 (7.1)		202	193		27	26	
		PN 25	(9.3)	8	23 (.91)	190 (7.5)		(8.0)	(7.6)		(60)	(58)	
	ASME B16.5	CL150			19 (.75)	191 (7.5)							
	AS 2129	Table E	215		18	178	250						
	AS 4087	PN 16	(8.5)	4	(.71)	(7.0)	(9.9)						
		5K	200 (7.9)	8	19	165 (6.5)							
	JIS B2220	7.5K	238 (9.4)	4	(.75)	195 (7.7)					23	20	
		10K	210 (8.3)	8		175 (6.9)					(51)	(44)	
DN125 (5 in)	EN 1092	PN 10, 16	270		18 (.71)	210 (8.3)		221	212		30	29	
		PN 25	(10.6)		28 (1.10)	220 (8.7)		(8.7)	(8.3)		(66)	(64)	
	ASME B16.5	CL150		8	22 (.87)	216 (8.5)	250						
	AS 2129	Table E	255 (10.0)		18 (.71)	210 (8.3)	(9.9)						
	JIS B2220	5K	235 (9.3)		19 (.75)	200 (7.9)					26	23	
		10K	250 (9.8)		23 (.91)	210 (8.3)					(57)	(51)	
DN150 (6 in)	EN 1092	PN 10, 16	300		23 (.91)	240 (9.5)				224		35	
	ASME B16.5	CL150	(11.8)		22 (.87)	242 (9.5)				(8.8)		(77)	
	EN 1092	PN 25		8	26 (1.02)	250 (9.8)						(75)	
	AS 2129	Table E	280		22 (.87)	235	300	233			10,2		
	AS 4087	PN 16	(11.0)		18 (.71)	(9.3)	(11.8)	(9.2)	223	(.40)	33	31	
		5K	265 (10.4)		19	230 (9.1)				(8.8)	(73)	(68)	
	JIS B2220	7.5K	290 (11.4)	6	(.75)	247 (9.7)							
		10K	280 (11.0)	8	23 (.91)	240 (9.5)							
DN200 (8 in)	EN 1092	PN 10	343 (13.5)	8	23	295							
		PN 16			(.91)	(11.6)		259			68	67	
		PN 25	360 (14.2)	12	28 (1.10)	310 (12.2)		(10.2)			(150)	(147)	
	ASME B16.5	CL150	343 (13.5)		22	298 (11.7)							
	AS 2129	Table E	335		(.87)	292	350		250	10,2			
	AS 4087	PN 16	(13.2)	8	18 (.71)	(11.5)			(9.8)	(.40)	51	48	
	JIS B2220	5K	320 (12.6)		23 (.91)	280 (11.0)		258	(10.2)		(112)	(106)	
		7.5K	342 (8.7)		19 (.75)	299 (11.8)							
		10K	330 (13.0)	12	23 (.91)	290 (11.4)							
DN250 (10 in)	EN 1092	PN10	395 (15.6)		22 (.87)	350 (.87)							
		PN16	405 (15.9)	12	26 (1.02)	355 (14.0)							
		PN25	425 (16.7)		30 (1.18)	370 (14.6)							
	AS 2129	Table E	405		22	356							
	AS 4087	PN 16	(15.9)	8	(.87)	(14.0)		450	285	10,2	78	75	
		5K	385 (15.2)	12	23 (.91)	345 (13.6)		(17.7)	(10.9)	(.40)	(172)	(165)	
	JIS B2220	7.5K	410 (16.1)	8	23 (.91)	360 (14.2)							
		10K	400 (15.8)	12	25 (.98)	355 (14.0)							
		ASME B16.5	CL150	406 (16.0)	12	22 (.87)	362 (14.3)						
DN300 (12 in)	EN 1092	PN10	445 (17.5)	12	22 (.87)	400 (15.8)							
		PN16	460 (18.1)		26 (1.02)	410 (16.1)							
		PN25	485 (19.1)	16	30 (1.18)	430 (16.9)							
	AS 2129	Table E	455		26 (1.02)	406		500	310	10,2	115	112	
	AS 4087	PN 16	(17.9)	12	22 (.87)	(16.0)		(19.7)	(12.2)	(.40)	(253)	(247)	
		5K	430 (16.9)	12	23	390 (15.4)							
	JIS B2220	7.5K	464 (18.3)	10	(.91)	414 (16.3)							
		10K	445 (17.5)	16	25 (.98)	400 (15.8)							
		ASME B16.5	CL150	483 (19.0)	12	22 (.87)	432 (17.0)						

Table 2 R-style sensor – DN100 to 300 (4 to 12 in)

## ...Dimensions – sensors

R-style sensor – DN350 to 600 (14 to 24 in)

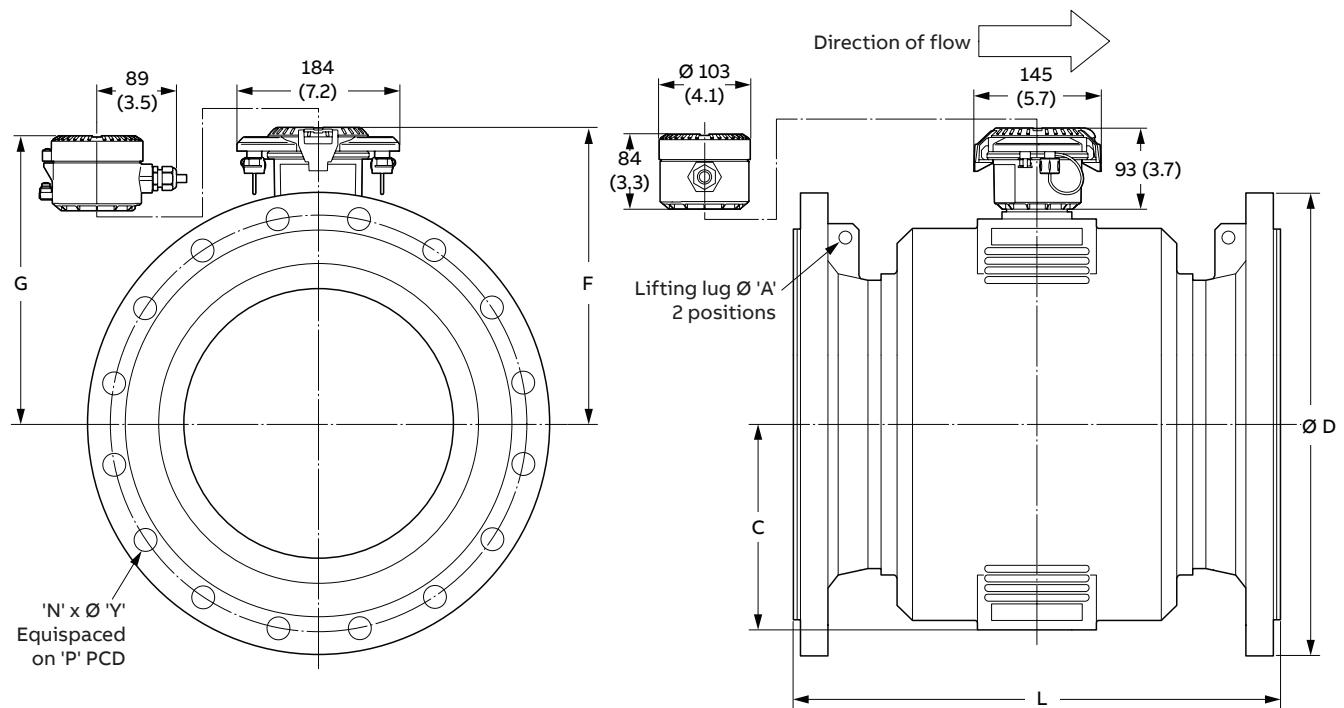


Figure 4 R-style sensor – DN350 to 600 (14 to 24 in)

Sensor size	Standard	Flange Class	Flange OD	No. Holes	Bolt hole dia	Dimensions in mm (in)						Cover flat	Approx weight kg (lbs)
						Bolt hole PCD	Sensor length	Trans height	T. Box height	Lifting lug	C		
			D	N	Y	P	L	F	G	A	C	INT	REM
DN350 (14 in)	EN 1092	PN 10	505 (19.9)		22 (.87)	460 (18.1)							
		PN 16	520 (20.5)	16	26 (1.02)	470 (18.5)							
		PN 25	555 (21.9)		33 (1.30)	490 (19.3)							
	ASME B16.5	CL150	535 (21.1)		29,5 (1.16)	476 (18.8)							
		AS 2129	Table E		26	470							
		AS 4087	PN 16	12	(1.02)	(18.5)							
	JIS B2220	5K	480 (18.9)		25	435 (17.1)							
		7.5K	530 (20.7)	10	(.98)	472 (18.6)							
		10K	490 (19.3)	16		445 (17.5)							
DN400 (16 in)	EN 1092	PN 10	565 (22.3)		26 (1.02)	515 (20.3)							
		PN 16	580 (22.8)	16	30 (1.18)	525 (20.7)							
		PN 25	620 (24.4)		36 (1.42)	550 (21.7)							
	ASME B16.5	CL150	600 (23.6)		29,5 (1.16)	540 (21.3)							
		AS 2129	Table E		26	521							
		AS 4087	PN 16	12	(1.02)	(20.5)							
	JIS B2220	5K	540 (21.3)	16	25	495 (19.5)							
		7.5K	582 (22.9)	12	(.98)	524 (20.6)							
		10K	560 (22.1)	16	27 (1.06)	510 (20.1)							
DN450 (18 in)	EN 1092	PN 10	615 (24.2)		26 (1.02)	565 (22.3)							
		PN 16	640 (25.2)	20	30 (1.18)	585 (23.0)							
		PN 25	670 (26.4)		36 (1.42)	600 (23.6)							
	ASME B16.5	CL150	635 (25.0)	16	32,5 (1.28)	578 (22.8)							
		AS 2129	Table E		26	584							
		AS 4087	PN 16	12	(1.02)	(23.0)							
	JIS B2220	5K	605 (23.8)	16	25 (.98)	555 (21.9)							
		7.5K	652 (25.7)	12	27 (1.06)	585 (23.0)							
		10K	620 (24.4)	20		565 (22.3)							
DN500 (20 in)	EN 1092	PN 10	670 (26.4)		26 (1.02)	620 (24.4)							
		PN 16	715 (28.2)	20	33 (1.30)	650 (25.6)							
		PN 25	730 (28.7)		36 (1.42)	660 (26.0)							
	ASME B16.5	CL150	700 (27.6)		32,5 (1.28)	635 (25.0)							
		AS 2129	Table E		26	641							
		AS 4087	PN 16	16	(1.02)	(25.2)							
	JIS B2220	5K	655 (25.8)	20	25 (.98)	605 (23.8)							
		7.5K	706 (27.8)	12	27	639 (25.2)							
		10K	675 (26.6)	20	(1.06)	620 (24.4)							
DN600 (24 in)	EN 1092	PN 10	780 (30.7)		30 (1.18)	725 (28.6)							
		PN 16	840 (33.1)	20	36 (1.42)	770							
		PN 25	845 (33.3)		39 (1.54)	(30.3)							
	ASME B16.5	CL150	815 (32.1)		35,5 (1.40)	749,5 (29.5)							
		AS 2129	Table E		33 (1.30)	756							
		AS 4087	PN 16	16	(32.5)	(29.7)							
	JIS B2220	5K	770 (30.3)	20	27	715 (28.2)							
		7.5K	810 (31.9)	16	(1.06)	743 (29.3)							
		10K	795 (31.3)	24	33 (1.30)	730 (28.7)							

Table 3 R-style sensor – DN350 to 600 (14 to 24 in)

## ...Dimensions – sensors

V-style sensor – DN40 to 200 (1½ to 8 in)

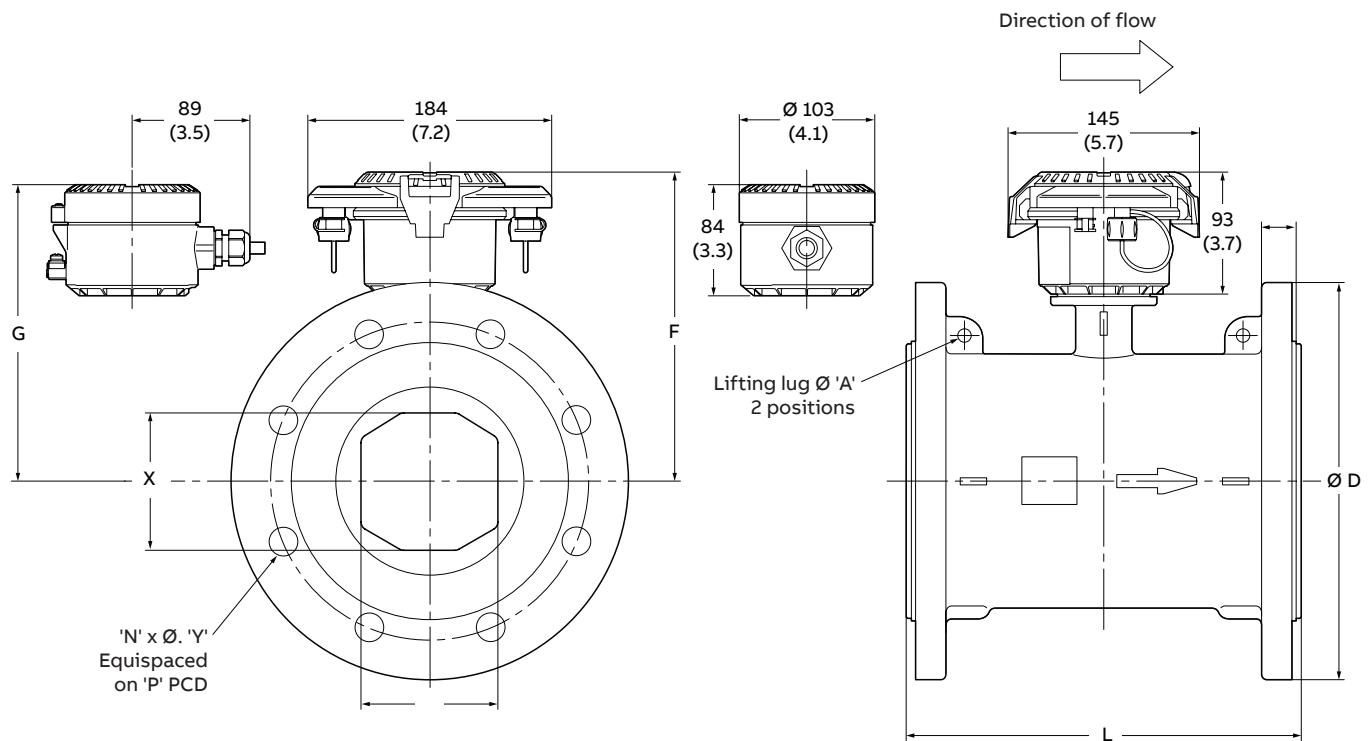


Figure 5 V-style sensor – DN40 to 200 (1½ to 8 in)

Sensor size	Flange		Dimensions in mm (in)									Approx weight kg (lbs)	
	Standard	Class	Flange OD	No. holes	Bolt hole dia.	Bolt hole PCD	Sensor length	Trans height	T. box height	Lifting lug	INT	REM	
					D	N	Y	P	L	F	G	A	
DN40 (1½ in)	EN 1092	PN 10, 16, 25	150		19 (.75)	110 (4.3)			158	149		13	12
	ASME B16.5	CL150	(5.9)	4	15.7 (.62)	98			(6.2)	(5.9)		(29)	(27)
	AS 2129	Table E	135 (5.3)		14 (.55)	(3.9)	200		154	144	N/A	10	7
	JIS B2220	10K	140 (5.5)		19 (.75)	105 (4.2)	(7.9)		(6.1)	(5.7)		(22)	(15)
DN50 (2 in)	EN 1092	PN 10, 16, 25	165		19	125 (4.9)						14	13
	ASME B16.5	CL150	(6.5)	4	(.75)	121 (4.8)	200		162	153	N/A	(31)	(29)
	AS 2129	Table E	150		18	114	(7.9)		(6.4)	(6.0)		11	8
	AS 4087	PN 16	(5.9)		(.71)	(4.5)	JIS B2220	10K	155 (6.1)	19 (4.7)		(24)	(18)
DN65 (2½ in)	EN 1092	PN 10, 16	185	4	19	145			176	167		16	15
	ASME B16.5	CL150	(7.3)	8	(.75)	(5.7)	200		(6.9)	(6.6)	N/A	(35)	(33)
	AS 2129	Table E	165		20 (.79)	140 (5.5)	(7.9)		168	158		13	10
	AS 4087	PN 16	(6.5)	4	(.71)	(5.0)	JIS B2220	10K	175 (6.9)	19 (5.5)		(29)	(22)
DN80 (3 in)	EN 1092	PN 10, 16, 25	200	8	19 (.75)	160 (6.3)			181	172		17	16
	ASME B16.5	CL150	(7.9)		20 (.79)	152 (6.0)	200		(7.1)	(6.8)	N/A	(38)	(36)
	AS 2129	Table E		4	18	146	(7.9)		174	165		16	13
	AS 4087	PN 16	(7.3)	8	(.71)	(5.8)	JIS B2220	10K	19 (.75)	150 (5.9)		(36)	(28)
DN100 (4 in)	EN 1092	PN 10, 16	235		19 (.75)	180 (.71)			202	193			
	ASME B16.5	CL150	(9.3)	8	23 (.91)	190 (7.5)	250		(8.0)	(7.6)	N/A	19	18
	AS 2129	Table E			19 (.75)	191 (7.5)	(9.9)		212	203		(42)	(40)
	AS 4087	PN 16	215 (8.5)	4	18	178	JIS B2220	7.5K	238 (9.4)	(7.0)		(8.3)	(8.0)
					(.71)	(7.7)		10K	210 (8.3)	195 (7.7)			
				8	19 (.75)	175 (6.9)	JIS B2220	10K	250 (9.8)				
DN125 (5 in)	EN 1092	PN 10, 16	270		18 (.71)	210 (8.3)			221	212		30	29
	ASME B16.5	CL150	(10.6)		28 (1.10)	220 (8.7)	250		(8.7)	(8.3)	N/A	(66)	(64)
	AS 2129	Table E	255 (10.0)	8	22 (.87)	216 (8.5)	(9.9)		212	203		24	21
	AS 4087	PN 16			18 (.71)	210 (8.3)	JIS B2220	10K	250 (9.8)	(8.3)		(53)	(46)
DN150 (6 in)	EN 1092	PN10, 16	300		23 (.91)	240 (9.5)			233	224		35	34
	ASME B16.5	CL150	(11.8)	8	22 (.87)	242 (9.5)	300		(9.2)	(8.8)	N/A	(77)	(75)
	EN 1092	PN 25			26 (1.02)	250 (9.8)	(11.8)		235	225		10,2	
	AS 2129	Table E	280		22 (.87)	235	(9.3)		(9.3)	(8.9)		34	31
	AS 4087	PN 16	(11.0)		18 (.71)	(9.3)	JIS B2220	7.5K	290 (11.4)	247 (9.7)		(75)	(68)
				6	19 (.75)		JIS B2220	10K	280 (11.0)	240 (9.5)			
DN200 (8 in)	EN 1092	PN10	375	8	23	295			259	250		67	66
		PN16	(11.8)		(.91)	(11.6)	350		(10.2)	(9.8)	N/A	(147)	(145)
		PN 25	360 (14.2)	12	28 (1.10)	310 (12.2)	(13.8)					10,2	
	ASME B16.5	CL150	343 (13.5)		22	298 (11.7)	(13.8)					(.40)	
	AS 2129	Table E	335	8	(.87)	292	JIS B2220	7.5K	342 (8.7)	18 (.71)		258	250
	AS 4087	PN 16	(13.2)		18 (.71)	(11.5)	JIS B2220	10K	330 (13.0)	19 (.75)		(10.2)	(9.8)
					19 (.75)	299 (11.8)	JIS B2220	10K	23 (.91)	290 (11.4)			

Table 4 V-style sensor – DN40 to 200 (1½ to 8 in)

## ...Dimensions – sensors

F-style sensor – DN250 to 400 (10 to 16 in)

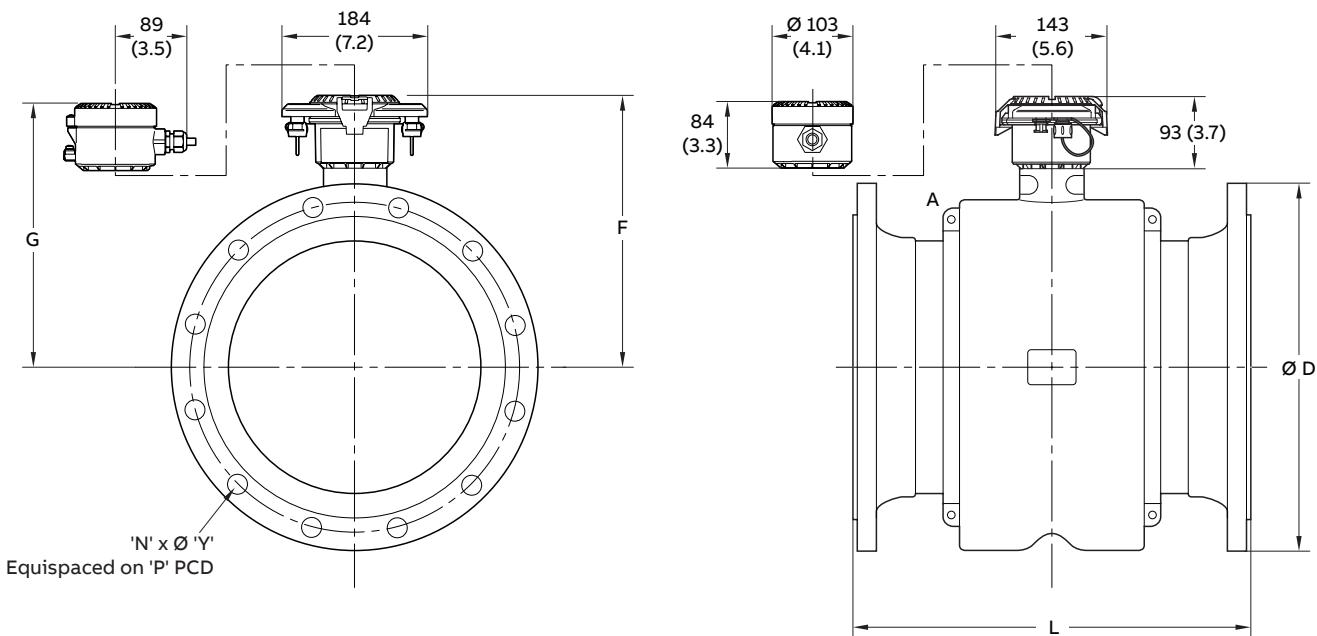


Figure 6 F-style sensor – DN250 to 400 (10 to 16 in)

Sensor size	Flange		Dimensional in mm [in]									Approx. weight kg (lbs)	
	Standard	Class	Flange OD	No. holes	Bolt hole dia.	Bolt hole PCD	Sensor length	Trans height	Tx box height	Lifting lug	INT	REM	
			D	N	Y	P	L	F	G	A			
DN250 (10 in)	EN 1092 or DIN	PN10	395 (15.55)	12	22	350	450	319	310	N/A	61	59	
		PN16	405 (15.94)	12	26	355					65	63	
		PN25	425 (16.73)	12	30	370					84	82	
		PN40	450 (17.72)	12	33	385					95	93	
	AS4087	PN16	405 (15.94)	8	22	356					65	63	
		PN35	430 (16.93)	12	26	381					95	93	
	JIS B2220	5K	385 (15.16)	12	23	345					65	63	
		10K	400 (15.75)	12	25	355							
	ASME B16.5	CL300	445 (17.52)	16	28.6	387.4					105	103	
		CL150	405 (15.94)	12	26	362					70	68	
DN300 (12 in)	EN 1092 or DIN	PN10	445 (17.52)	12	22	400	500	342	333	N/A	74	72	
		PN16	460 (18.11)	12	26	410					80	78	
		PN25	485 (19.09)	16	30	430					100	98	
		PN40	515 (20.28)	16	33	450					130	128	
	JIS B2220	5K	430 (16.93)	12	23	390					80	78	
		10K	445 (17.52)	16	25	400					130	128	
	AS4087	PN16	455 (17.91)	12	22	406					130	128	
		PN35	490 (19.29)	26	26	438					150	148	
	ASME B16.5	CL300	520 (20.47)	16	31.8	450.8					105	103	
		CL150	485 (19.09)	12	26	431.8							
DN350 (14 in)	EN 1092 or DIN	PN10	505 (19.88)	16	22	460	550	357	348	N/A	95	93	
		PN16	520 (20.47)	16	26	470					110	108	
		PN25	555 (21.85)	16	33	490					145	143	
		PN40	580 (22.83)	16	36	510					195	193	
	JIS B2220	5K	480 (18.90)	12	22	435					95	93	
		10K	490 (19.29)	16	25	445					130	128	
	AS4087	PN16	525 (20.67)	12	26	470					185	183	
		PN35	550 (21.65)	16	30	495					140	138	
	ASME B16.5	CL300	585 (23.03)	20	31.8	514.4					105	103	
		CL150	535 (21.06)	12	29	476.3							
DN400 (16 in)	EN 1092 or DIN	PN10	565 (22.24)	16	26	515	600	399	390	N/A	103	101	
		PN16	580 (22.83)	16	30	525					126	124	
		PN25	620 (24.41)	16	36	550					170	168	
		PN40	660 (25.98)	16	39	585					258	256	
	JIS B2220	5K	540 (21.26)	12	25	495					103	101	
		10K	560 (22.05)	16	27	510					116	114	
	AS4087	PN16	580 (22.83)	12	26	521					154	152	
		PN35	610 (24.02)	20	30	552					302	300	
	ASME B16.5	CL300	650 (25.59)	24	35	571.5					265	263	
		CL150	600 (23.62)	12	29	539.8					175	173	

Table 5 F-style sensor – DN250 to 400 (10 to 16 in)

## ...Dimensions – sensors

F-style sensor – DN450 to 600 (18 to 24 in)

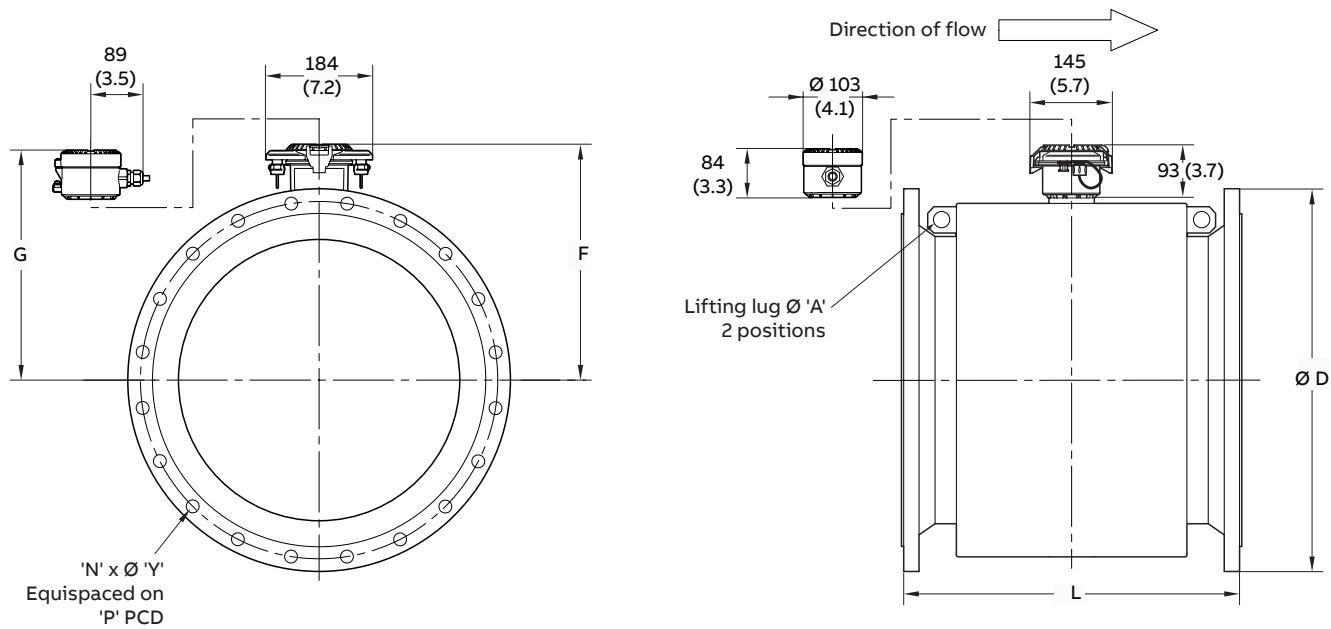


Figure 7 F-style sensor – DN450 to 600 (18 to 24 in)

Sensor size	Flange		Dimensional in mm [in]												
	Standard	Class	Flange OD	No. holes	Bolt hole dia.	Bolt hole PCD	Sensor length	Trans height	Tx box height	Lifting lug	Approx weight kg (lbs)	INT	REM		
DN450 (18 in)	EN 1092 or DIN	PN10	615 (24.21)	20	26	565	600	407	398	30	173	171			
		PN16	640 (25.20)	20	30	585					188	186			
		PN25	670 (26.38)	20	36	600	686				245	243			
		PN40	685 (26.97)	20	39	610					315	313			
	JIS B2220	5K	605 (23.82)	16	25	555	600	407	398	30	165	163			
		10K	620 (24.41)	20	27	565					177	175			
	AS4087	PN16	640 (25.20)	12	26	584	600	407	398	30	232	230			
		PN35	675 (26.57)	20	33	610					328	326			
	ASME B16.5	CL300	710 (27.95)	24	35	628.6	762	407	398	30	368	366			
		CL150	635 (25.00)	16	32	577.9					250	248			
DN500 (20 in)	EN 1092 or DIN	PN10	670 (26.38)	20	26	620	600	407	398	30	190	188			
		PN16	715 (28.15)	20	33	650					240	238			
		PN25	730 (28.74)	20	36	660	700				300	298			
		PN40	755 (29.72)	20	42	670	762				392	390			
	JIS B2220	5K	655 (25.79)	20	25	605	600	407	398	30	190	188			
		10K	675 (26.57)	20	27	620					290	288			
	AS4087	PN16	705 (27.76)	16	26	641	762	407	398	30	435	433			
		PN35	735 (28.94)	24	33	673					300	298			
	ASME B16.5	CL150	700 (27.56)	20	32	635	762	407	398	30	490	488			
		CL300	775 (30.51)	24	35	658.8					284	282			
DN600 (24 in)	EN 1092 or DIN	PN10	780 (30.71)	20	30	725	800	458	449	30	318	316			
		PN16	840 (33.07)	20	36	770					460	458			
		PN25	845 (33.27)	20	39	770					600	598			
		PN40	890 (35.04)	20	26	705	890				275	273			
	JIS B2220	5K	770 (30.31)	20	27	715	800	458	449	30	306	304			
		10K	795 (31.30)	24	33	730					382	380			
	AS4087	PN16	825 (32.48)	16	30	756	749.3	458	449	30	452	450			
		PN35	850 (33.46)	24	36	781					550	548			
	ASME B16.5	CL300	915 (36.02)	24	41	812.8	749.3	458	449	30	425	423			

Table 6 F-style sensor – DN450 to 600 (18 to 24 in)

## ...Dimensions – sensors

F-style sensor – DN700 to 2400 (28 to 96 in)

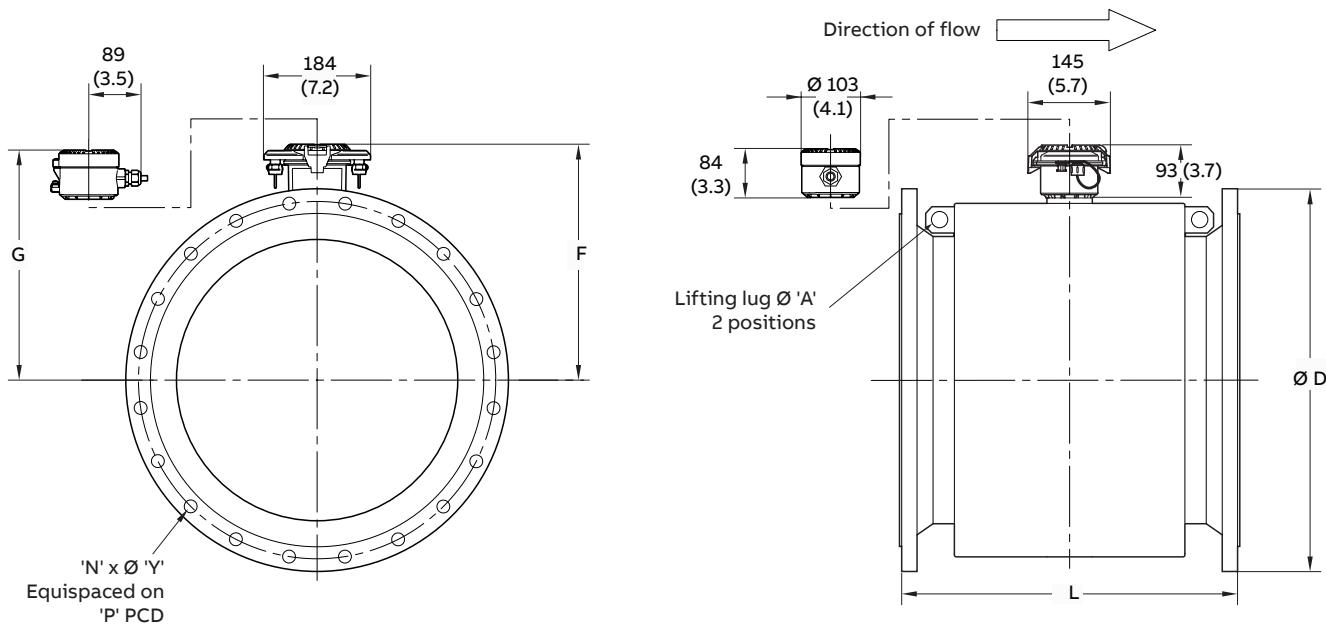


Figure 8 F-style sensor – DN700 to 2400 (28 to 96 in)

Sensor size	Flange		Dimensional in mm (in)									INT	REM
	Standard	Class	Flange OD	No. holes	Bolt hole dia.	Bolt hole PCD	Sensor length	Trans height	Tx box height	Lifting lug			
	D	N	Y	P	L	F	G	A					
DN700 (28 in)	JIS	5K	875	24	27	820						216	214
		10K	905	24	33	840						282	280
		PN6	860	24	26	810	700					225	223
		PN10	895	24	30	840						303	301
	EN 1092 or DIN	PN16	910	24	36	840						337	335
		PN25	960	24	42	875	800					471	469
		PN40	995	24	48	900	910					586	584
		CLASS B	927	28	32 (1.25)	864 (34)						249	247
AS 4087	AWWA C207	CLASS D	927									280	278
		CLASS E	927	28	32 (1.25)	864 (34)	700	497	492	30		472	470
		CLASS F	1035	28	44 (1.75)	940 (37)						715	713
	AS 2129	PN16	910	20	30	845						359	357
		PN35	935	24	36	857	910					539	537
	ASME B16.5	TABLE D	910	20	30	845	700					263	261
		TABLE E	910	20	33	845						337	335
ASME B16.5	CL150 SERIES A	925	28	35 (1.375)	863.6	790						503	501
	CL150 SERIES B	835	40	22 (0.875)	795.3	910						323	321
ASME B16.5	CL300 SERIES A	1035	28	44.5 (1.75)	939.8	940						811	809
	CL300 SERIES B	920	36	35 (1.375)	857.2	910						631	629

Table 7 F-style sensor – DN700 (28 in)

Sensor size	Flange		Dimensional in mm (in)														
	Standard	Class	Flange OD	No. holes	Bolt hole dia.	Bolt hole PCD	Sensor length	Trans height	Tx box height	Lifting lug	Approx weight kg (lbs)	INT	REM				
			D	N	Y	P	L	F	G	A							
DN750 (30 in)	JIS	JIS5K	945	24	33	880	762	523	518	30	251	249					
		JIS10K	970	24	33	900					327	325					
		CLASS B	984	28	32 (1.25)	914 (36)					273	271					
		CLASS D	984								344	342					
	AWWA C207	CLASS E	984	28	32 (1.25)	914 (36)					496	494					
		CLASS F	1092	28	44 (1.75)	997 (39.25)					790	788					
		PN16	995	20	33	927		523	518	30	467	465					
		PN35	1015	28	36	940	990				663	661					
		TABLE D	995	20	33	927	762				340	338					
		TABLE E	995	20	36	927					454	452					
ASME B16.5	AS 4087	CL150 SERIES A	985	28	35 (1.375)	914.4	820	800	547	542	544	542					
		CL150 SERIES B	885	44	22 (0.875)	846.1	990				320	318					
	AS 2129	CL300 SERIES A	1090	28	47.6 (1.875)	997	975				972	970					
		CL300 SERIES B	990	36	38.1 (1.5)	920.8	990				748	746					
		PN16	1020	28	33	950	280				278						
		PN6	975	24	30	920	364				362						
		PN10	1015	34	33	950	800				294	292					
		PN16	1025	24	39	950					406	404					
		PN25	1085	24	48	990					469	467					
		PN40	1140	24	56	1030					615	613					
		CLASS B	1060	28	38 (1.5)	978 (38.5)					866	864					
DN800 (32 in)	EN 1092 or DIN	CLASS D	1060								328	326					
		CLASS E	1060	28	38 (1.5)	978 (38.5)	800	547	542	30	408	406					
		CLASS F	1150	28	44 (1.75)	1054 (41.5)					634	632					
		PN16	1060	20	36	984					897	895					
		PN35	1060	28	36	984					530	528					
	AS 4087	TABLE D	1060	20	36	984	1040				751	749					
		TABLE E	1060	20	36	984					386	384					
		CL150 SERIES A	1060	28	41.3 (1.625)	977.9	940				519	517					
		CL150 SERIES B	940	48	22 (0.875)	900.1	1040				700	698					
		CL300 SERIES A	1150	28	51 (2)	1054.1	1120				406	404					
DN900 (36 in)	AS 2129	CL300 SERIES B	1055	32	41.3 (1.625)	977.9	1040				1227	1225					
		PN16	1175	24	36	1092	900	598	593	30	933	931					
		PN35	1185	32	39	1105					369	367					
		TABLE D	1175	24	36	1092					445	443					
		TABLE E	1175	24	36	1092					390	388					
	ASME B16.5	CL150 SERIES A	1170	32	41.3 (1.625)	1085.8					502	500					
		CL150 SERIES B	1055	44	25.4 (1)	1009.6	1170				589	587					
		CL300 SERIES A	1270	32	54 (2.125)	1168.4	1080				819	817					
		CL300 SERIES B	1170	32	44.5 (1.75)	1089	1170				1158	1156					
		PN16	1175	24	36	1092	417				415						
ASME B16.5	AS 4087	PN35	1185	32	39	1105	1170	598	593	30	493	491					
		CLASS D	1168	32	38 (1.5)	1086 (42.75)					827	825					
		CLASS E	1168								1150	1148					
		CLASS F	1270	32	51 (2)	1168 (46)					706	704					
		PN16	1175	24	36	1092					1044	1042					
	AS 2129	PN35	1185	32	39	1105	900				514	512					
		TABLE D	1175	24	36	1092					694	692					
		TABLE E	1175	24	36	1092					961	959					
		CL150 SERIES A	1170	32	41.3 (1.625)	1085.8	1010				595	593					
		CL150 SERIES B	1055	44	25.4 (1)	1009.6	1170				1513	1511					
ASME B16.5	ASME B16.5	CL300 SERIES A	1270	32	54 (2.125)	1168.4	1080				1147	1145					
		CL300 SERIES B	1170	32	44.5 (1.75)	1089	1170										

Table 8 F-style sensor – DN750 to 900 (30 to 36 in)

## ...Dimensions – sensors

...F-style sensor – DN700 to 2400 (28 to 96 in)

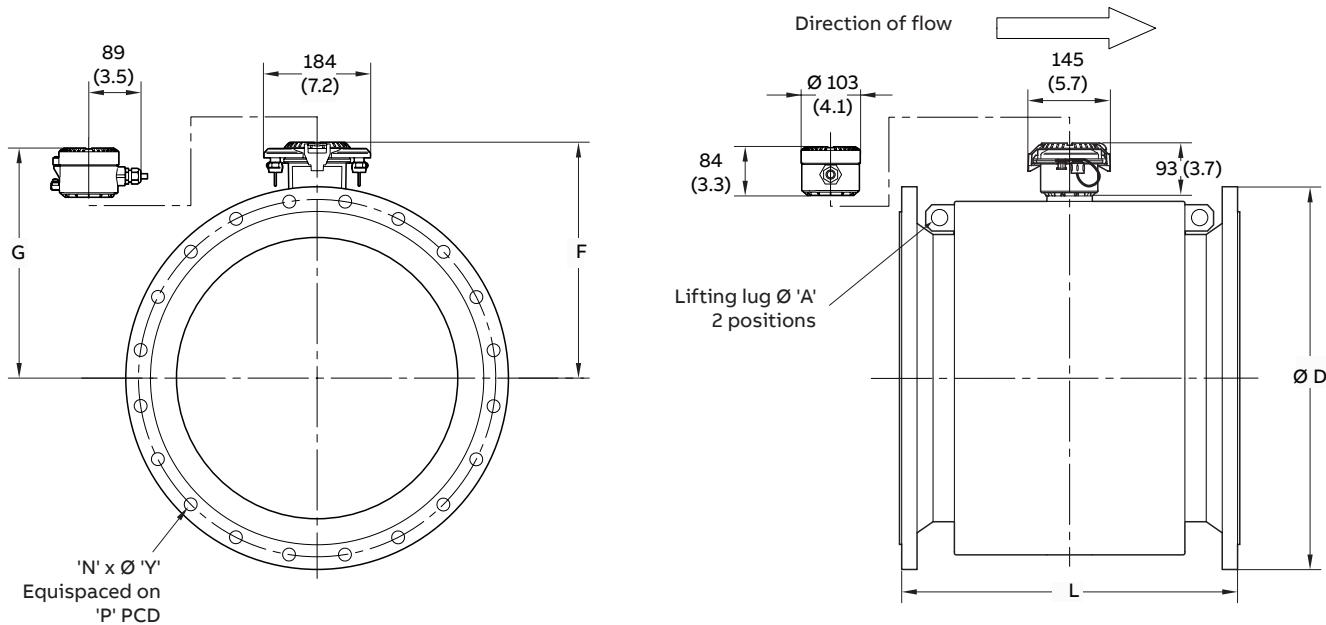


Figure 9 F-style sensor – DN700 to 2400 (28 to 96 in)

Sensor size	Flange		Dimensional in mm (in)									Approx weight kg (lbs)	
	Standard	Class	Flange OD	No. holes	Bolt hole dia.	Bolt hole PCD	Sensor length	Trans height	Tx box height	Lifting lug		INT	REM
DN1000 (40 in)	JIS	JIS5K	1195	28	33	1130						441	439
		JIS10K	1235	28	39	1160						572	570
		PN6	1175	28	30	1120	1000					466	464
		PN10	1230	28	36	1160						674	672
	EN 1092 or DIN	PN16	1255	28	42	1170						879	877
		PN25	1320	28	56	1210	1170					1207	1205
		PN40	1360	28	56	1250	1300					1413	1411
		CLASS B	1289	36	38 (1.5)	1200 (47.25)						503	501
	AWWA C207	CLASS D	1289									659	657
		CLASS E	1289	36	38 (1.5)	1200 (47.25)	1000	648	643	30		1028	1026
		CLASS F	1378	36	51 (2)	1276 (50.25)						1367	1365
		PN16	1255	24	36	1175						831	829
AS 4087	PN35	1275	36	39	1194	1300						1244	1242
	TABLE D	1255	24	36	1175	1000						610	608
	TABLE E	1255	24	39	1175							833	831
	CL150 SERIES A	1290	36	41.3 (1.625)	1200.2	1080						1149	1147
ASME B16.5	CL150 SERIES B	1175	44	28.6 (1.125)	1120.8	1300						738	736
	CL300 SERIES A	1240	32	44.5 (1.75)	1155.7	1150						1349	1347
	CL300 SERIES B	1275	40	44.5 (1.75)	1190.6	1300						1487	1485

Table 9 F-style sensor – DN1000 (40 in)

Sensor size	Standard	Flange Class	Dimensional in mm (in)									Approx weight kg (lbs)	
			Flange OD	No. holes	Bolt hole dia.	Bolt hole PCD	Sensor length	Trans height	Tx box height	Lifting lug		INT	REM
D	N	Y	P	L	F	G	A						
DN1050 (42 in)	AWWA C207	CLASS B	1346	36	38 (1.5)	1257 (49.5)	1067	701	697	30	564	562	
		CLASS D	1346								669	667	
		CLASS E	1346	36	38 (1.5)	1257 (49.5)					1143	1141	
		CLASS F	1448	36	51 (2)	1340 (52.75)					1568	1566	
	ASME B16.5	CL150 SERIES A	1345	36	41.3 (1.625)	1257.3	1170	701	697	30	1289	1287	
		CL150 SERIES B	1225	48	28.6 (1.125)	1171.6					809	807	
DN1100 (44 in)	JIS	CL300 SERIES A	1290	32	44.5 (1.75)	1206.5	1118	701	697	30	1527	1525	
		CL300 SERIES B	1335	36	47.6 (1.875)	1244.6					1704	1702	
		JIS5K	1305	28	33	1240					510	508	
		JIS10K	1345	28	39	1270	1170	701	697	30	689	687	
		CLASS B	1403	40	38 (1.5)	1315 (51.75)					615	613	
		CLASS D	1403								807	805	
DN1200 (48 in)	JIS	CLASS E	1404	40	38 (1.5)	1315 (51.75)	1200	701	697	30	1205	1203	
		CLASS F	1505	36	51 (2)	1397 (55)					1719	1717	
		5K	1420	32	33	1350					651	649	
		10K	1465	32	39	1380	1560	753	748	30	967	965	
		PN6	1405	32	33	1340					710	708	
		PN10	1455	32	39	1380					1107	1105	
DN1350 (54 in)	AWWA C207	EN 1092 or DIN	PN16	32	48	1390	1560	753	748	30	1363	1361	
		PN25	1530	32	56	1420					1559	1557	
		PN40	1575	32	62	1460					2133	2131	
		CLASS B	1511	44	38 (1.5)	1422 (56)	1200	753	748	30	772	770	
		CLASS D	1511								999	997	
		CLASS E	1511	44	38 (1.5)	1422 (56)					1458	1456	
		CLASS F	1651	40	51 (2)	1543 (60.76)	1200	753	748	30	2400	2398	
		AS 4087	PN16	32	36	1410					1253	1251	
		AS 2129	TABLE-D	32	36	1410					1023	1021	
		AS 4087	TABLE-E	32	39	1410	1560	753	748	30	1272	1270	
		AS 4087	PN35	40	42	1441					2115	2113	
		ASME CL150	SERIES A	44	41.3 (1.625)	1422.4					1707	1705	
DN1400 (56 in)	EN 1092 or DIN	SERIES B	1390	44	31.8 (1.25)	1335.1	1310				1085	1083	
		ASME CL150	SERIES A	465	32	51 (2)	1371.6	1200			2163	2161	
		SERIES B	1510	40	51 (2)	1416	1400				2352	2350	
		PN6	1630	36	36	1560	1400	848	843	45	981	979	
		PN10	1675	36	42	1590					1213	1211	
		PN16	1685	36	48	1590					1942	1940	
DN1400 (56 in)	ASME CL150	PN25	1755	36	62	1640	1820	848	843	45	1085	1083	
		PN40	1795	36	62	1680					1731	1729	
		SERIES A	1745	48	47.6 (1.875)	1651					1770	1768	
		SERIES B	1600	60	31.8 (1.25)	1543	1490				2368	2366	
		SERIES A	1710	28	60.3 (2.375)	1600.2	1400				3086	3084	
		SERIES B	1765	36	60.3 (2.375)	1651	1820				2566	2554	

Table 10 F-style sensor – DN1050 to 1400 (42 to 56 in)

## ...Dimensions – sensors

...F-style sensor – DN700 to 2400 (28 to 96 in)

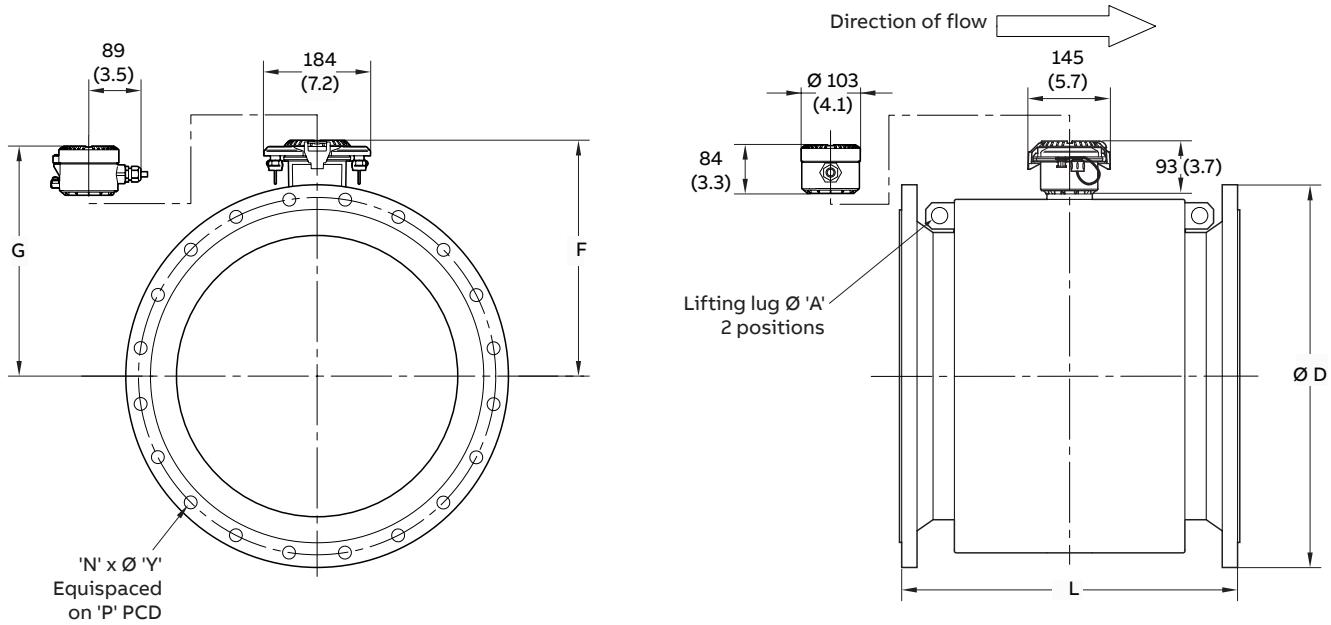
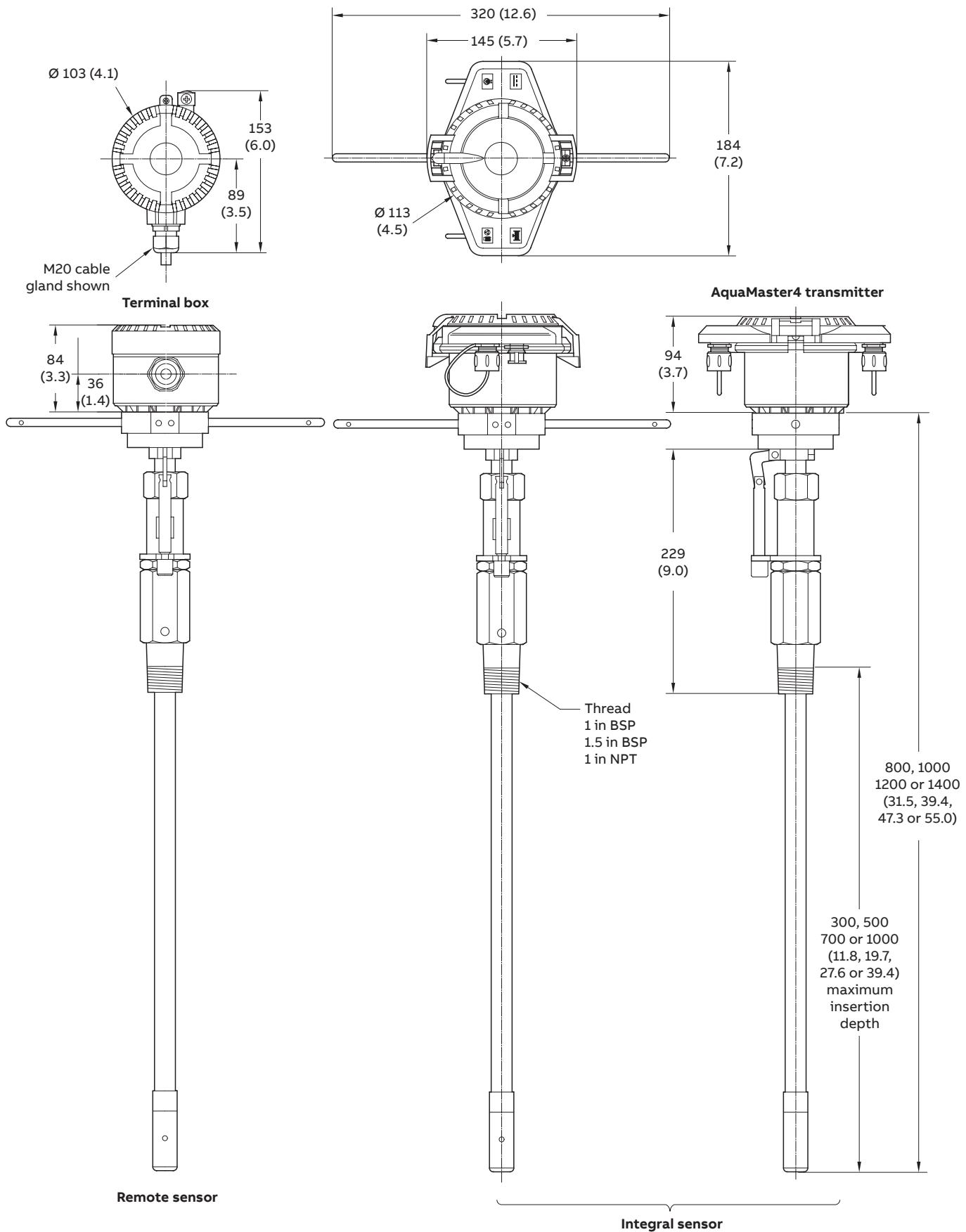


Figure 10 F-style sensor – DN700 to 2400 (28 to 96 in)

Sensor size	Flange		Dimensional in mm (in)										
	Standard	Class	Flange OD	No. Holes	Bolt Hole Dia	Bolt Hole PCD	Sensor Length	Trans Height	Tx box Height	Lifting Lug	Approx weight in kg(lbs)	INT	REM
			D	N	Y	P	L	F	G	A			
DN1500 (60 in)	JIS	5K	1730	36	33	1660	1524	958	953	45	1029	1027	
		10K	1795	40	45	1700					1504	1502	
		CLASS B	1854								1229	1227	
	AWWA C207	CLASS D	1854	52	44(1.75)	1759(69.25)		958	953	45	1514	1512	
		CLASS E	1854	52	44(1.75)	1759(69.25)					2544	2542	
		SERIES A	1855	52	47.6(1.875)	1759					3084	3082	
DN1600 (64 in)	ASME CL150	SERIES B	1725	52	35(1.375)	1662.1	1600	959	954	45	2031	2029	
		SERIES A	1810	32	60.3(2.375)	1701.8					3875	3873	
		SERIES B	1880	40	60.3(2.375)	1763.7					4181	4179	
	EN 1092 or DIN	PN6	1830	40	36	1760	2080	959	954	45	1434	1432	
		PN10	1915	40	48	1820					2525	2523	
		PN16	1975	40	56	1820					2768	2766	
DN1650 (66 in)	AWWA C207	PN25	1930	40	62	1860	1650	1009	1004	45	3201	3199	
		PN40	2025	40	70	1900					4375	4373	
		CLASS B	2032								1504	1502	
	EN 1092 or DIN	CLASS D	2032	52	44(1.75)	1930(76)	1009	1004	45	2025	2023		
		PN6	2045	44	39	1970	1800	1074	1069	45	1853	1851	
		PN10	2115	44	48	2020					3180	3178	
DN1800 (72 in)	EN 1092 or DIN	PN16	2130	44	56	2020					3657	3655	
		PN25	2195	44	70	2070	1800	1074	1069	45	4422	4420	
		CLASS B	2197								1773	1771	
	AWWA C207	CLASS D	2197	60	44(1.75)	2096(82.5)					2387	2385	
		PN6	2262				1800	1184	1179	45	2309	2307	
		PN10	2325	48	48	2230					3037	3035	
DN2000 (80 in)	EN 1092 or DIN	PN16	2345	48	62	2230	2000	1184	1179	45	2581	2579	
		PN25	2425	48	70	2300					4254	4252	
		CLASS B	2534								4556	4554	
		CLASS D	2534	64	51(2)	2426(95.5)					5896	5894	
	AWWA C207	PN6	2475	52	42	2390	2200	1288	1283	45	2641	2639	
		PN10	2550	52	56	2440					3487	3485	
DN2200 (88 in)	EN 1092 or DIN	PN6	2685	56	42	2600	2400	1388	1283	45	3363	3361	
		PN10	2760	56	56	2650					5795	5793	
DN2400 (96 in)	EN 1092 or DIN	PN6	2685	56	42	2600	2400	1388	1283	45	4100	4098	
		PN10	2760	56	56	2650					6968	6966	

Table 11 F-style sensor - DN1500 to 2400 (42 to 96 in)

## Dimensions – insertion flowmeter

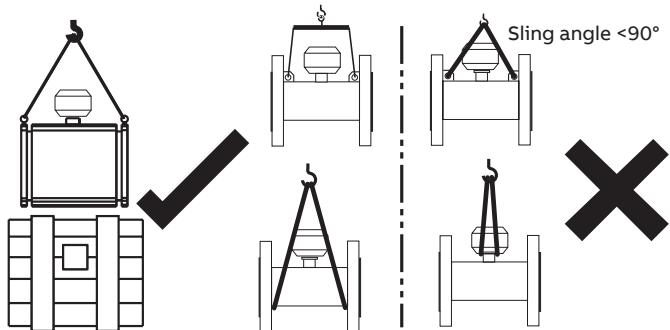


## Installation requirements – sensor

This section is intended to give an overview of installation of a flowmeter. For Installation requirements, technical information and Health and Safety precautions refer to User Guide [OI/FER100/FER200-EN](#).

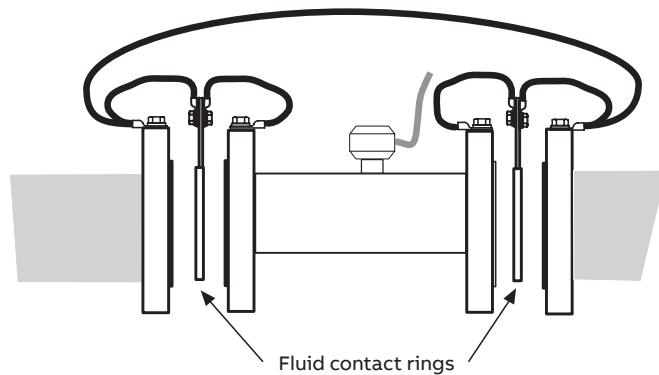
### Unpacking the flowmeter

Care must be taken when lifting the flowmeter to use the lifting hooks provided or sling under the body of the meter. Never lift the flowmeter using the terminal connection box or the sensor cable as this causes damage and invalidates the warranty.

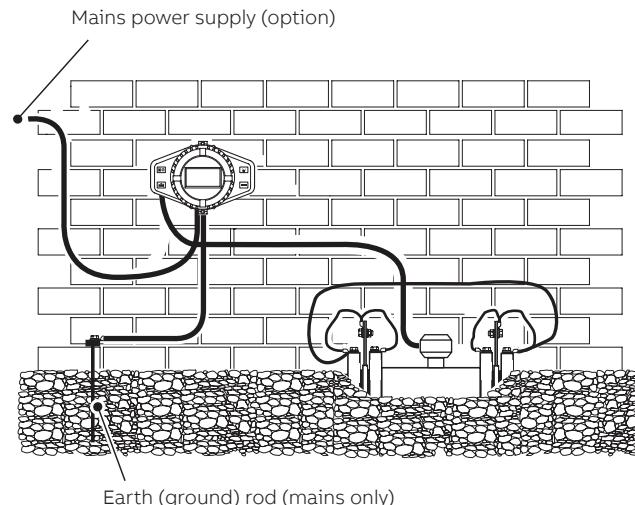


### Grounding

The flowmeter sensor must be cross-bonded to the upstream and downstream pipes. For technical reasons, this potential must be identical to the potential of the metering fluid. The fluid connection is made by installing 2 fluid contact rings (for grounding).

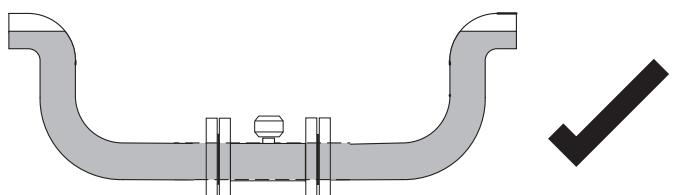


**Note.** The grounding arrangements shown below are applicable to both cathodic and non-cathodic protected installations.



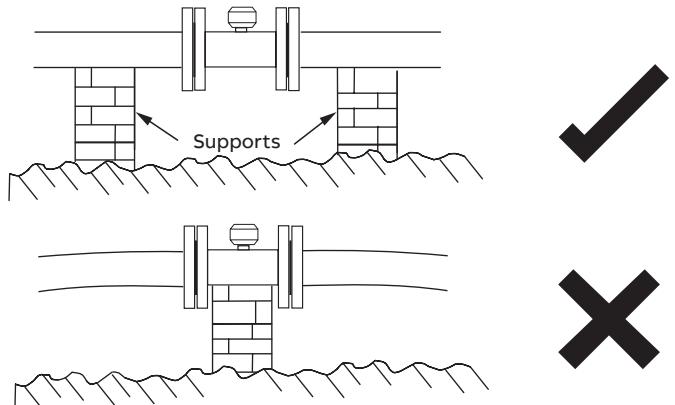
### Mounting

The installation conditions shown below must be observed to achieve the best operational results. The sensor tube must always be completely full.



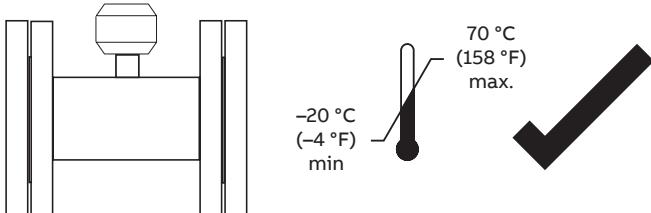
The flow direction must correspond to the identification plate. The flowmeter measures the flowrate in both directions. Forward flow is the factory setting.

The flowmeter must be installed without mechanical tension (torsion, bending). If necessary, support the pipeline.

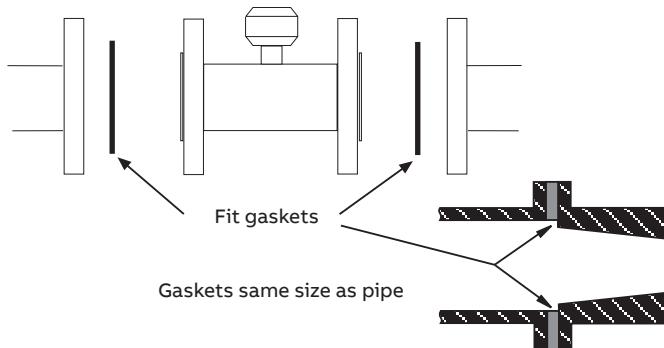


## ...Installation requirements – sensor

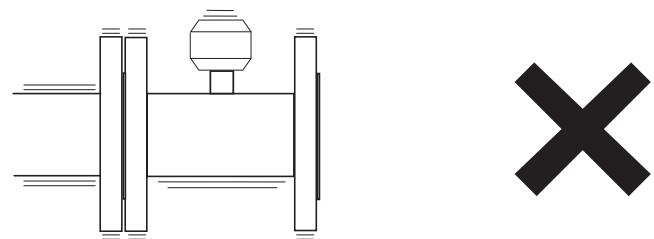
The flange seal material must be compatible with the fluid and fluid temperatures.



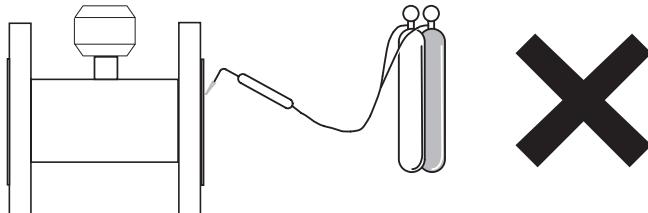
Seals must not extend into the flow area as this causes turbulence that adversely influences flowmeter accuracy.



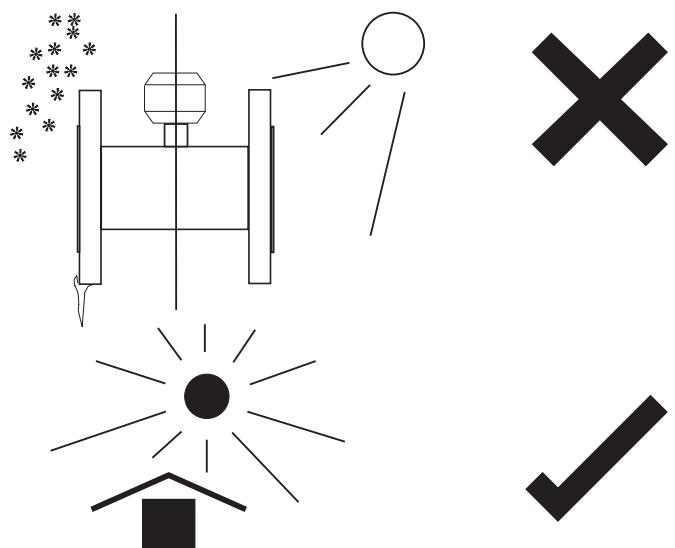
The pipeline must not exert any forces and torques on the flowmeter (for example, vibration).



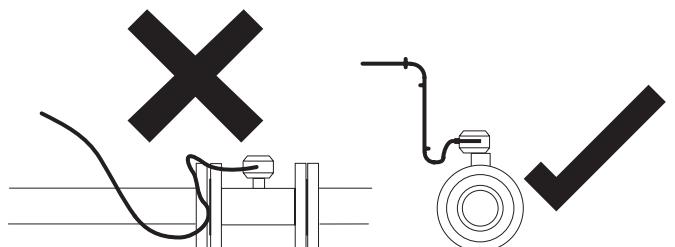
The flowmeter must not be submitted to localized heating during installation; take care to remember this is a measuring instrument.



The flowmeter must not be exposed to direct sunlight. Provide appropriate sun protection where necessary.

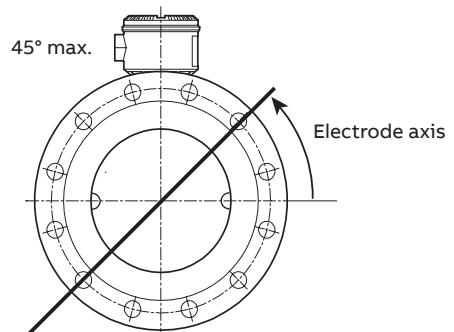


The cable to the flowmeter must be installed neatly or within a conduit. Both loose or conduit installations must have a u-bend below terminal connection box height to enable any water to run off thus avoiding any capillary action into the flowmeter sensor.



### Electrode axis

The electrode axis must be horizontal wherever possible or no more than 45° from horizontal.



## Installation requirements – transmitter

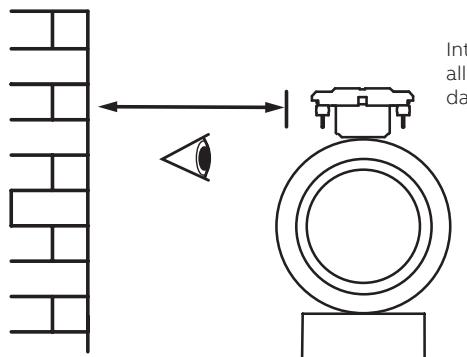


Figure 11 Siting

Integral version –  
allow room to read  
data plate

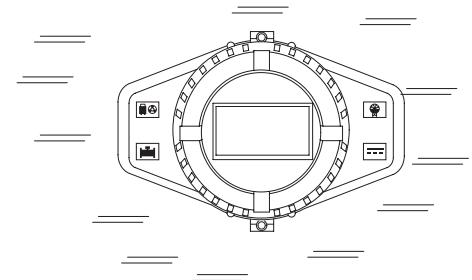
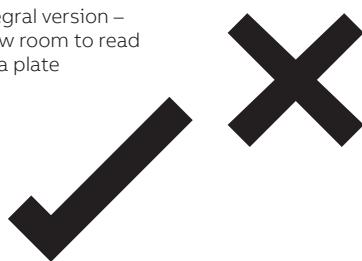


Figure 14 Vibration

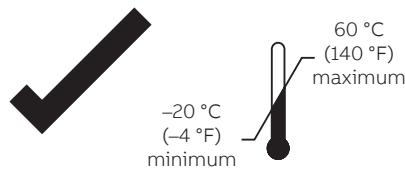


Figure 12 Within temperature limits

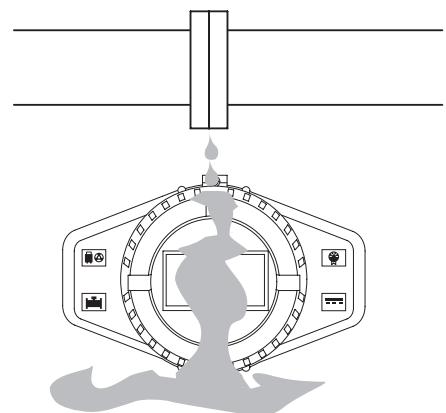
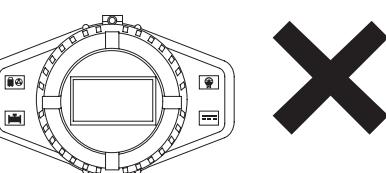


Figure 15 Spillage

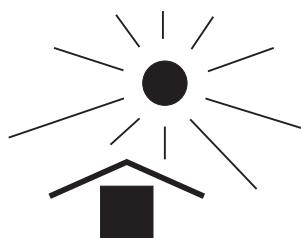
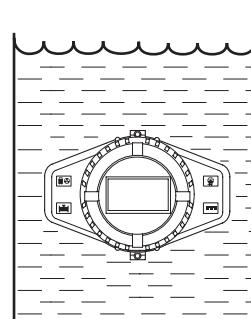


Figure 13 Shade



IP68 (NEMA 6P)  
ENCLOSURE 6P

Submerged –  
9 months  
accrued time

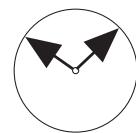
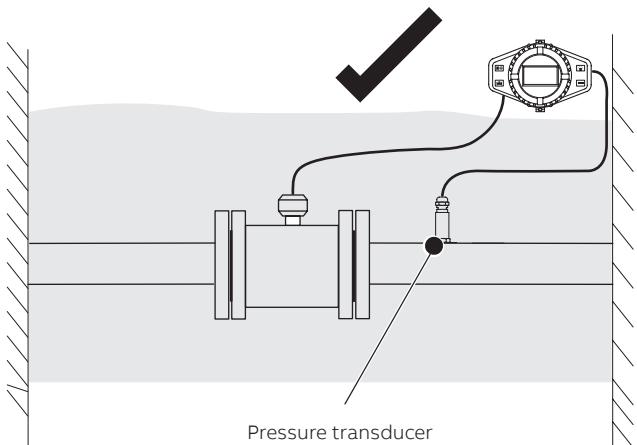


Figure 16 Within environmental rating

## ...Installation requirements – transmitter



For access to display and communication

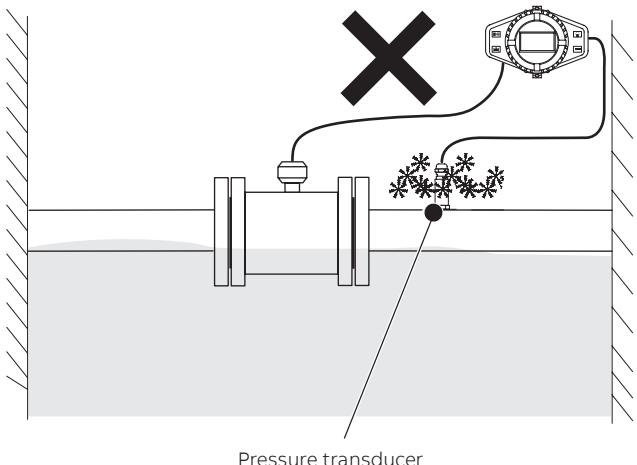
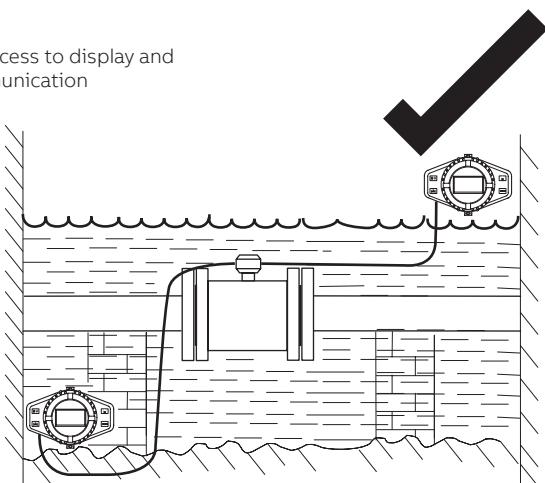


Figure 18 Access to transmitter

Figure 17 Pressure transducer – protect from frost

## AquaMaster4 series differences

AquaMaster4			
	Features	41X (standard)	43X (advanced)
<b>Mounting</b>	Integral	✓	✓
	Remote	✓	✓
<b>Sensors</b>	Full bore flanged rubber DN40 to DN2400	✓	✓
	Octagonal bore flanged polypropylene DN40 to DN200	✓	✓
	Reduced bore flanged rubber DN40 to DN600	✓	✓
	Probe 300 to 1000 mm	✓	✓
<b>Measurement</b>	Class 2 / 0.5 % calibration	✓	
	Class 2 / 0.4 % calibration		✓
	Class 1 and 2 / 0.2 % calibration		✓
	Extended range class 1 and 2 calibration to OIML R49 and NMI R49		✓
	Totalizer	✓	✓
	Pressure		✓
	Internal logger		✓
<b>Power</b>	AC (100 to 230 V, 50 or 60 Hz)		✓
	Battery	✓	✓
	Renewable (solar / wind)		✓
<b>Outputs</b>	Digital outputs	✓	✓
	Modbus		✓
	Sensus compatible	✓	✓
<b>Special application needs</b>	Sensor submerged (up to 10 m) or buried (up to 5 m) *	✓	✓
	Retrofit with legacy AquaMaster sensors		✓

\*DN40 to 600 reduced bore, DN40 to 200 octagonal bore sensors and DN450 to 2400 full bore sensors

## Ordering information

### Electromagnetic flowmeter

	1,2,3,4,5,6	7	8,9,10,11	12,13	14	15	16	17,18	19	20,21
<b>Sensor and transmitter</b>										
Standard integral flowmeter	FEW411									
Standard remote flowmeter	FEW412									
Advanced integral flowmeter	FEW431									
Advanced remote flowmeter	FEW432									
<b>Sensor only</b>										
Standard remote sensor	FEW418									
Advanced remote sensor	FEW438									
<b>Sensor style / liner material</b>										
Full bore / rubber liner	F									
Octagonal bore / polypropylene liner	V									
Reduced bore / rubber liner	R									
Probe / PEEK	A									
<b>Meter size</b>										
DN40 (1½ in)	0040									
DN50 (2 in)	0050									
DN65 (2½ in)	0065									
DN80 (3 in)	0080									
DN100 (4 in)	0100									
DN125 (5 in)	0125									
DN150 (6 in)	0150									
DN200 (8 in)	0200									
DN250 (10 in)	0250									
DN300 (12 in)	0300									
300 mm (12 in) insertion probe length	P030									
DN350 (14 in)	0350									
DN400 (16 in)	4000									
DN450 (18 in)	0450									
DN500 (20 in)	0500									
500 mm (20 in) insertion probe length	P050									
DN600 (24 in)	0600									
DN700 (28 in)	0700									
700 mm (28 in) insertion probe length	P070									
DN750 (30 in)	0750									
DN800 (32 in)	0800									
DN900 (36 in)	0900									
DN1000 (40 in)	1000									
1000 mm (40 in) insertion probe length	P100									
DN1050 (42 in)	1050									
DN1100 (44 in)	1100									
DN1200 (48 in)	1200									
DN1350 (54 in)	1350									
DN1400 (56 in)	1400									
DN1500 (60 in)	1500									
DN1600 (64 in)	1600									
DN1650 (66 in)	1650									
DN1800 (72 in)	1800									
DN1950 (78 in)	1950									
DN2000 (80 in)	2000									
DN2100 (84 in)	2100									
DN2200 (88 in)	2200									
DN2400 (96 in)	2400									
Others	9999									

Continued on next page ...

	1,2,3,4,5,6	7	8,9,10,11	12,13	14	15	16	17,18	19	20,21
See page 42										
<b>Process connection type</b>										
ANSI / ASME B16.5 / 16.47 series B Class 150 – DN40 to 600 (1½ to 24 in)				A1						
ANSI / ASME B16.5 / 16.47 series B Class 300 – DN40 to 600 (1½ to 24 in)				A3						
AWWA C207 Class B – DN700 to 2400 (28 to 96 in)				C1						
AWWA C207 Class D – DN700 to 2400 (28 to 96 in)				C2						
AWWA C207 Class E – DN700 to 2400 (28 to 96 in)				C3						
AS 4087 PN 16 – DN40 to 2400 (1½ to 96 in)				E1						
AS 2129 Table E – DN40 to 2400 (1½ to 96 in)				E4						
JIS 7.5K – DN40 to 2400 (1½ to 96 in)				J0						
JIS 10K – DN40 to 2400 (1½ to 96 in)				J1						
JIS 5K – DN40 to 2400 (1½ to 96 in)				J2						
1 in BSP coupling (½ in pressure tap) – probe only				N1						
1½ in BSP coupling (¾ in pressure tap) – probe only				N2						
1 in NPT coupling (½ in pressure tap) – probe only				N3						
ISO 7005, DIN, EN 1092 – 1 PN 10 – DN40 to 2400 (1½ to 96 in)				S1						
ISO 7005, DIN, EN 1092 – 1 PN 16 – DN40 to 2400 (1½ to 96 in)				S2						
ISO 7005, DIN, EN 1092 – 1 PN 25 – DN40 to 2400 (1½ to 96 in)				S3						
ISO 7005, DIN, EN 1092 – 1 PN 40 – DN40 to 2400 (1½ to 96 in)				S4						
Others				Z9						
<b>Process connection material</b>										
Carbon steel				B						
Stainless steel				C						
Stainless steel carrier (probe only)				J						
Brass seal carrier (probe only)				K						
Without (probe only)				U						
<b>Measuring electrodes material</b>										
Stainless steel 316L (1.4404)				R						
Super austenitic steel (1.4529)				U						
<b>Grounding accessories</b>										
Without				A						
2 grounding rings (standard)				E						
<b>Protection class – transmitter / sensor</b>										
IP 68, NEMA 6P / IP 68, NEMA 6P – integral, remote cable not fitted and not potted (IP68 only after potting by others)									80	
IP 68, NEMA 6P / IP 68, NEMA 6P – remote mount cable fitted and potted									81	
<b>Power supply</b>										
Battery powered – battery not fitted				B						
Battery powered – battery fitted				L						
AC + internal back-up				K						
External renewable energy + internal back-up				R						
<b>Outputs</b>										
MODBUS + pulse output *										M4
Pulse output										B1
Sensus communication protocol compatible + pulse output *										S1
Without (FEW411, FEW412 and sensor only)										Y0

\* With 3KXF221400L0XXX FEW4 sensor cable – see **Accessories** on page 47.

## ...Ordering information

### ...Electromagnetic flowmeter

<b>Options – add to order code as required</b>	
<b>Logger and protocol</b>	
Internal logger option	LPN
<b>Calibration type (3 test points as standard)</b>	
Class 2.5 calibration to NMI M10 – FEW411 and FEW412 only	RCS
Class 2 / 0.5 % factory calibration – FEW411 and FEW412 only	RCC
Class 2 / 0.4 % factory calibration – standard with FEW431 and FEW432 only	RCD
Class 2 / 0.2 % factory calibration – option with FEW431 and FEW432 only	RCB
Class 1 / 0.2 % factory calibration – option with FEW431 and FEW432 only	RCF
Class 2 calibration to OIML R49 and NMI R49 – option with FEW431 and FEW432 only	RCM
Class 1 calibration to OIML R49 and NMI R49 – option with FEW431 and FEW432 only	RCN
2 % factory calibration (probe only)	RCW
<b>Number of test points</b>	
1	TV1
5	TV5
<b>Signal cable length and type</b>	
5 m (approx. 15 ft)	SC1
10 m (approx. 30 ft)	SC2
20 m (approx. 66 ft)	SC4
30 m (approx. 98 ft)	SC6
50 m (approx. 164 ft)	SCA
100 m (approx. 328 ft)	SCE
150 m (approx. 492 ft)	SCG
<b>Additional cables</b>	
Sensus cable, 5 m	SR1
Sensus cable, 20 m	SR4
Renewable energy cable, 10 m	SP2
<b>Accessories</b>	
1½ in ball valve	AB
RS485 lead with MIL connector for MODBUS	AT
<b>Display protective cover</b>	
Display protective cover without NFC	AD1
Display protective cover with NFC, 5 m cable	AD2
Display protective cover with NFC, 20 m cable	AD3
<b>Pressure span</b>	
2000 kPa / 20 bar / 300 psi	PS3
4000 kPa / 40 bar / 580 psi	PS4
<b>Pressure transducer</b>	
Remote, cable length 10 m (33 ft)	PT5
Remote, cable length 20 m (65 ft)	PT6
<b>Other usage certifications</b>	
UL Fire Service approval	CMF
<b>Potable water approvals</b>	
WRAS – cold water approval	CWA
NSF-61	CWC
DVGW	CWD
AZ / NZS 4020	CWE
ACS	CWF
WRAS – 60 °C water approval	CWK
<b>Other options</b>	
With customer property label	KL
<b>Documentation language</b>	
German	M1
Spanish	M3
French	M4
English	M5
Chinese	M6
Polish	M9

**Transmitter**

	Product coding field number	1,2,3,4,5,6	7	8,9
<b>Transmitter only</b>				
Standard remote transmitter	FET412			
Advanced remote transmitter	FET432			
<b>Power supply</b>				
Battery powered – battery not fitted		B		
Battery powered – battery fitted		L		
AC + internal back-up		K		
External renewable energy + internal back-up		R		
<b>Outputs</b>				
MODBUS		M4		
Pulse output		B1		
Sensus communication protocol compatible		S1		
Without (FEW411 and FEW412 only)		Y0		

**Options – add to order code as required**

<b>Logger and protocol</b>		
Internal logger option		LPN
<b>Additional cables</b>		
Sensus cable, 5 m		SR1
Sensus cable, 20 m		SR4
Renewable energy cable, 10 m		SP2
<b>Accessories</b>		
RS485 lead with MIL connector for MODBUS		AT
<b>Display protective cover</b>		
Display protective cover without NFC		AD1
Display protective cover with NFC, 5 m cable		AD2
Display protective cover with NFC, 20 m cable		AD3
<b>Pressure span</b>		
2000 kPa / 20 bar / 300 psi		PS3
4000 kPa / 40 bar / 580 psi		PS4
<b>Pressure transducer</b>		
Remote, cable length 10 m (33 ft)		PT5
Remote, cable length 20 m (65 ft)		PT6
<b>Other usage certifications</b>		
Measuring Instruments Directive (MID)		CM1
<b>Documentation language</b>		
German		M1
Spanish		M3
French		M4
English		M5
Chinese		M6
Polish		M9

## ...Ordering information

### Probe bore gauge tool

	1,2,3,4	5	6,7,8,9
Probe bore gauge tool	APBGT		
<b>Housing</b>			
R1 housing		2	
<b>Bore size</b>			
700 mm			700
760 mm			760
800 mm			800
900 mm			900
1000 mm			1000
1100 mm			1100
1200 mm			1200
1400 mm			1400
1500 mm			1500
1600 mm			1600
1800 mm			1800
2000 mm			2000
2200 mm			2200

### Transmitter electronics only

	1,2,3,4, 5, 6	7	8,9
<b>Standard integral transmitter generic</b>	F E T 4 1 9		
<b>Standard remote transmitter generic</b>	F E T 4 1 0		
<b>Advanced integral transmitter generic</b>	F E T 4 3 9		
<b>Advanced remote transmitter generic</b>	F E T 4 3 0		
<b>Power supply</b>			
Battery powered – battery not fitted		B	
AC + internal back-up		K	
External renewable energy + internal back-up		R	
<b>Outputs</b>			
MODBUS		M4	
Pulse output		B1	
Sensus communication protocol compatible		S1	
Without		Y0	

### Additional codes to be added as required

<b>Logger and protocol</b>		
Internal logger option		LPN
<b>Pressure span</b>		
2000 kPa / 20 bar / 300 psi		PS3
4000 kPa / 40 bar / 580 psi		PS4
Others		PSZ
<b>Pressure transducer</b>		
Remote, cable length 10 m (33 ft)		PT5
Remote, cable length 20 m (65 ft)		PT6
<b>Other usage certifications</b>		
Measuring Instruments Directive (MID)		CM1
<b>Documentation language</b>		
German		M1
Spanish		M3
French		M4
English		M5
Chinese		M6
Polish		M9

## Accessories

Part No.	Description
3KXF208400L0100	AM4 battery pack 10 lithium D cells
3KXF208400L0200	AM4 battery pack 50 lithium D cells
3KXF208400L0300	AM4 display protective cover
3KXF208400L0400	AM4 display protective cover NFC 5 m cable
3KXF208400L0500	AM4 display cover NFC 20 m Cable
3KXF208400L0600	AM4 RS485 lead Mil connectors Modbus
3KXF221400L0100	FEW4 sensor cable 5 m (15 ft approx.)
3KXF221400L0200	FEW4 sensor cable 10 m (30 ft approx.)
3KXF221400L0300	FEW4 sensor cable 20 m (66 ft approx.)
3KXF221400L0400	FEW4 sensor cable 30 m (98 ft approx.)
3KXF221400L0500	FEW4 sensor cable 50 m (164 ft approx.)
3KXF221400L0600	FEW4 sensor cable 100 m junction box / Mil
3KXF221400L0700	FEW4 sensor cable 150 m junction box / Mil
3KXF221400L0800	FEW4 sensor cable 500 m
3KXF221400L0900	FEW4 junction box and cable – M20 to Mil
3KXF208400L0700	AM4 Sensus cable 5 m (15 ft approx.)
3KXF208400L0800	AM4 Sensus cable 20 m (66 ft approx.)
3KXF208400L0900	AM4 renewable energy cable 10 m
3KXF208400L1000	AM4 pulse output cable 1 m
3KXF208400L2100	AM4 pressure transducer 20 bar 10 m
3KXF208400L2200	AM4 pressure transducer 20 bar 20 m
3KXF208400L2500	AM4 pressure transducer 40 bar 10 m
3KXF208400L2600	AM4 pressure transducer 40 bar 20 m
3KXF221400L1100	FEW4 terminal box potting compound 200 g
3KXF221400L1200	FEW4 ball valve stainless steel 1½ in BSP
3KXF221400L1300	FEW4 bush stainless steel 1½ in M x 1 in BSP
3KXF221400L1400	FEW4 ball valve stainless steel 1½ in NPT
3KXF221400L1500	FEW4 bush stainless steel 1½ in M x 1 in NPT
3KXF221400L1600	FEW4 AquaProbe seal replacement kit
3KXF208400L2700	AM4 transmitter seal kit
3KXF208400L2800	AM4 battery connector kit
3KXF221400L1700	FEW4 pre-amp board and potting kit
3KXF208400L2900	Aquamaster 4 – demonstration kit
3KXF221400L1800	FEW4 terminal box maintenance kit
3KXF208400L3000	AM4 anti-tamper security kit
3KXF208400L3100	AM4 remote transmitter mounting bracket kit
3KXF221400L1900	FEW4 earth strap kit

## Acknowledgments

- MODBUS is a registered trademark of the Modbus-IDA organization.
- Sensus is a registered trademark of Sensus USA, Inc.
- Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.



---

**ABB Limited**  
**Measurement & Analytics**  
Oldends Lane, Stonehouse  
Gloucestershire, GL10 3TA  
UK  
Tel: +44 (0)1453 826 661  
Fax: +44 (0)1453 829 671  
Email: instrumentation@gb.abb.com

**ABB Inc.**  
**Measurement & Analytics**  
125 E. County Line Road  
Warminster, PA 18974  
USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

**ABB Engineering (Shanghai) Ltd.**  
**Measurement & Analytics**  
No. 4528, Kangxin Highway  
Pudong New District  
Shanghai, 201319  
P.R. China  
Tel: +86(0) 21 6105 6666  
Fax: +86(0) 21 6105 6677  
Email: china.instrumentation@cn.abb.com

**abb.com/measurement/flow**

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

© Copyright 2018 ABB.  
All rights reserved.