ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/FET400-EN REV. H

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)

Integrated mobile communications
- NB-IoT (LTE Cat NB1 for China) & 4G LTE Cat1 with fall back to 3G

Multiple power options
- battery (with up to 10 years' life), renewable and AC mains

Wide range of sensor styles and size
- reduced bore DN40 to 600, virtual full bore DN40 to 200, full bore DN250 to 2400 and probe 300 to 1000 mm

Ideal for arduous applications
- IP68 for submersion up to 10 m that are prone to flooding and up to 5 m buriable

Verification
- in-situ diagnostics and self-checking capabilities to OIML type P

Flexible communications
- pulse, Modbus™ and Sensus™ with NFC interface to mobile smartphone/tablet

Diverse data options for mobile communications
- CSV/JSON files exchange through explicit FTPS/FTP (TLS1.2-based encryption) or MQTTS/MQTT Sparkplug B for 4G/3G and data exchange through LwM2m (over CoAP with DTLS 1.2 encryption) for NB-IoT (China Telecom IoT Platform)

Product is certified to NSF/ANSI/CAN 61-G, OIML R49:2013 & MID

Applications

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

Additional product features

- In-situ diagnostics and optional self-checking capabilities with OIML R49 type P
- High and low flowrate alarms
- Backward compatible with legacy AquaMaster sensors
- Drinking water certifications: WRAS, NSF-61, ACS, AS/NZS 4020
- Certificates: OIML R49:2013, MID MI-001, NMI 10, PAC and UL 327 B
- Wireless certification: CE-RED, FCC/IC, PTCRB, SRRC, ACMA/RCM

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 measurement (flow & pressure), data logging and mobile communications
- 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)
- Frequent granular data of process (flow rates and totalizer) and diagnostic parameters help to reduce operational cost or eliminate energy wastage and will enable you to control your supply and demand more accurately
- Get data at a higher resolution for precise and specific periods of interest anytime and every time
- Cyber Security assurance for data confidentiality and integrity including changes made in configuration settings or firmware upgrades with complete traceability which could be requested over air in near real time
- Fit-and-flow with factory default settings. Use the ABB Velox Interface mobile smartphone/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 flowmeter through the use of ABB's SRV500 in-situ verification tool

Overview

FEX41X/FEX43X

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™
Easy firmware update

Configurable features

In-built logger

Pressure measurement

Self-checking

Communications options

Pulse output

Modbus

Sensus protocol

Multiple sensor options

Reduced bore DN40 to 600

Virtual full bore DN40 to 200

Full bore DN250 to 2400

Probe 300 to 1000 mm

Measurement performance

Accuracy up to ±0.2 % ±0.5 mm/s whichever is greater

Range (R) up to R1000

Drinking water approvals

NSF-61 | WRAS | AS/NZS 4020 | DVGW | ACS | D.M. 174

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

OIML R49:2013 for accuracy class 1 and 2 | MID MI-001 | NMI 10 | PAC

Calibration rig approvals

ISO 17025 | UKAS | NATA | SIMT | NIST traceable | NABL

FEX45X

Multiple power options

- 6 x internal batteries (up to 8 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** Easy firmware update

Configurable features

- In-built logger
- Pressure measurement
- Self-checking

Communications options

- Pulse output
- Modbus
- 4G/ nB - IoT

Data options

- FTPS/MQTTS with Sparkplug B
- CSV/JSON

Multiple sensor options

- Reduced bore DN40 to 600
- Virtual full bore DN40 to 200
- Full bore DN250 to 2400
- Probe 300 to 1000 mm

Measurement performance

- Accuracy up to ±0.2 % ±0.5 mm/s whichever is greater
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...Overview

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? 	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. The AquaMaster4's in-built optional cellular engine and 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. Such high resolution data facilitates step testing, leakage detection, water network analysis, reduces operational expenses and eliminates energy wastage. The in-built logger delivers accuracies which are not possible when using an external data logger.	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? 	A free app (Velox Interface) is available for use with Android™ 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. 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. '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.	Increase productivity of your staff/contractor and eliminate poor quality through human error 
Do you want to have the lowest operational expenditure throughout the lifecycle of the product? 	Using standard off-the-shelf 'D' lithium cells, the AquaMaster4 can be operated for up to 10 years. 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. There is no longer any need for bespoke cables and laptops to connect to each transmitter.	Lower cost of ownership 
	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 flowmeter 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.	Simplifies compliance to ISO 9001 traceability without any additional effort 

FEX41X / FEX43X

Protective cover with wire to the contactless coupler

The removable cover protects the transmitter display from accidental impact damage

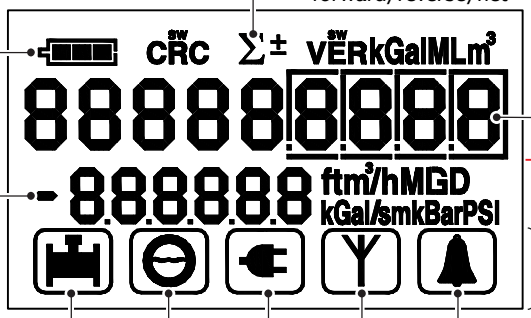
Wall mount contactless coupler

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)

Upper display: forward flow total/reverse flow total/net flow total

Battery state

Totalizer: forward/reverse/net



Display

Sensor fault

Empty pipe condition

Mains failure

Mobile communications

Alarm condition read diagnostics

5 alarm icons

Lower display: flow rate flow velocity, pressure

Contactless communication

Interacting with the transmitter is easily achieved with an Android smartphone/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

Power supply enclosure

Enclosure for battery, AC or renewable power options

...Overview

FEX45X

NFC Cover with wire to the contactless coupler/USB

The removable cover enables contactless communication with USB termination or extension to wall mount contactless coupler

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)

In-built data logger (optional)

Optional multi-speed, flowrate and pressure internal logger runs at high speed, allowing user to request logged data at any interval (typically set to one minute, but can be as fast as 15 seconds)

Contactless communication

AquaMaster4 is the first instrument to feature a contactless interface using industry standard Near Field Communication (NFC). A free App (Velox) available for use with Android and Windows smartphones and tablets supports simple configuration changes to be made on your touchscreen color phone/tablet.

Wireless communication

In–built cellular engine (4G/nB- IoT) sends logged data of measurement along with changes in configuration settings either as summary report or in reply to ad hoc requests with alarm notification for diagnostics

Fit and flow

No need to match sensor and transmitter, as the sensor stores all calibration factors, site settings and serial numbers

Power options

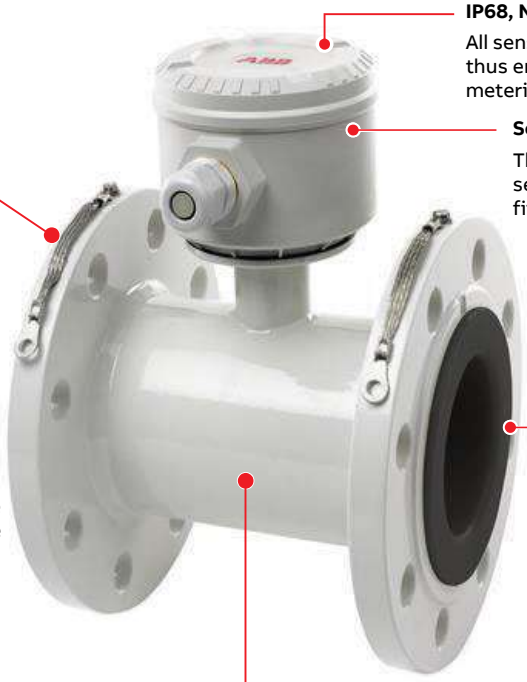
Plug-in external power supply unit (PSU) with option to select Battery/AC Main/Solar or Wind which is a 3.6 V DC interface only. Integral flowmeters are powered with internal batteries.

IP68 connectors

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

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-61 | WRAS | AS/NZS 4020 | DVGW | ACS | D.M. 174

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

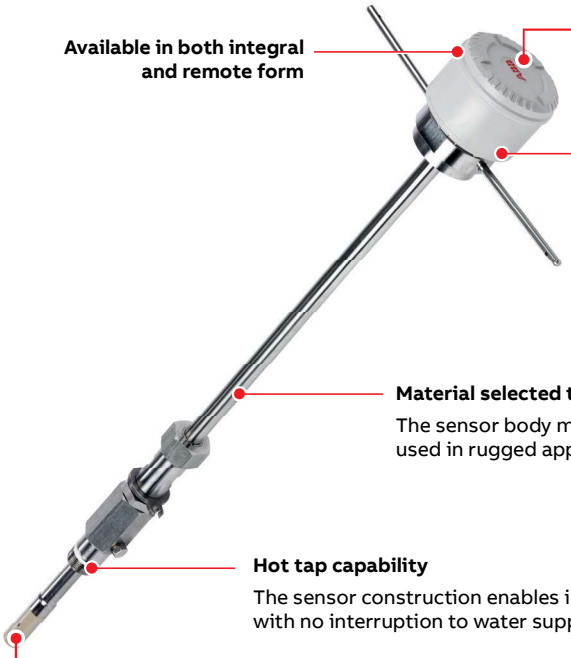
Upstream and downstream pipe length

Reduced bore DN40 to 600 requires 0D upstream and downstream

Virtual full bore DN40 to 200 requires 5D upstream and 0D downstream (0D upstream and 0D downstream to OIML R49:2013 only)

Full bore DN250 to 2400 requires 5D upstream and 2D downstream (3D upstream and 0D downstream to OIML R49:2013 only)

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

Drinking water approvals

NSF-61 | WRAS | ACS

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 are 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 m^3/s, enabling larger meters to be calibrated at high flowrates.

All of ABB calibration facilities are continuously pumped enabling a flowmeter to 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.

1995
CalMaster released
Worlds first flow verification system
Step change in regulatory compliance and flow maintenance
Tests to within 1 % of original calibration certificate

2006
CalMaster2 released
Worlds first battery powered flowmeter verification system

2008
VeriMaster and ScanMaster released
Flow verification testing without interrupting the measurement
Testing using revolutionary in-built diagnostics coming from the flowmeter itself

2017
SRV500 released
Multi-product verification platform
Digital solution with secure data storage in ABB cloud
Flexible licence options

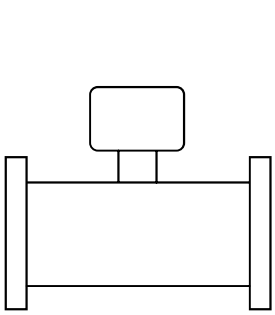
Introducing SRV500
The next generation verification tool suite for use with ABB's complete range of active electronic flowmeters. Download the software for free and use the instrument-specific test routine to provide the best possible check of product health, without stopping your process.

SRV500 verifies the condition and performance of the flowmeter 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.

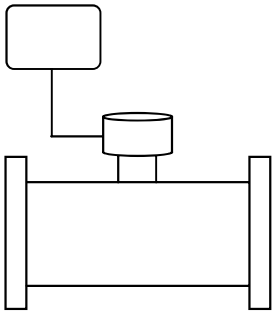
SRV500 enables the operator to choose whether to use either the factory fingerprint or to create a new fingerprint based on real site conditions after product commissioning. All verifications performed in the field can then be compared with the fingerprint data and previous tests to ensure flowmeter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

Specification – transmitter (41X/43X)

Mounting on flow sensor



Integral with sensor



Remote with up to 150 m (492 ft) cable

Power supply

Battery

AC mains

Solar

Wind

Battery power

Only use 3.6 V lithium thionyl chloride D batteries recommended by ABB

Note. The following batteries work with the product:

- SAFT LS33600
- Eve ER34615
- GB Cell ER34615
- cT-energy ER34615
- OmniCel ER34615
- GEBC ER34615
- LiYa ER34615
- Fanso ER34615H

The above batteries comply with the safety requirements of IEC60086-4, and have a maximum peak discharge current of less than 500mA.

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
Virtual full 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 2/Class 1 calibration to OIML R49 & MID options (CM2 & CM1 in ordering code)
- when Modbus or Sensus output is in use

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 (Oreo 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)

- Passive Output 1: forward pulses
- Passive 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 12

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), <2 m (6 ft)

Submerged

9 months accrued time

Humidity

0 to 100 %

Temperature ranges

Storage: –20 to 60 °C (–4 to 140 °F)

Ambient: –25 to 60 °C (–13 to 140 °F)

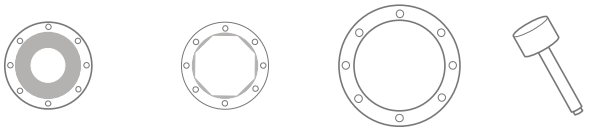
Transmitter vibration

IEC 60068-2-6 (2007)

Vibration level 2g

Options

Compatible sensor styles



Reduced bore DN40 to 600	Virtual full bore DN40 to 200	Full bore DN250 to 2400	Probe 300 to 1000 mm

External pressure transducer (option)

Up to 20 and 40 bar absolute

Backward compatibility (option)

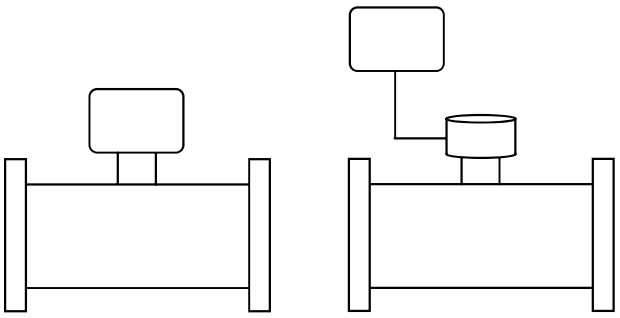
- Full compatibility with legacy AquaMaster remote sensors. Plugs directly into AquaMaster4 with no specific configuration required.

MID/Tamper detection (option)

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

Specification– transmitter (FEX45X)

Mounting on flow sensor



Integral with sensor

Remote with up to 150 m (492 ft.) cable

Power supply

Battery AC mains Solar Wind

Battery power

6/4 lithium thionyl chloride 'D' batteries.

Note. The following batteries work with the product:

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

* Preferred

Nominal External Battery Power Supply Unit (PSU) only: FTPS/FTP

Sensor style	Size	Integral	Remote
Reduced bore	DN40 to 80	8.5 years	7 years
	DN100 to 300	7 years	6.5 years
	DN350 to 600	7 years	6 years
Octagonal bore	DN40 to 200	8.5 years	7 years
Full bore	DN250 to 600	7 years	6 years
	DN700 to 2400	4 years	4 years

MQTTS/MQTT with Sparkplug B

Sensor style	Size	Integral	Remote
Reduced bore	DN40 to 80	11 years	9 years
	DN100 to 300	9 years	7.5 years
	DN350 to 600	8.5 years	7.5 years
Octagonal bore	DN40 to 200	11 years	9 years
Full bore	DN250 to 600	8.5 years	7.5 years
	DN700 to 2400	4.5 years	4 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
- mobile communication transmission interval of:
  - 24 h for Detailed Report through 4G over FTPS/FTP/MQTTS/MQTT with Sparkplug B, or- 6 h for Summary Report through NB - IoT over LwM2M 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 2/Class 1 calibration to OIML R49 & MID options (CM2 & CM1 in
- ordering code)
- when Modbus output is in use
- with extended use of mobile communications

Mains supply (option – remote only)

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

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: 5 days
- DN250 to 600: 3 days
- DN700 to 2400: 1 day

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.

Nominal External Backup Power for Mains and Renewable Power Supply Unit (PSU) FTPS/FTP:

Sensor style	Size	Integral	Remote
Reduced bore	DN40 to 80	5.5 years	5 years
	DN100 to 300	5 years	4 years
	DN350 to 600	4.5 years	4 years
Octagonal bore	DN40 to 200	5.5 years	5 years
Full bore	DN250 to 600	4.5 years	4 years
	DN700 to 2400	2.5 years	2.5 years

Note. Test conditions are the same as for battery-operated transmitter with 4 batteries only.

MQTTS/MQTT with Sparkplug B

Sensor style	Size	Integral	Remote
Reduced bore	DN40 to 80	6.5 years	5 years
	DN100 to 300	5.5 years	4.5 years
	DN350 to 600	5 years	4.5 years
Octagonal bore	DN40 to 200	6.5 years	5.5 years
Full bore	DN250 to 600	5 years	4.5 years
	DN700 to 2400	3 years	3 years

Battery change-over backup time

- Approximately 2 minutes

Antenna

- Internal
- External (option)

Note. Mobile communications do not operate if the internal antenna is under water . The general advice is to mount the antenna as high as possible, always outside of any metal enclosures and not under the surface of the ground.

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 (Oreo or newer). Functions of Velox Interface include configuration, diagnostics, logger data retrieval and transmitter flash update.

IMPORTANT (NOTE)
Please ensure all required regulatory approvals are in place before you put the FEX45X transmitter in use.
use.

Outputs

- Pulse/Alarm
- RS485 Modbus
- Mobile communications (4G fall back to 3G/NB-IoT)

Pulse outputs (option)

- Passive Output 1: forward pulses
- Passive 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

Mobile communications – 4G/3G

- 4G LTE Cat1 with fall back to 3G (HSPA/HSPA+)
- Data exchange via FTPS/FTP or MQTTS/MQTT Sparkplug B (V 3.0.0) (TLS1.2 encryption with digital certificate based mutual authentication) protocol
- Data exchange format configurable to CSV/JSON
- Data exchange interval, 15 mins, 30 mins, 1 hour, 2 hours, 4 hours, 6 hours, 8 hours, 12 hours or 24 hours configurable

Mobile communications – NB – IoT

- NB – IoT over China Telecom
- Data exchange via LwM2M (DTLS 1.2 encryption)
- Data exchange format JSON (JavaScript Object Notation) for China Telecom
- Data exchange interval 1 hour, 6 hours, 12 hours or 24 hours configurable

Logger

Logger function	Flow, pressure, forward, reverse, and net flow totals
No. of records	45792
Logging interval *	15 seconds 30 seconds 1 minute 5 minutes 15 minutes (selectable)
Logger capacity	31 days @ 1 minute 477 days @ 15 minutes

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

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

Audit logger

- Time-stamped records for all events, such as configuration changes, diagnostics, regular alarms and critical alarms (firmware update, change of totalizer, roll over of totalizer, reset of totalizer).

- stored as standard (3000 records) and critical (1000 records) events in separate database.
- available as .csv for easy import into databases/ spreadsheets

Response time (programmable)

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

Report types in mobile communications

- Summary report with totalizer (fwd., reverse and net),-flow rate, alarm status (OK/Not OK), signal quality, and battery life along with Pressure
- Detail report with totalizer (fwd., reverse, and net), flow rate, pressure log, alarm, signal quality, battery life
- Diagnostic alarm report

Remote requests through mobile communications

- Summary report, detail report, and audit log report
- Firmware update
- Configuration changes
- Device Certificate update

...Specification – transmitter (FEX45X)

Environmental and operating conditions

Ingress rating

IP68 (NEMA 6P), <2m (6 ft.), for 360 hours (Tested according to IEC 60529)

Humidity

0 to 100 %

Temperature ranges

Storage: –20 to 60 °C (–4 to 140 °F)

Ambient: –25 to 60 °C (–13 to 140 °F)

Environmental classification

O, M1 and E2 for internal antenna devices & E1 for external antenna devices

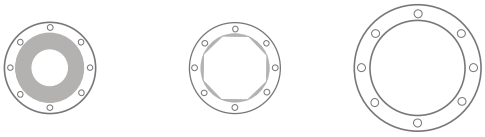
Transmitter vibration

IEC 60068-2-6 (2007)

Vibration level 2g

Options

Compatible sensor styles



Reduced bore DN40 to 600 | Octagonal bore DN40 to 200 | Full bore DN250 to 2400

External pressure transducer (option)

Up to 20 and 40 bar absolute

Backward compatibility (option)

- Full compatibility with legacy AquaMaster remote sensors. Plugs directly into AquaMaster 4 with no specific configuration required. Note the transmitter is not compatible with legacy telemetry applications and software applications

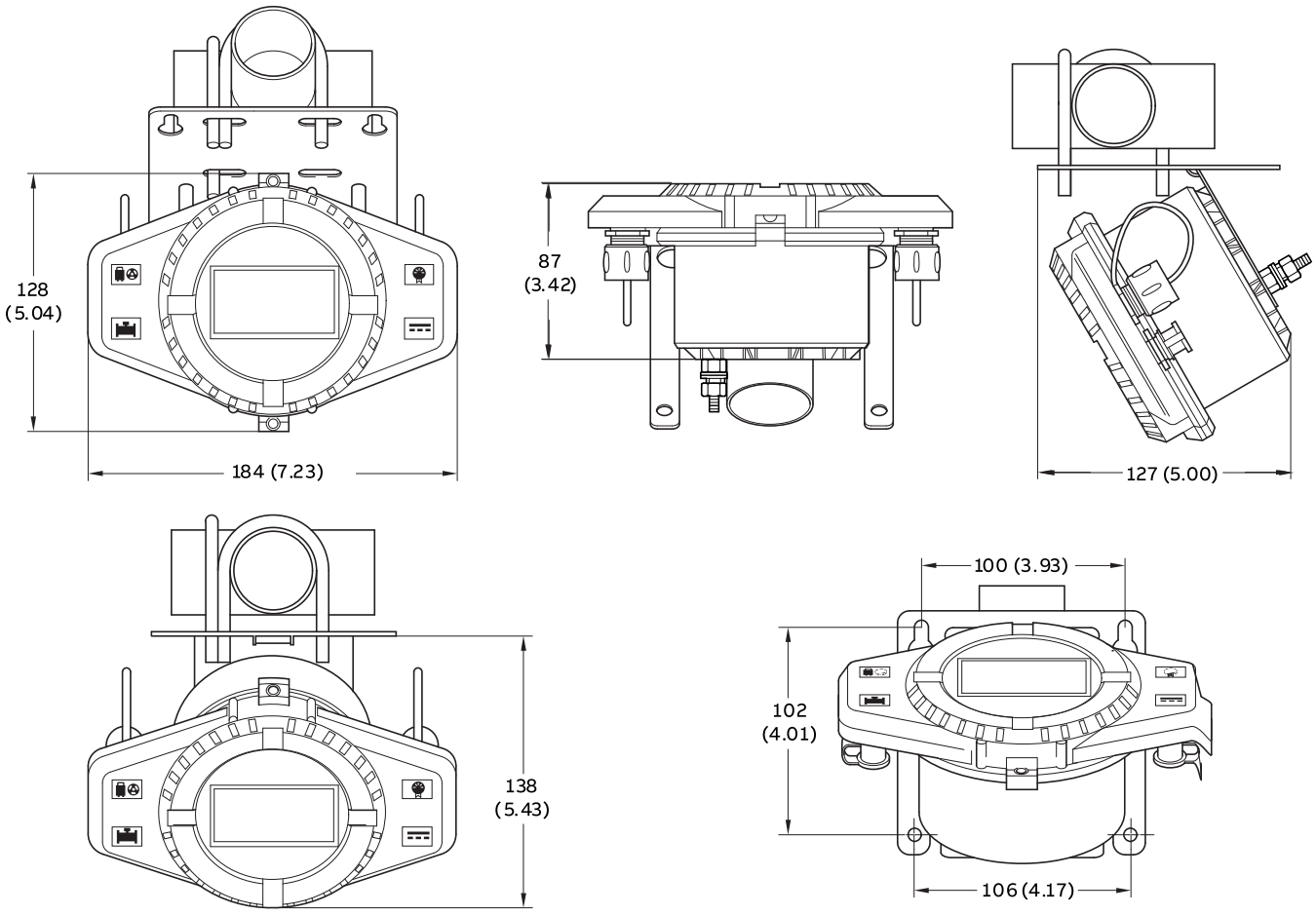
Read-only switch

- Switch selectable inside the SIM card chamber
- Prevents changes to meter configuration that affect the meter/output accuracy

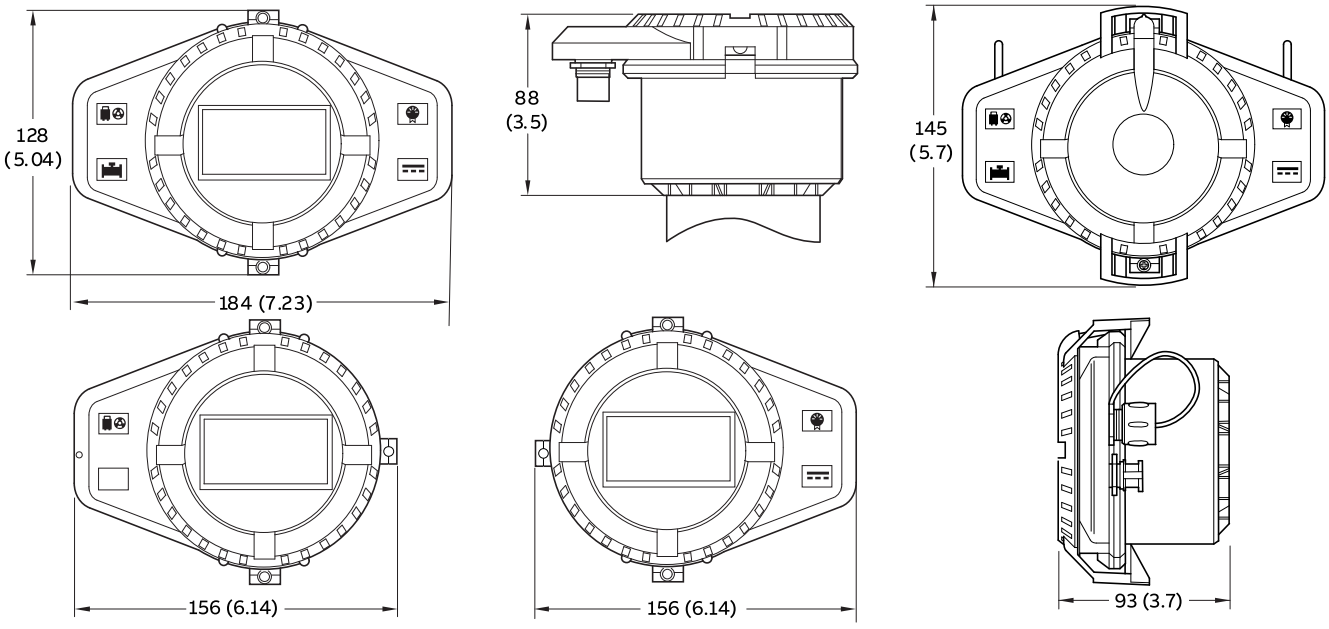
Specification

Dimensions – transmitter (41X/43X)

Dimensions in mm (in)



Wall-/Pipe-mount remote transmitter



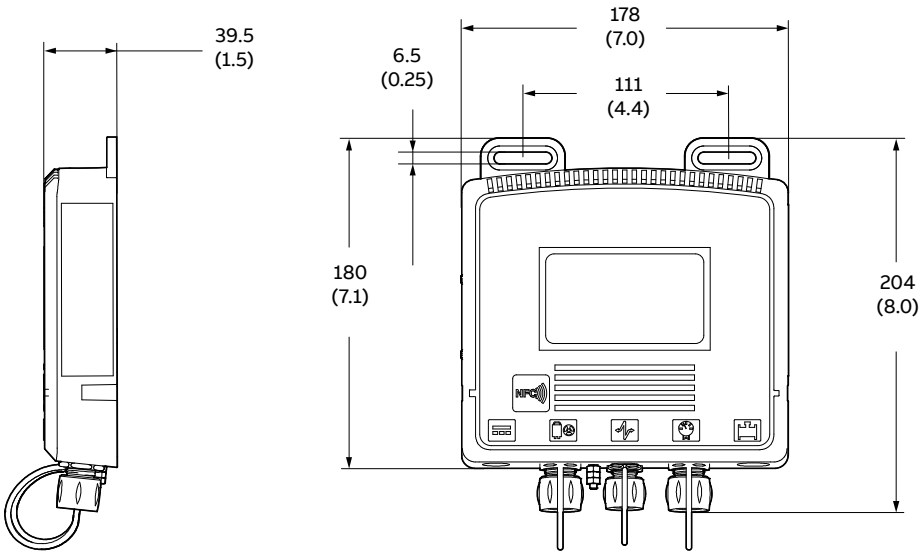
Integral transmitter

Transmitter with NFC aerial cover

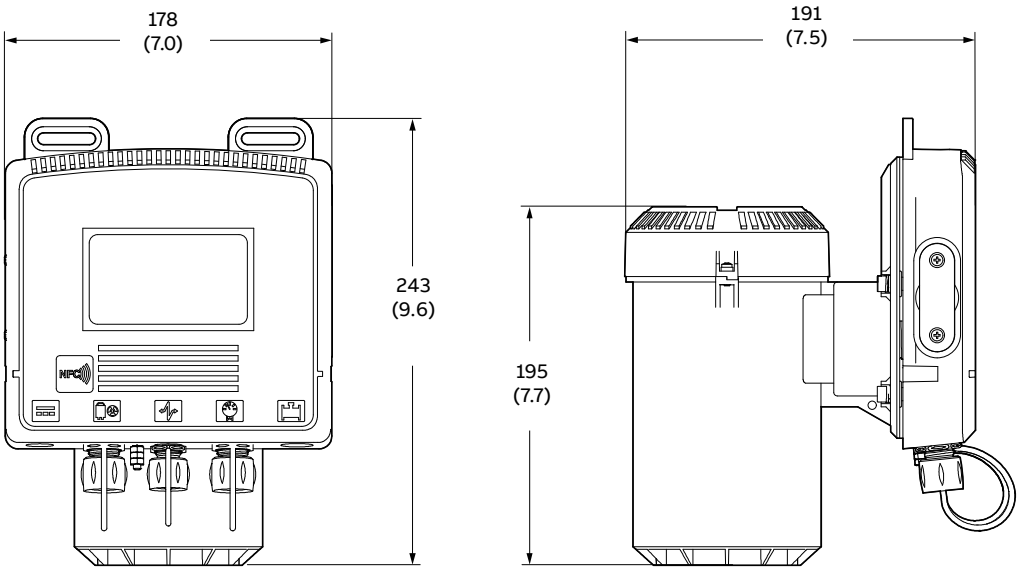
...Specification

Dimensions – FET450

Dimensions in mm (in)

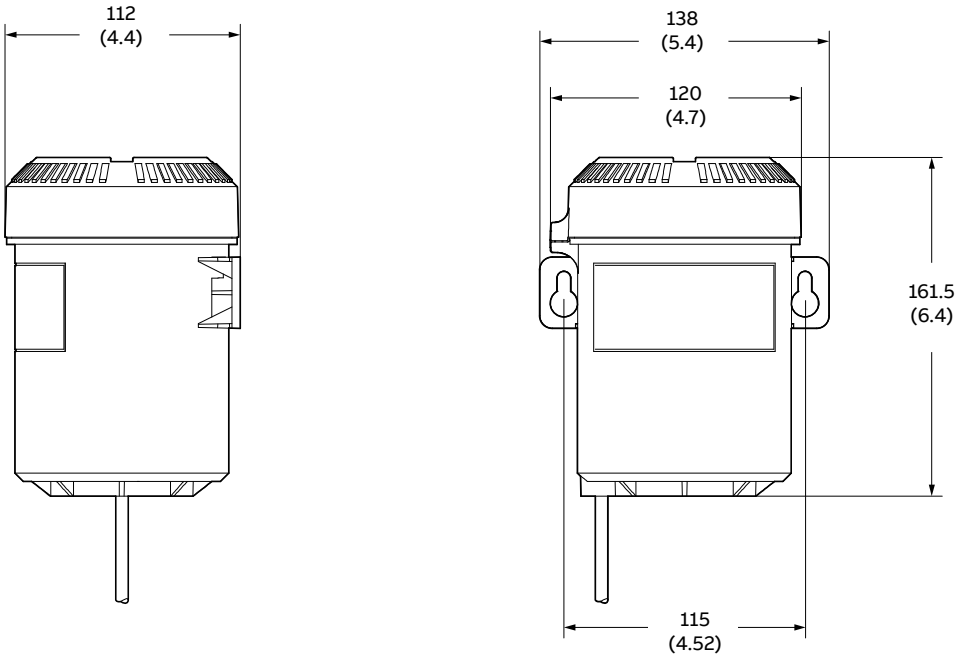


Wall-/Pipe-mount remote transmitter

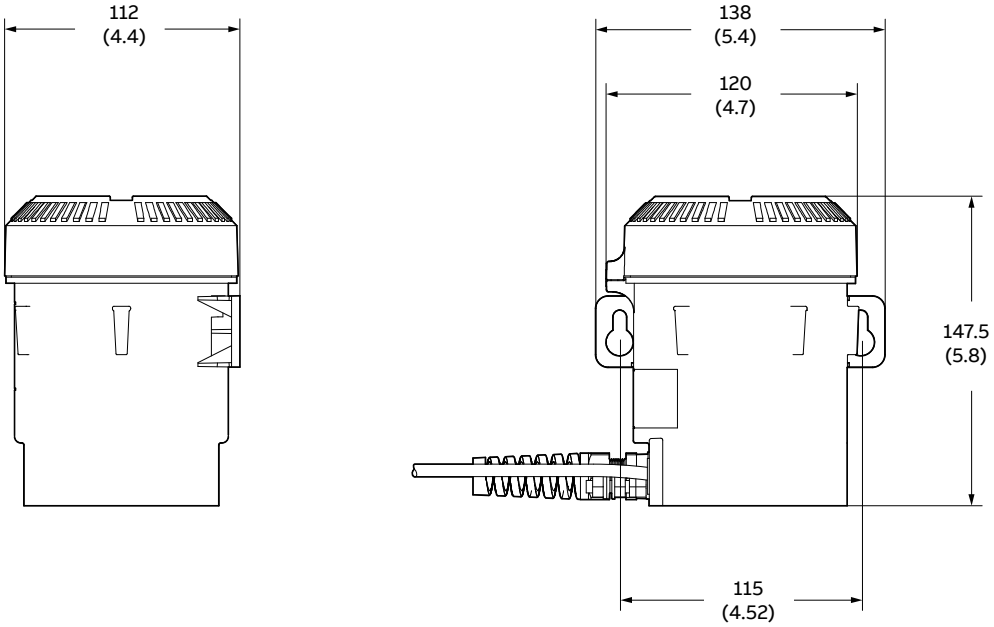


Integral transmitter

Dimensions – Power supply unit for FET452



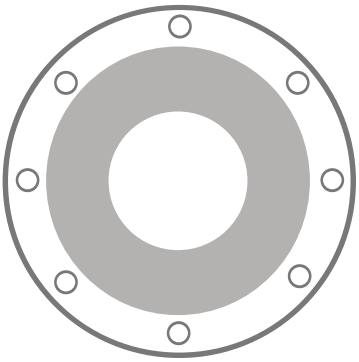
Battery power supply unit (PSU)



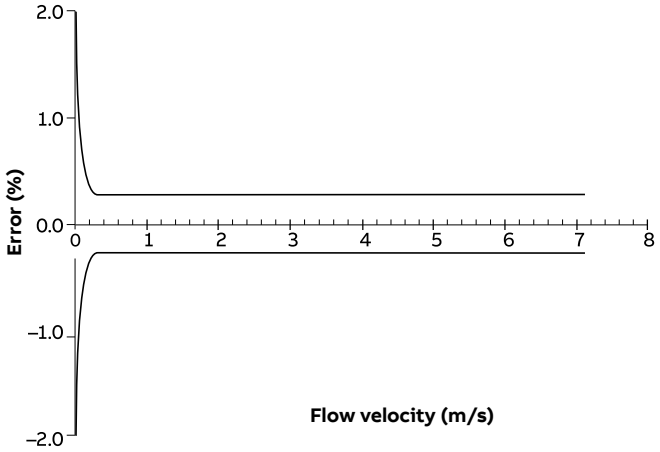
Mains/renewable power supply unit (PSU)

...Specification

Reduced bore sensor



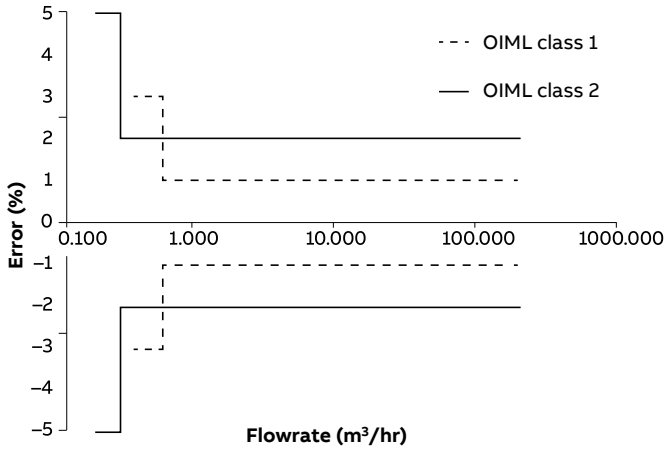
Measurement accuracy



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

* Whichever is the greater

Metrological performance to OIML R49:2013



			Mains powered		Battery/Renewable energy powered	
			Class 2 (R = 1000)	Class 1 (R = 500)	Class 2 (R = 400)	Class 1 (R = 160)
DN	in	Q3 (m³/h)	Q1 (m³/h)	Q1 (m³/h)	Q1 (m³/h)	Q1 (m³/h)
40	1½	25	0.025	0.05	0.063	0.16
50	2	40	0.04	0.08	0.10	0.25
65	2½	63	0.063	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
Q3/Q1 = R

			Mains powered		Battery/Renewable energy powered	
			Class 2 (R = 1000)	Class 1 (R = 500)	Class 2 (R = 400)	Class 1 (R = 160)
DN	in	Q3 (US gal/min)	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	2.77	5.55	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	27.7	55.5	69	173

Q2 = 1.6 * Q1
Q4 = 1.25 * Q3
Q3/Q1 = R

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
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 200: SG iron
- DN250 to 600: carbon steel
- All sizes (DN 40 - 600) 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 continuous submersion (Tested for 1500 hours according to IEC 60529)
- For buriable applications: 1 m < sensor depth ≤ 5 m

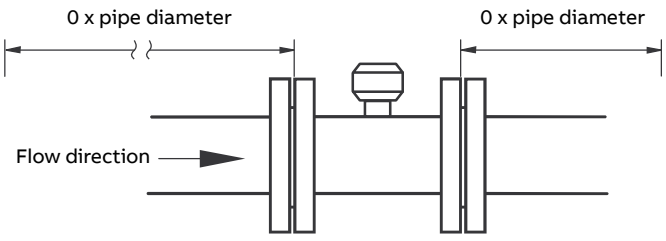
Temperature ranges

Ambient: –25 to 70 °C (–13 to 158°F)
Process: –6 to 70 °C (21 to 158 °F)
Ambient (OIML R49): –25 to 55 °C (–13 to 131 °F)

Conductivity

>20 µS/cm

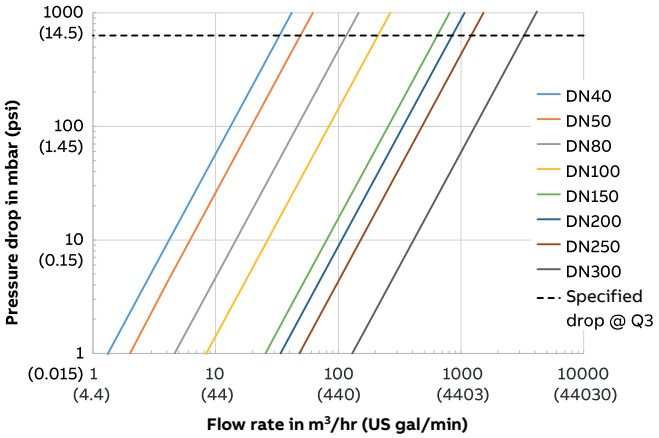
Upstream and downstream pipe conditions



Pressure loss

Flow rate	Pressure loss in bar (psi)
Q_3	DN40 - 50 < 0.4 (5.8)
Q_3	DN65 - 600 < 0.63 (9.1)
Q_3 /2	<0.16 (2.3)

Reduced bore sensor pressure drop (typical)



Potable water approvals

WRAS*
ACS#
NSF – 61#
AZ/NZS 4020*

Approvals, certification and safety

NSF

Certified to NSF/ANSI/CAN 61-G

Certified to NSF/ANSI/CAN 61-G

* Material approval
#Meter Approval

...Specification

...Reduced bore sensor

Metrological certifications

- OIML R49:2013 for accuracy class 1 and 2 and water temperature class T50 0.1 to 50 °C (32.18 to 122 °F)
- Environmental class: O, M1 ,E1** and E2*
- MID MI-001
- NMI 10 for Australia
- PAC for China

			Mains powered			Battery/Renewable energy powered		
			Class 2.5 (R = 630	Class 2 (R = 1000)	Class 1 (R = 500)	Class 2.5 (R = 250	Class 2 (R = 400)	Class 1 (R = 160)
DN	in	Q3 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)
40	1½	25	0.04	0.025	0.05	0.1	0.062	0.062(3)
50	2	40	0.063	0.04	0.08	0.16	0.1	0.1(3)
65	2½	63	0.1	0.063	0.063(2)	0.252	0.157	0.39
80	3	100	0.159	0.1	0.1(2)	0.4	0.25	0.625
100	4	160	0.254	0.16	0.32	0.64	0.4	1
125	5	160	0.254	0.16	0.32	0.64	0.4	1
150	6	400	0.63	0.4	0.4(2)	1.6	1	1(3)
200	8	630	1	0.63	0.63(2)	2.52	1.575	1.575(3)
250	10	1000	1.59	1	2	4	2.5	6.25
300	12	1600	2.54	1.6	3.2	6.4	4	10
350	14	1600	2.54	1.6	3.2	6.4	4	10
400	16	2500	7.94(7)	5(1)	5	20(8)	12.5(4)	15.63
450	18	2500	7.94(7)	5(1)	5	20(8)	12.5(4)	15.63
500	20	4000	6.35	4	8	63.5(9)	40(5)	100(6)
600	24	6300	10	6.3	12.6	100(9)	63(5)	157.5(6)

(1) R = 500, (2) R = 1000, (3) R = 400, (4) R = 200, (5) R = 100 (6) R = 40 (7) R = 315 (8) R = 125 (9) R = 63

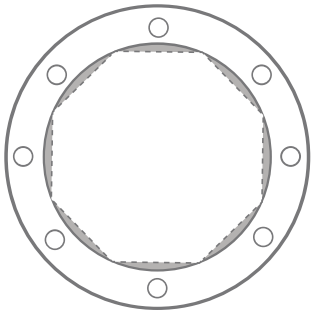
Q2 = 1.6 * Q1
Q4 = 1.25 * Q3
Q3/Q1 = R

UL Fire Service approval (41X/43X)

Size	UL low flow GPM	UL high flow GPM	Pressure drop (psi)
2	6	235	≤ 10
2½	6.5	280	≤ 9
3	6	465	≤ 7
4	10	630	≤ 6
6	20	1780	≤ 4
8	20	3345	≤ 8
10	45	4450	≤ 6
12	85	5245	≤ 2

* Applicable only for internal antenna devices of FEX45X & all options of FEX43X
** Applicable for external antenna devices of FEX45X

Full bore sensor



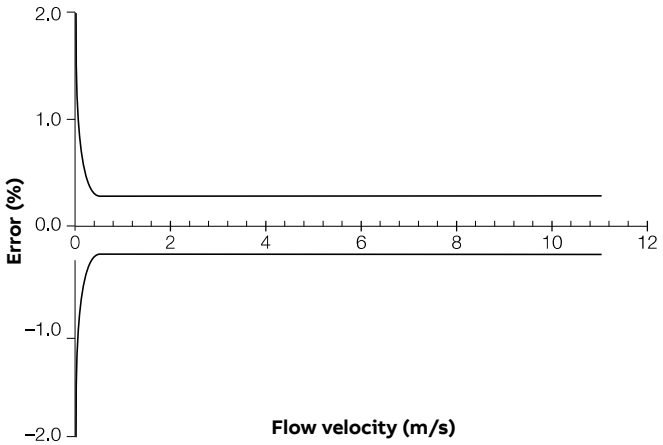
DN40 to 200

Virtual full bore, polypropylene liner

DN250 to 2400

Full bore, elastomer or hard rubber liner

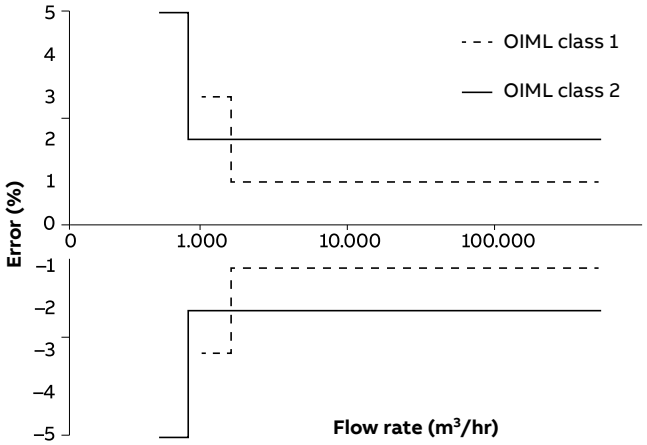
Measurement accuracy



	Mains powered		Battery/Renewable energy powered	
DN	**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 R49:2013



			Mains powered		Battery/Renewable energy powered	
			Class 2 (R = 500)	**Class 1 (R = 250)**	**Class 2 (R = 250)**	**Class 1 (R = 125)**
DN	**in**	**Q3 (m³/h)**	**Q1 (m³/h)**	**Q1 (m³/h)**	**Q1 (m³/h)**	**Q1 (m³/h)**
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	0.50	1	1	2
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
750	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
1350	54	63000	200.00	393.7	393.75	787
1400	56	63000	200.00	393.70	393.75	787
1500	60	63000	200.00	393.70	393.75	787
1600	64	63000	200.00	393.70	393.75	787
1650	66	63000	200.00	393.7	393.7	787
1800	72	100000	317.46	625	625	1250
1950	78	100000	317.46	625	625	1250
2000	80	100000	317.46	625	625	1250
2100	84	100000	317.46	625	625	1250
2200	88	160000	507.94	1000	1000	2000
2400	96	160000	507.94	1000	1000	2000

Q2 = 1.6 * Q1
Q4 = 1.25 * Q3
Q3/Q1 = R

...Specification

...Full bore sensor

			Mains powered		Battery/Renewable energy powered	
			Class 2 (R = 500)	Class 1 (R = 250)	Class 2 (R = 250)	Class 1 (R = 125)
DN	in	Q3 (US gal/min)	Q1 (US gal/min)	Q1 (US gal/min)	Q1 (US gal/min)	Q1 (US gal/min)
40	1½	176	0.35	0.70	0.7	1.41
50	2	277	0.55	1.11	1.11	2.22
65	2½	440	0.88	1.76	1.76	3.52
80	3	704	1.41	2.82	2.82	5.64
100	4	1101	2.20	4	4.40	8.81
125	5	1101	2.20	4	4.40	8.81
150	6	2774	5.55	11.10	11.10	22.2
200	8	4403	8.8	17.6	17.6	35.2
250	10	7045	14.09	28.2	28.2	56.4
300	12	11007	22	44	44	88
350	14	17611	35	70	70.4	141
400	16	17611	35	70	70.4	141
450	18	27738	55.48	111	111	222
500	20	27738	55.48	111	111	222
600	24	44029	88	176	176	352

Q2 = 1.6 * Q1
Q4 = 1.25 * Q3
Q3/Q1 = R

			Class 2 (R = 315)	Class 1 (R = 160)	Class 2 (R = 160)	Class 1 (R = 80)
700	28	70446	224	440	440	881
750	30	70446	224	440	440	881
800	32	70446	224	440	440	881
900	36	110072	349	688	688	1374
1000	40	110072	349	688	688	1374
1050	42	110072	349	688	688	1374
1100	44	176115	559	1101	1101	2201
1200	48	176115	559	1101	1101	2201
1350	54	277381	881	1733	1734	3465
1400	56	277381	881	1733	1734	3465
1500	60	277381	881	1733	1734	3465
1600	64	277381	881	1733	1734	3465
1650	66	277381	881	1733	1734	3465
1800	72	440287	1398	2752	2752	5504
1950	78	440287	1398	2752	2752	5504
2000	80	440287	1398	2752	2752	5504
2100	84	440287	1398	2752	2752	5504
2200	88	704459	2236	4403	4403	8806
2400	96	704459	2236	4403	4403	8806

Q2 = 1.6 * Q1
Q4 = 1.25 * Q3
Q3/Q1 = R

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 200: SG iron
- DN250 to 2400: carbon steel
- Sizes DN40 to 200 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
- Sizes DN250 to 400: In-organic Zinc based system for the flanges and painted Cast aluminum housing (Paint coat ≥ 80 µm, RAL 9002)
- Sizes DN450 to 2400: Welded steel Design (Paint coat ≥ 80 µm, RAL 9002)

Terminal box for remote sensors

Polycarbonate

Environmental and process conditions

Ingress rating

- DN40 -200 & DN450 - 2400 : IP68 (NEMA 6P) to 10 m (33 ft) for continuous submersion (Tested for 1500 hours according to IEC 60529)
- For buriable applications (DN40 to 200, virtual full bore, polypropylene liner and DN450 to 2400, full bore, rubber liner): 1 m < sensor depth ≤ 5 m
- DN250 - 400: IP68 (NEMA 6P) to 10 m (33 ft) for periodic submersion (Tested for 1500 hours according to IEC 60529)

Temperature ranges

Ambient: –25 to 70 °C (–13 to 158°F)

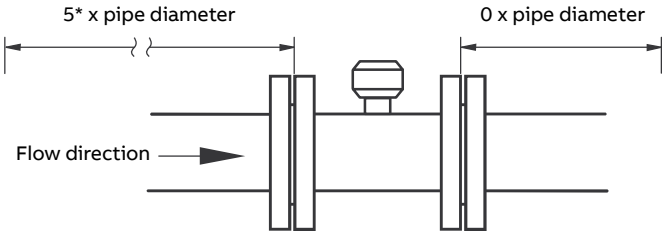
Ambient (OIML R49): –25 to 55 °C (–13 to 131 °F)

		Process temperature	
Liner material	**Bore size**	**Minimum**	**Maximum**
Polypropylene	DN40 to 200	–6 °C (21 °F)	70 °C (158 °F)
Rubber	DN250 to 2400	–10 °C (14 °F)	80 °C (176 °F)

Conductivity

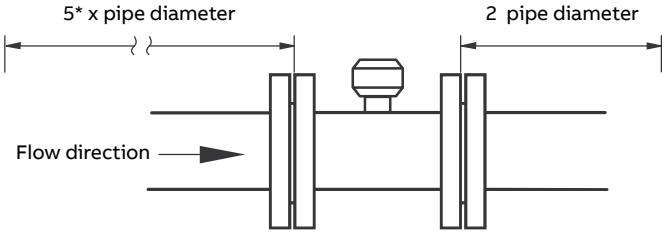
>20 µS/cm

Upstream and downstream pipe conditions (virtual full bore DN40 to 200)



* Upstream 0 X pipe diameter for OIML R49 Class 2 (± 2%) accuracy only

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

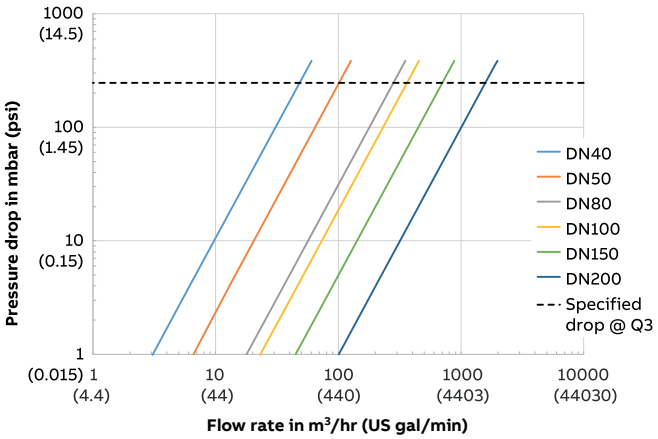


* Upstream 3 X pipe diameter for OIML R49 Class 2 (± 2%) accuracy only

Pressure loss

Flow rate	**Pressure loss in bar (psi)**
Q_3	<0.1 bar (1.5 psi) for DN40 and DN50 <0.16 bar (2.4 psi) for DN65 to DN250
Q_3	< 0.1 bar (1.5 psi) for sizes DN250 and larger

Virtual full bore sensor pressure drop (typical)



Potable water approvals

WRAS*

ACS#

NSF – 61#

AZ/NZ 4020*

Approvals, certification and safety

NSF

Certified to NSF/ANSI/CAN 61-G

Certified to NSF/ANSI/CAN 61-G

* Material approval

#Meter Approval

...Specification

...Full bore sensor

Metrological certifications

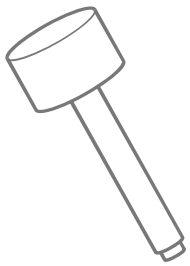
- OIML R49:2013 for accuracy class 1 and 2 and water temperature class T50 0.1 to 50 °C (32.18 to 122 °F)
- Environmental class: O, M1 ,E1** and E2*
- MID MI-001
- NMI 10 for Australia
- PAC for China

			Mains powered				Battery/Renewable energy powered	
			Class 2.5 (R = 315)	Class 2 (R = 500)	Class 1 (R = 250)	Class 2.5 (R = 160)	Class 2 (R = 250)	Class 1 (R = 125)
DN	in	Q3 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)	Q1 (m^3/h)
40	1½	40	0.127	0.08	0.08(1)	0.25	0.16	0.32
50	2	63	0.2	0.126	0.126(1)	0.394	0.25	0.504
65	2½	100	0.32	0.20	0.20(1)	0.625	0.40	0.4(2)
80	3	160	0.508	0.32	0.32(1)	1	0.64	0.64(2)
100	4	250	0.79	0.50	0.5(1)	1.56	1	1(2)
125	5	250	0.79	0.50	0.5(1)	1.56	1	1(2)
150	6	630	2	1.26	2.52	3.94	2.52	5.04
200	8	1000	3.17	2	4	6.25	4	8
250	10	1600	5.08	3.20	6.40	10	6.40	12.80
300	12	2500	7.94	5	10	15.625	10	20
350	14	4000	63.5(8)	40(3)	40(3)	25.0	16	16(2)
400	16	4000	63.5(8)	40(3)	40(3)	25.0	16	16(2)
450	18	6300	100(8)	63(3)	63(3)	39.375	25.20	25.2(2)
500	20	6300	100(8)	63(3)	63(3)	39.375	25.20	25.2(2)
600	24	6300	100(8)	63(3)	63(3)	63(3)	39.37(4)	78.75(5)
700	28	10000	80(7)	50(6)	100(3)	158.7(8)	100(3)	200(9)
750	30	10000	80(7)	50(6)	100(3)	158.7(8)	100(3)	200(9)
800	32	10000	80(7)	50(6)	100(3)	158.7(8)	100(3)	200(9)
900	36	10000	125(5)	80(7)	158.7(8)	250(10)	158.7(8)	-
1000	40	16000	128(7)	80(6)	160(3)	254(8)	160(3)	-
1050	42	16000	128(7)	80(6)	160(3)	254(8)	160(3)	-
1100	44	16000	200(5)	128(7)	253.9(8)	400(10)	254(8)	-
1200	48	16000	200(5)	128(7)	253.9(8)	400(10)	254(8)	-
1350	54	16000	254(8)	200(5)	400(10)	400(10)	400(10)	-
1400	56	16000	254(8)	200(5)	400(10)	400(10)	400(10)	-
1500	60	16000	254(8)	200(5)	400(10)	400(10)	400(10)	-
1600	64	16000	400(10)	200(5)	400(10)	400(10)	400(10)	-
1650	66	16000	400(10)	200(5)	400(10)	400(10)	400(10)	-
1800	72	16000	400(10)	317.5(9)	-	-	-	-

(1) R = 500, (2) R = 250, (3) R = 100, (4) R = 160, (5) R = 80, (6) R = 200,
(7) R = 125, (8) R= 63, (9) R = 50, (10) R = 40
Q2 = 1.6 * Q1
Q4 = 1.25 * Q3
Q3/Q1 = R

* Applicable only for internal antenna devices of FEX45X & all options of FEX43X
** Applicable for external antenna devices of FEX45X

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
⅛ in BSP

Note: Insertion flow meters are recommended to be used with Metallic pipes only.

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.

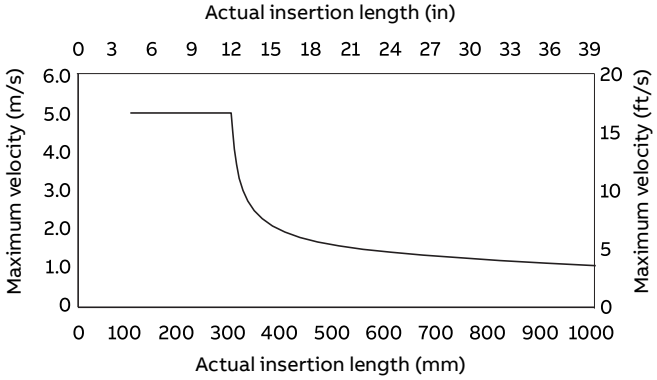


Figure 2 Maximum allowable velocity for different insertion lengths

Potable water approvals for wetted parts
WRAS
ACS
NSF-61

* 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

...Insertion flowmeter

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)

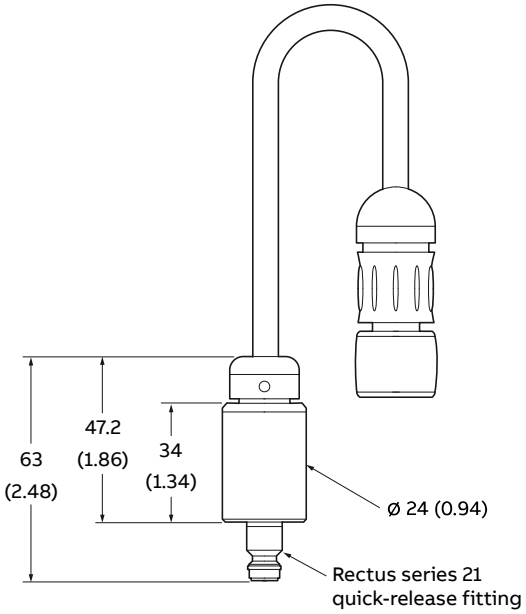
Ambient temperature range
–20 to 70 °C (–4 to 158 °F)

Pressure range (specify when ordering)
20 and 40 bar absolute

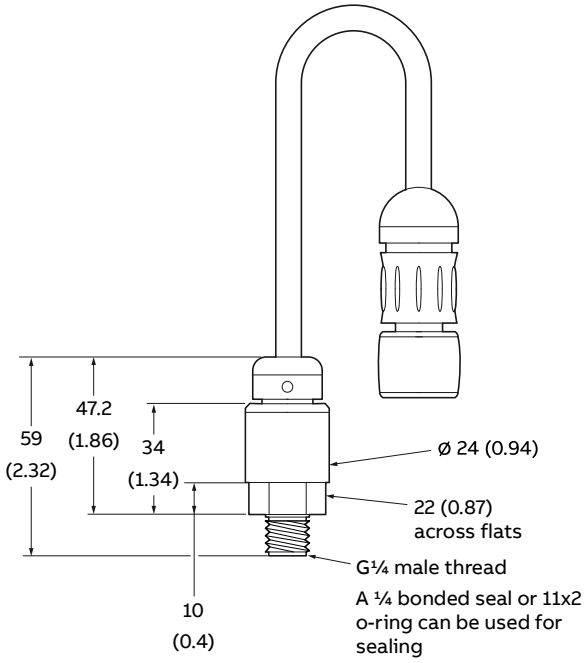
Accuracy (typical)
- < ±0.1 % of span + thermal errors
- Thermal zero shift < 0.01 % span/°C
- Thermal span shift < ±0.015 %/°C

Potable water approvals for wetted parts
WRAS

Dimensions
Dimensions in mm (in)
All dimensions nominal



20 bar transsducer



40 bar transsducer

Dimensions – sensors

R-style sensor – DN 40 to DN 300 (1½ to 12 in)

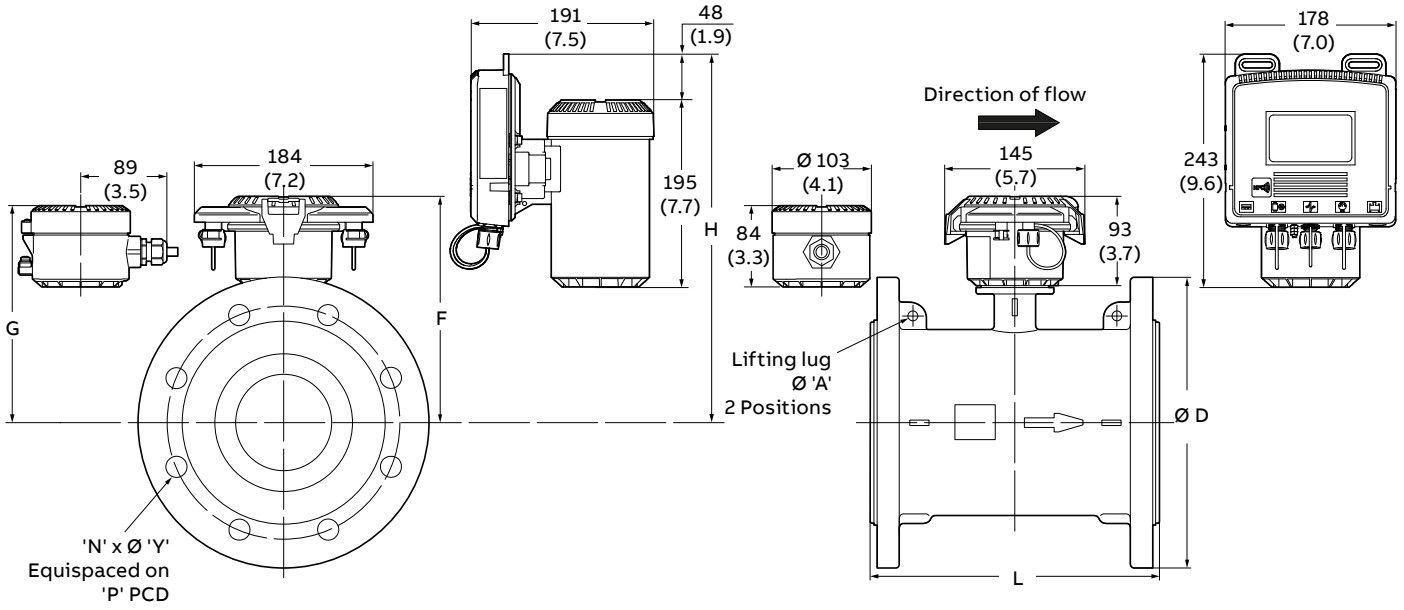


Figure 3 R-style sensor – DN 40 to DN 300 (1½ to 12 in)

Table 1 R-style sensor – DN 40 to DN 80 (1½ to 3 in)

Sensor size	Flange		Dimensions in mm (in)									Approx. weight kg (lbs)		
	Standard	Class	Flange OD D	No. holes N	Bolt hole dia. Y	Bolt hole PCD P	Sensor length L	Tx. height F	T. box height G	Tx. height H	Lifting lug A	Integral FEW411/ FEW431	Remote	Integral FEW451
DN 40 (1½ in)	EN 1092	PN 10, 16, 25	150 (5.9)	4	19 (0.75)	110 (4.3)	200 (7.9)	158 (6.2)	149 (5.9)	308 (12.1)	N/A	13 (29)	12 (27)	15 (34)
	ASME B16.5	CL150			15.7 (0.62)	98 (3.9)								
	AS 2129	Table E	135 (5.3)		14 (0.55)			154 (6.1)	144 (5.7)	304 (12.0)		11 (24)	8 (18)	13 (29)
	JIS B2220	5K	120 (4.7)		15 (0.59)	95 (3.7)								
		10K	140 (5.5)		19 (0.75)	105 (4.2)								
DN 50 (2 in)	EN 1092	PN 10, 16, 25	165 (6.5)	4	19 (0.75)	125 (4.9)	200 (7.9)	162 (6.4)	153 (6.0)	312 (12.3)	N/A	15 (32)	14 (30)	17 (38)
	ASME B16.5	CL150				121 (4.8)								
	AS 2129	Table E	150 (5.9)		18 (0.71)	114 (4.5)			152 (6.0)			12 (26)	9 (20)	14 (31)
	AS 4087	PN 16												
	JIS B2220	5K	130 (5.1)		15 (0.59)	105 (4.1)								
		10K	155 (6.1)		19 (0.75)	120 (4.7)								
DN 65 (2½ in)	EN 1092	PN 10, 16	185 (7.3)	4	19 (0.75)	145 (5.7)	200 (7.9)	176 (6.9)	167 (6.6)	326 (12.8)	N/A	19 (42)	18 (40)	21 (47)
		PN 25		8										
	ASME B16.5	CL150	165 (6.5)	4	20 (0.79)	140 (5.5)		168 (6.6)	158 (6.2)	318 (12.5)		14 (31)	11 (24)	16 (36)
	AS 2129	Table E			18 (0.71)	127 (5.0)								
	AS 4087	PN 16												
	JIS B2220	5K	155 (6.1)		15 (0.59)	130 (5.1)								
		10K	175 (6.9)		19 (0.75)	140 (5.5)								
DN 80 (3 in)	EN 1092	PN 10, 16, 25	200 (7.9)	8	19 (0.75)	160 (6.3)	200 (7.9)	181 (7.1)	172 (6.8)	331 (13.0)	N/A	21 (47)	20 (44)	23 (51)
	ASME B16.5	CL150			20 (0.79)	152 (6.0)								
	AS 2129	Table E	185 (7.3)	4	18 (0.71)	146 (5.8)		174 (6.9)	165 (6.5)	324 (12.8)		17 (37)	14 (31)	19 (42)
	AS 4087	PN 16												
	JIS B2220	5K	180 (7.1)		19 (0.75)	145 (5.7)								
		10K	185 (7.3)	8		150 (5.9)								

…Dimensions – sensors

…R-style sensor – DN 40 to DN 300 (1½ to 12 in)

Table 2 R-style sensor – DN 100 to DN 300 (4 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	Tx. height	T. box height	Tx. height	Lifting lug	Integral FEW411/ FEW431	Remote	Integral FEW451
			D	N	Y	P	L	F	G	H	A			
DN 100 (4 in)	EN 1092	PN 10, 16	235 (9.3)	8	19 (0.75)	180 (7.1)	250 (9.9)	202 (8.0)	193 (7.6)	352 (13.9)	N/A	27 (60)	26 (58)	29 (64)
		PN 25			23 (0.91)	190 (7.5)								
	ASME B16.5	CL150			19 (0.75)	191 (7.5)								
	AS 2129	Table E	215 (8.5)	4	18 (0.71)	178 (7.0)								
	AS 4087	PN 16												
	JIS B2220	5K	200 (7.9)	8		165 (6.5)		212 (8.3)	203 (8.0)	362 (14.3)		23 (51)	20 (44)	25 (56)
		7.5K	238 (9.4)	4	19 (0.75)	195 (7.7)								
		10K	210 (8.3)	8		175 (6.9)								
DN 125 (5 in)	EN 1092	PN 10, 16	270 (10.6)	8	18 (0.71)	210 (8.3)	250 (9.9)	221 (8.7)	212 (8.3)	371 (14.6)	N/A	30 (66)	29 (64)	32 (71)
		PN 25			28 (1.10)	220 (8.7)								
	ASME B16.5	CL150			22 (0.87)	216 (8.5)								
	AS 2129	Table E	255 (10.0)		18 (0.71)	210 (8.3)								
	JIS B2220	5K	235 (9.3)		19 (0.75)	200 (7.9)		212 (8.3)	203 (8.0)	362(14.3)		26 (57)	23 (51)	28 (62)
		10K	250 (9.8)		23 (0.91)	210 (8.3)								
DN 150 (6 in)	EN 1092	PN 10, 16	300 (11.8)	8	23 (0.91)	240 (9.5)	300 (11.8)	233 (9.2)	224 (8.8)	383(15.1)	10.2 (0.40)	35 (77)	34 (75)	37 (82)
	ASME B16.5	CL150			22 (0.87)	242 (9.5)								
	EN 1092	PN 25	280 (11.0)		26 (1.02)	250 (9.8)			223 (8.8)			33 (73)	31 (68)	35 (78)
	AS 2129	Table E			22 (0.87)	235 (9.3)								
	AS 4087	PN 16			18 (0.71)									
	JIS B2220	5K	265 (10.4)		19 (0.75)	230 (9.1)								
		7.5K	290 (11.4)	6		247 (9.7)								
		10K	280 (11.0)	8	23 (0.91)	240 (9.5)								
DN 200 (8 in)	EN 1092	PN 10	370 (14.6)	8	23 (0.91)	295 (11.6)	350 (13.8)	259 (10.2)	249 (9.8)	409 (16.1)	10.2 (0.40)	68 (150)	67 (147)	70 (155)
		PN 16		12										
		PN 25	360 (14.2)		28 (1.10)	310 (12.2)								
	ASME B16.5	CL150	370 (14.6)	8	22 (0.87)	298 (11.7)								
	AS 2129	Table E	335 (13.2)			292 (11.5)								
	AS 4087	PN 16			18 (0.71)									
	JIS B2220	5K	320 (12.6)		23 (0.91)	280 (11.0)		258 (10.2)		408 (16.1)		51 (112)	48 (106)	53 (117)
		7.5K	342 (8.7)		19 (0.75)	299 (11.8)								
		10K	330 (13.0)	12	23 (0.91)	290 (11.4)								
DN 250 (10 in)	EN 1092	PN10	395 (15.6)	12	22 (0.87)	350 (0.87)	450 (17.7)	285 (11.2)	276 (10.9)	435 (17.1)	10.2 (0.40)	78 (172)	75 (165)	80 (177)
		PN16	405 (15.9)		26 (1.02)	355 (14.0)								
		PN25	425 (16.7)		30 (1.18)	370 (14.6)								
	AS 2129	Table E	405 (15.9)		22 (0.87)	356 (14.0)								
	AS 4087	PN 16		8										
	JIS B2220	5K	385 (15.2)	12	23 (0.91)	345 (13.6)								
		7.5K	410 (16.1)	8		360 (14.2)								
		10K	400 (15.8)	12	25 (0.98)	355 (14.0)								
	ASME B16.5	CL150	406 (16.0)	12	22 (0.87)	362 (14.3)								
DN 300 (12 in)	EN 1092	PN10	445 (17.5)	12	22 (0.87)	400 (15.8)	500 (19.7)	310 (12.2)	301 (11.9)	460(18.1)	10.2 (0.40)	115 (253)	112 (247)	117 (258)
		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 (17.9)	12	26 (1.02)	406 (16.0)								
	AS 4087	PN 16			22 (0.87)									
	JIS B2220	5K	430 (16.9)	12	23 (0.91)	390 (15.4)								
		7.5K	464 (18.3)	10		414 (16.3)								
		10K	445 (17.5)	16	25 (0.98)	400 (15.8)								
	ASME B16.5	CL150	483 (19.0)	12	22 (0.87)	432 (17.0)								

R-style sensor – DN 350 to DN 600 (14 to 24 in)

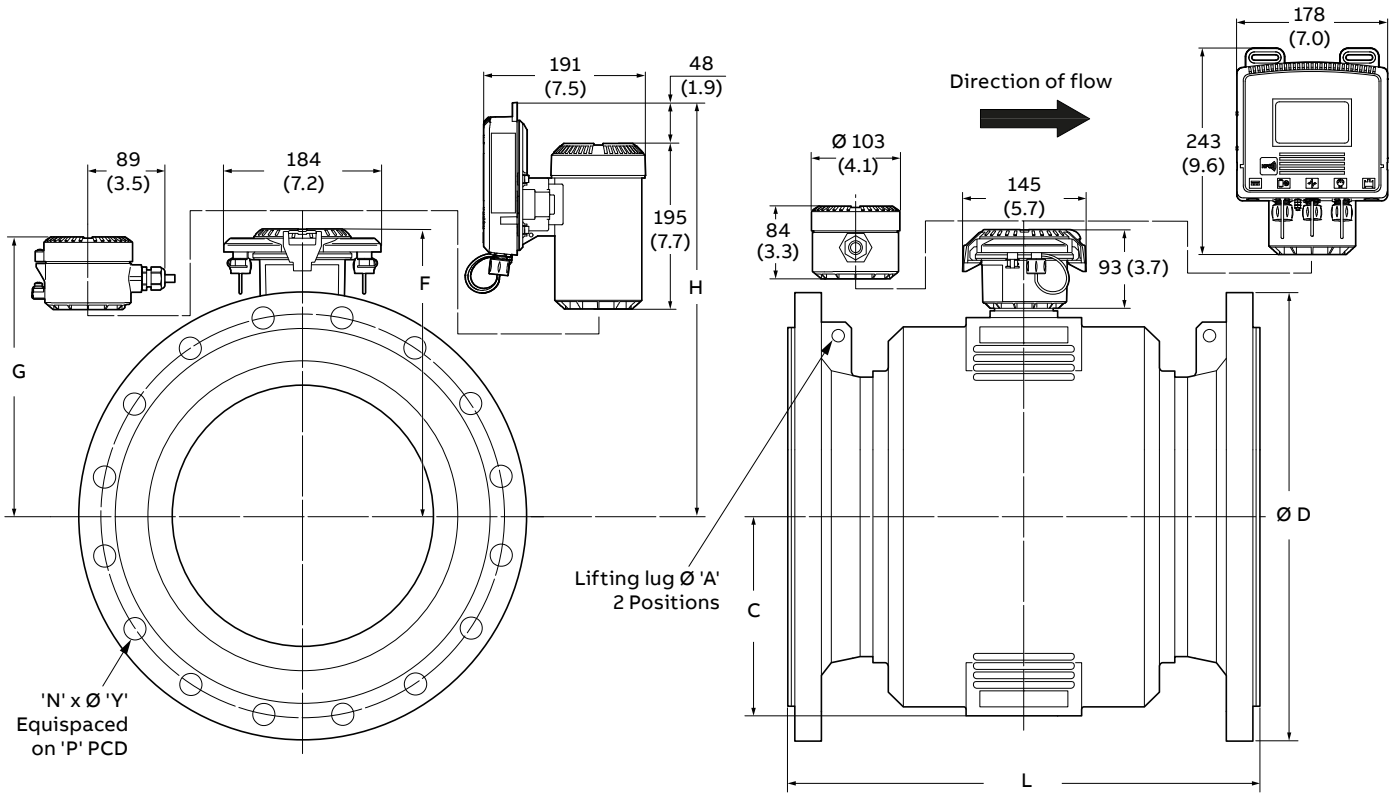


Figure 4 R-style sensor – DN 350 to DN 600 (14 to 24 in)

...Dimensions – sensors

...R-style sensor – DN 350 to DN 600 (14 to 24 in)

Table 3 R-style sensor – DN 350 to DN 600 (14 to 24 in)

Sensor size	Flange		Dimensions in mm (in)										Approx. weight kg (lbs)		
	Standard	Class	Flange OD D	No. Holes N	Bolt hole dia Y	Bolt hole PCD P	Sensor length L	Tx. height F	T. box height G	Tx. height H	Lifting lug A	Cover flat C	Integral FEW411/ FEW431	Remote	Integral FEW451
DN 350 (14 in)	EN 1092	PN 10	505 (19.9)	16	22 (0.87)	460 (18.1)	550 (21.7)	334 (13.2)	324 (12.8)	484 (19.1)	14.5 (0.57)	231 (9.1)	102 (225)	100 (220)	104 (230)
		PN 16	520 (20.5)		26 (1.02)	470 (18.5)									
		PN 25	555 (21.9)		33 (1.30)	490 (19.3)									
	ASME B16.5	CL150	535 (21.1)	12	29.5 (1.16)	476 (18.8)									
	AS 2129	Table E	525 (20.7)		26 (1.02)	470 (18.5)									
	AS 4087	PN 16													
	JIS B2220	5K	480 (18.9)			435 (17.1)									
		7.5K	530 (20.7)	10	25 (0.98)	472 (18.6)									
		10K	490 (19.3)	16		445 (17.5)									
DN 400 (16 in)	EN 1092	PN 10	565 (22.3)	16	26 (1.02)	515 (20.3)	600 (23.6)	360 (14.2)	354 (13.9)	510 (20.1)	14.5 (0.57)	257 (10.1)	117 (258)	115 (254)	119 (263)
		PN 16	580 (22.8)		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	580 (22.8)	12	26 (1.02)	521 (20.5)									
	AS 4087	PN 16													
	JIS B2220	5K	540 (21.3)	16	25 (0.98)	495 (19.5)									
		7.5K	582 (22.9)	12		524 (20.6)									
		10K	560 (22.1)	16	27 (1.06)	510 (20.1)									
DN 450 (18 in)	EN 1092	PN 10	615 (24.2)	20	26 (1.02)	565 (22.3)	700 (27.6)	388 (15.3)	379 (14.9)	538 (21.2)	14.5 (0.57)	285 (11.2)	162 (357)	160 (353)	164 (362)
		PN 16	640 (25.2)		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	640 (25.2)	16	26 (1.02)	584 (23.0)									
	AS 4087	PN 16		12											
	JIS B2220	5K	605 (23.8)	16	25 (0.98)	555 (21.9)									
		7.5K	652 (25.7)	12	27 (1.06)	585 (23.0)									
		10K	620 (24.4)	20		565 (22.3)									
DN 500 (20 in)	EN 1092	PN 10	670 (26.4)	20	26 (1.02)	620 (24.4)	770 (30.3)	419 (16.5)	410 (16.2)	569 (22.4)	14.5 (0.57)	316 (12.5)	219 (483)	217 (477)	221 (488)
		PN 16	715 (28.2)		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	705 (27.8)	16	26 (1.02)	641 (25.2)									
	AS 4087	PN 16													
	JIS B2220	5K	655 (25.8)	20	25 (0.98)	605 (23.8)									
		7.5K	706 (27.8)	12	27 (1.06)	639 (25.2)									
		10K	675 (26.6)	20		620 (24.4)									
DN 600 (24 in)	EN 1092	PN 10	780 (30.7)	20	30 (1.18)	725 (28.6)	920 (36.2)	446 (17.6)	437 (17.2)	596 (23.5)	14.5 (0.57)	343 (13.5)	317 (699)	315 (695)	319 (704)
		PN 16	840 (33.1)		36 (1.42)	770 (30.3)									
		PN 25	845 (33.3)		39 (1.54)										
	ASME B16.5	CL150	815 (32.1)		35.5 (1.40)	749.5 (29.5)									
	AS 2129	Table E	825 (32.5)	16	33 (1.30)	756 (29.7)									
	AS 4087	PN 16			30 (1.18)										
	JIS B2220	5K	770 (30.3)	20	27 (1.06)	715 (28.2)									
		7.5K	810 (31.9)	16		743 (29.3)									
		10K	795 (31.3)	24	33 (1.30)	730 (28.7)									

V-style sensor – DN 40 to DN 200 (1½ to 8 in)

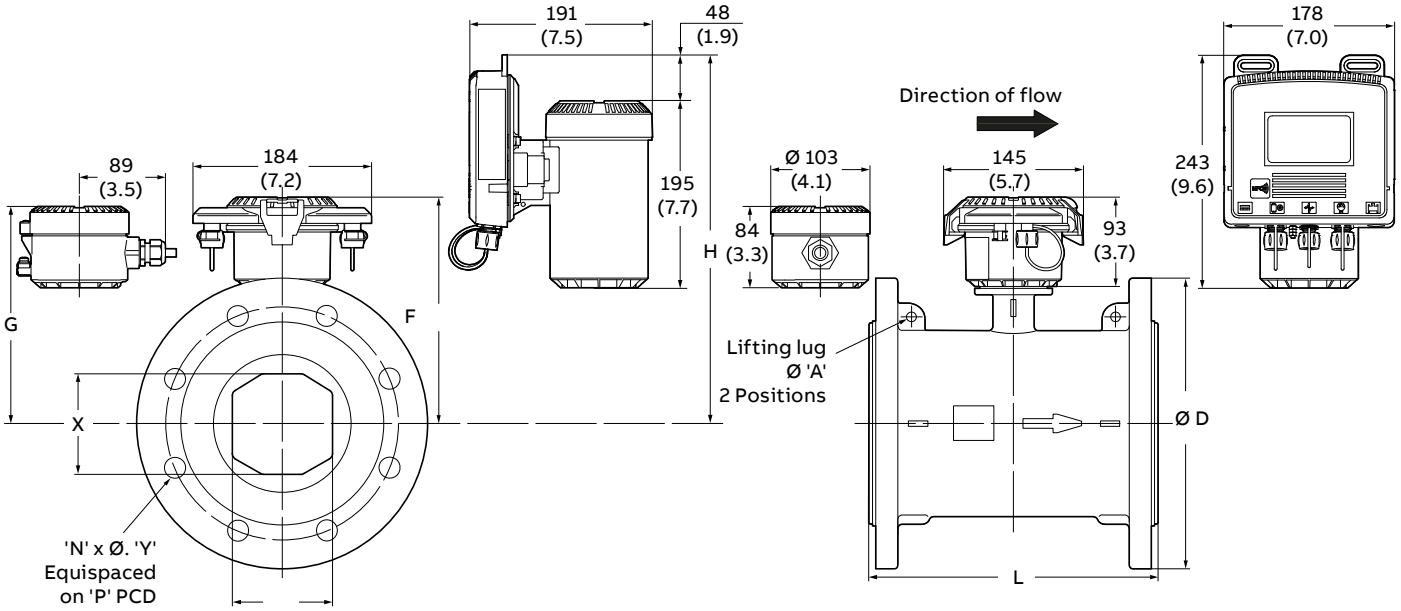


Figure 5 V-style sensor – DN 40 to DN 200 (1½ to 8 in)

...Dimensions – sensors

...V-style sensor – DN 40 to DN 200 (1½ to 8 in)

Table 4 V-style sensor – DN 40 to DN 200 (1½ to 8 in)

Sensor size	Flange		Dimensions in mm (in)									Approx. weight kg (lbs)		
	Standard	Class	Flange OD D	No. holes N	Bolt hole dia. Y	Bolt hole PCD P	Sensor length L	Tx. height F	T. box height G	Tx. height H	Lifting lug A	Integral FEW411 FEW431	Remote	Integral FEW451
DN 40 (1½ in)	EN 1092	PN 10, 16, 25	150 (5.9)	4	19 (0.75)	110 (4.3)	200 (7.9)	158 (6.2)	149 (5.9)	308 (12.1)	N/A	13 (29)	12 (27)	15 (33)
	ASME B16.5	CL150			15.7 (0.62)	98 (3.9)								
	AS 2129	Table E	135 (5.3)		14 (0.55)			154 (6.1)	144 (5.7)	304 (12)		10 (22)	7 (15)	12 (27)
	JIS B2220	10K	140 (5.5)		19 (0.75)	105 (4.2)								
DN 50 (2 in)	EN 1092	PN 10, 16, 25	165 (6.5)	4	19 (0.75)	125 (4.9)	200 (7.9)	162 (6.4)	153 (6.0)	312 (12.3)	N/A	14 (31)	13 (29)	16 (36)
	ASME B16.5	CL150				121 (4.8)								
	AS 2129	Table E	150 (5.9)		18 (0.71)	114 (4.5)						11 (24)	8 (18)	13 (29)
	AS 4087	PN 16												
	JIS B2220	10K	155 (6.1)		19 (0.75)	120 (4.7)								
DN 65 (2½ in)	EN 1092	PN 10, 16	185 (7.3)	4	19 (0.75)	145 (5.7)	200 (7.9)	176 (6.9)	167 (6.6)	326 (12.9)	N/A	16 (35)	15 (33)	18 (40)
		PN 25		8										
	ASME B16.5	CL150		4	20 (0.79)	140 (5.5)								
	AS 2129	Table E	165 (6.5)		18 (0.71)	127 (5.0)		168 (6.6)	158 (6.2)	318 (12.5)		13 (29)	10 (22)	15 (33)
	AS 4087	PN 16												
	JIS B2220	10K	175 (6.9)		19 (0.75)	140 (5.5)								
DN 80 (3 in)	EN 1092	PN 10, 16, 25	200 (7.9)	8	19 (0.75)	160 (6.3)	200 (7.9)	181 (7.1)	172 (6.8)	331 (13.1)	N/A	17 (38)	16 (36)	19 (42)
	ASME B16.5	CL150			20 (0.79)	152 (6.0)								
	AS 2129	Table E		4	18 (0.71)	146 (5.8)		174 (6.9)	165 (6.5)	324 (12.8)		16 (36)	13 (28)	18 (40)
	AS 4087	PN 16	185 (7.3)											
	JIS B2220	10K		8	19 (0.75)	150 (5.9)								
DN 100 (4 in)	EN 1092	PN 10, 16	235 (9.3)	8	19 (0.75)	180 (0.71)	250 (9.9)	202 (8.0)	193 (7.6)	352 (13.9)	N/A	19 (42)	18 (40)	21 (47)
		PN 25			23 (0.91)	190 (7.5)								
	ASME B16.5	CL150			19 (0.75)	191 (7.5)								
	AS 2129	Table E	215 (8.5)		18 (0.71)	178 (7.0)		212 (8.3)	203 (8.0)	362 (14.2)				
	AS 4087	PN 16		4										
	JIS B2220	7.5K	238 (9.4)		19 (0.75)	195 (7.7)								
		10K	210 (8.3)	8		175 (6.9)								
DN 125 (5 in)	EN 1092	PN 10, 16	270 (10.6)	8	18 (0.71)	210 (8.3)	250 (9.9)	221 (8.7)	212 (8.3)	371 (14.6)	N/A	30 (66)	29 (64)	32 (71)
		PN 25			28 (1.10)	220 (8.7)								
	ASME B16.5	CL150			22 (0.87)	216 (8.5)								
	AS 2129	Table E	255 (10.0)		18 (0.71)	210 (8.3)		212 (8.3)	203 (8.0)	362 (14.3)		24 (53)	21 (46)	26 (58)
	JIS B2220	10K	250 (9.8)		23 (0.91)	201 (8.3)								
DN 150 (6 in)	EN 1092	PN10, 16	300 (11.8)	8	23 (0.91)	240 (9.5)	300 (11.8)	233 (9.2)	224 (8.8)	383 (15.1)	10.2 (0.40)	35 (77)	34 (75)	37 (82)
	ASME B16.5	CL150			22 (0.87)	242 (9.5)								
	EN 1092	PN 25			26 (1.02)	250 (9.8)								
	AS 2129	Table E	280 (11.0)		22 (0.87)	235 (9.3)		235 (9.3)	225 (8.9)	385 (15.2)		34 (75)	31 (68)	36 (80)
	AS 4087	PN 16			18 (0.71)									
	JIS B2220	7.5K	290 (11.4)	6	19 (0.75)	247 (9.7)								
		10K	280 (11.0)	8	23 (0.91)	240 (9.5)								
DN 200 (8 in)	EN 1092	PN10	370 (14.6)	8	23 (0.91)	295 (11.6)	350 (13.8)	259 (10.2)	249 (9.8)	409 (16.1)	10.2 (0.40)	67 (147)	66 (145)	69 (153)
		PN16		12										
		PN 25	360 (14.2)		28 (1.10)	310 (12.2)								
	ASME B16.5	CL150	370 (14.5)	8	22 (0.87)	298 (11.7)								
	AS 2129	Table E	335 (13.2)			292 (11.5)								
	AS 4087	PN 16			18 (0.71)			258 (10.2)	249 (9.8)	408 (16.1)		53 (116)	50 (110)	55 (122)
	JIS B2220	7.5K	342 (8.7)		19 (0.75)	299 (11.8)								
		10K	330 (13.0)	12	23 (0.91)	290 (11.4)								

F-style sensor – DN 250 to DN 400 (10 to 16 in)

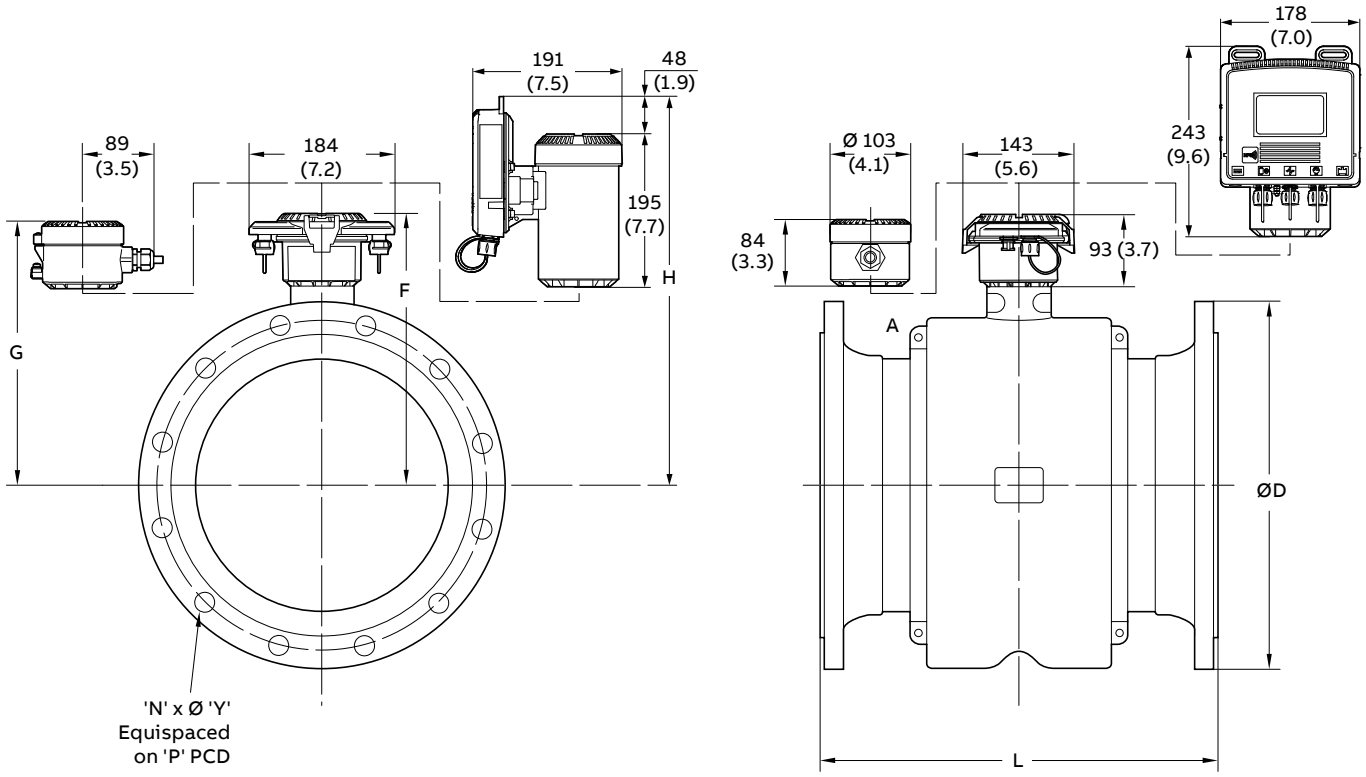


Figure 6 F-style sensor – DN 250 to DN 400 (10 to 16 in)

...Dimensions – sensors

...F-style sensor – DN 250 to DN 400 (10 to 16 in)

Table 5 F-style sensor – DN 250 to DN 400 (10 to 16 in)

Sensor size	Flange		Dimensions in mm (in)									Approx. weight kg (lbs)		
	Standard	Class	Flange OD D	No. holes N	Bolt hole dia. Y	Bolt hole PCD P	Sensor length L	Tx. height F	T. box height G	Tx. height H	Lifting lug A	Integral FEW411/ FEW431	Remote	Integral FEW451
DN250 (10 in)	EN 1092 or DIN	PN10	395 (15.55)	12	22 (0.87)	350 (13.78)	450 (17.72)	319 (12.56)	310 (12.20)	469 (18.46)	N/A	61 (134)	59 (130)	63 (139)
		PN16	405 (15.94)		26 (1.02)	355 (13.98)						65 (143)	63 (139)	67 (148)
		PN25	425 (16.73)		30 (1.18)	370 (14.57)						84 (185)	82 (181)	86 (190)
		PN40	450 (17.72)		33 (1.30)	385 (15.16)						95 (209)	93 (205)	97 (214)
	AS4087	PN16	405 (15.94)	8	22 (0.87)	356 (14.02)						65 (143)	63 (139)	67 (148)
		PN35	430 (16.93)	12	26 (1.02)	381 (15.00)						95 (209)	93 (205)	97 (214)
	JIS B2220	5K	385 (15.16)		23 (0.91)	345 (13.58)						65 (143)	63 (139)	67 (148)
		10K	400 (15.75)		25 (0.98)	355 (13.98)								
	ASME B16.5	CL300	445 (17.52)	16	29 (1.13)	387 (15.25)						105 (231)	103 (227)	107 (236)
		CL150	405 (15.94)	12	26 (1.02)	362 (14.25)						70 (154)	68 (150)	72 (159)
DN300 (12 in)	EN 1092 or DIN	PN10	445 (17.52)	12	22 (0.87)	400 (15.75)	500 (19.69)	342 (13.46)	333 (13.11)	492 (19.37)	N/A	74 (163)	72 (159)	76 (168)
		PN16	460 (18.11)		26 (1.02)	410 (16.14)						80 (176)	78 (172)	82 (181)
		PN25	485 (19.09)		30 (1.18)	430 (16.93)						100 (220)	98 (216)	102 (225)
		PN40	515 (20.28)	16	33 (1.30)	450 (17.72)	600 (23.62)					130 (287)	128 (282)	132 (291)
	JIS B2220	5K	430 (16.93)	12	23 (0.91)	390 (15.35)	500 (19.69)					80 (176)	78 (172)	82 (181)
		10K	445 (17.52)	16	25 (0.98)	400 (15.75)								
	AS4087	PN16	455 (17.91)	12	22 (0.87)	406 (15.98)								
		PN35	490 (19.29)	26	26 (1.02)	438 (17.24)						130 (287)	128 (282)	132 (291)
	ASME B16.5	CL300	520 (20.47)	16	32 (1.25)	451 (17.75)						150 (331)	148 (326)	152 (336)
		CL150	485 (19.09)	12	26 (1.02)	432 (17.00)						105 (231)	103 (227)	107 (236)
DN350 (14 in)	EN 1092 or DIN	PN10	505 (19.88)	16	22 (0.87)	460 (18.11)	550 (21.65)	357 (14.06)	348 (13.70)	507 (19.96)	N/A	95 (209)	93 (205)	97 (214)
		PN16	520 (20.47)		26 (1.02)	470 (18.50)						110 (243)	108 (238)	112 (247)
		PN25	555 (21.85)		33 (1.30)	490 (19.29)						145 (320)	143 (315)	147 (324)
		PN40	580 (22.83)		36 (1.42)	510 (20.08)	650 (25.59)					195 (430)	193 (425)	197 (435)
	JIS B2220	5K	480 (18.90)	12	22 (0.87)	435 (17.13)	550 (21.65)					95 (209)	93 (205)	97 (214)
		10K	490 (19.29)	16	25 (0.98)	445 (17.52)								
	AS4087	PN16	525 (20.67)	12	26 (1.02)	470 (18.50)						130 (287)	128 (282)	132 (291)
		PN35	550 (21.65)	16	30 (1.18)	495 (19.49)						185 (408)	183 (403)	187 (412)
	ASME B16.5	CL300	585 (23.03)	20	32 (1.25)	514(20.25)						140 (309)	138 (304)	142 (314)
		CL150	535 (21.06)	12	29 (1.14)	476 (18.75)						105 (231)	103 (227)	107 (236)
DN400 (16 in)	EN 1092 or DIN	PN10	565 (22.24)	16	26 (1.02)	515 (20.28)	600 (23.62)	399 (15.71)	390 (15.35)	549 (21.61)	N/A	103 (227)	101 (223)	105 (232)
		PN16	580 (22.83)		30 (1.18)	525 (20.67)						126 (278)	124 (273)	128 (283)
		PN25	620 (24.41)		36 (1.42)	550 (21.65)						170 (375)	168 (370)	172 (380)
		PN40	660 (25.98)		39 (1.54)	585 (23.03)	650 (25.59)					258 (569)	256 (564)	260 (574)
	JIS B2220	5K	540 (21.26)	12	25 (0.98)	495 (19.49)	600 (23.62)					103 (227)	101 (223)	105 (232)
		10K	560 (22.05)	16	27 (1.06)	510 (20.08)						116 (256)	114 (251)	118 (261)
	AS4087	PN16	580 (22.83)	12	26 (1.02)	521 (20.51)						154 (340)	152 (335)	156 (344)
		PN35	610 (24.02)	20	30 (1.18)	552 (21.73)						302 (666)	300 (661)	304 (670)
	ASME B16.5	CL300	650 (25.59)	24	35 (1.38)	572 (22.50)						265 (584)	263 (580)	267 (589)
		CL150	600 (23.62)	12	29 (1.14)	540 (21.25)						175 (386)	173 (381)	177 (391)

F-style sensor – DN 450 to DN 600 (18 to 24 in)

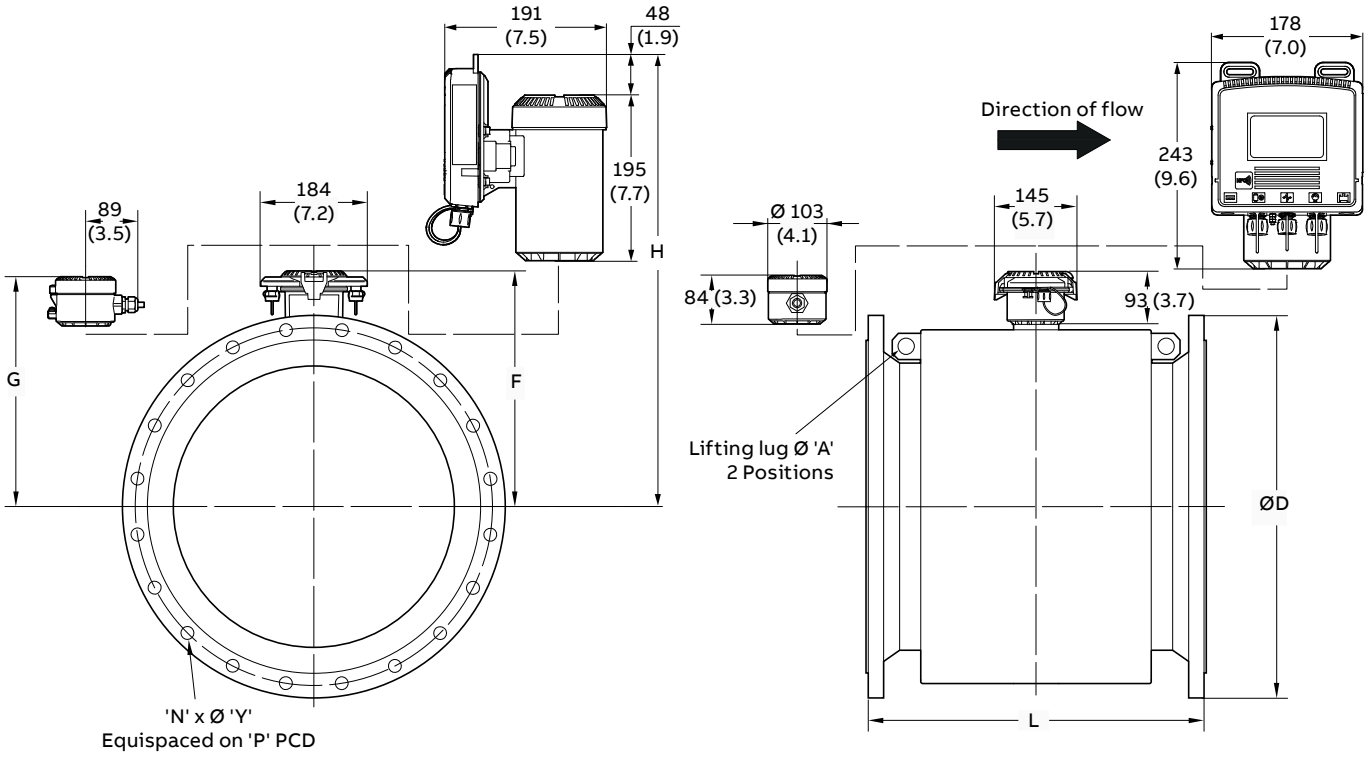


Figure 7 F-style sensor – DN 450 to DN 600 (18 to 24 in)

...Dimensions – sensors

...F-style sensor – DN 450 to DN 600 (18 to 24 in)

Table 6 F-style sensor – DN 450 to DN 600 (18 to 24 in)

Sensor size	Flange		Dimensions in mm (in)									Approx. weight kg (lbs)		
	Standard	Class	Flange OD D	No. holes N	Bolt hole dia. Y	Bolt hole PCD P	Sensor length L	Tx. height F	T. box height G	Tx. height H	Lifting lug A	Integral FEW411/ FEW431	Remote	Integral FEW451
DN450 (18 in)	EN 1092 or DIN	PN10	615 (24.21)	20	26 (1.02)	565 (22.24)	600 (23.62)	407 (16.02)	398 (15.67)	557 (21.93)	30 (1.18)	173 (381)	171 (377)	175 (386)
		PN16	640 (25.20)		30 (1.18)	585 (23.03)						188 (414)	186 (410)	190 (419)
		PN25	670 (26.38)		36 (1.42)	600 (23.62)	686 (27.01)					245 (540)	243 (536)	247 (545)
		PN40	685 (26.97)		39 (1.54)	610 (24.02)						315 (694)	313 (690)	317 (699)
	JIS B2220	5K	605 (23.82)	16	25 (0.98)	555 (21.85)	600 (23.62)					165 (364)	163 (359)	167 (369)
		10K	620 (24.41)	20	27 (1.06)	565 (22.24)						177 (390)	175 (386)	179 (395)
	AS4087	PN16	640 (25.20)	12	26 (1.02)	584 (22.99)						232 (511)	230 (507)	234 (516)
		PN35	675 (26.57)	20	33 (1.30)	610 (24.02)						328 (723)	326 (719)	330 (728)
	ASME B16.5	CL300	710 (27.95)	24	35 (1.38)	629 (24.75)						368 (811)	366 (807)	370 (816)
		CL150	635 (25.00)	16	32 (1.26)	578 (22.75)						250 (551)	248 (547)	252 (556)
DN500 (20 in)	EN 1092 or DIN	PN10	670 (26.38)	20	26 (1.02)	620 (24.41)	600 (23.62)	407 (16.02)	398 (15.67)	557 (21.93)	30 (1.18)	190 (419)	188 (414)	192 (424)
		PN16	715 (28.15)		33 (1.30)	650 (25.59)						240 (529)	238 (525)	242 (534)
		PN25	730 (28.74)		36 (1.42)	660 (25.98)	700 (27.56)					300 (661)	298 (657)	302 (666)
		PN40	755 (29.72)		42 (1.65)	670 (26.38)	762 (30.00)					392 (864)	390 (860)	394 (869)
	JIS B2220	5K	655 (25.79)		25 (0.98)	605 (23.82)	600 (23.62)					190 (419)	188 (414)	192 (424)
		10K	675 (26.57)		27 (1.06)	620 (24.41)								
	AS4087	PN16	705 (27.76)	16	26 (1.02)	641 (25.24)						290 (639)	288 (635)	292 (644)
		PN35	735 (28.94)	24	33 (1.30)	673 (26.50)						435 (959)	433 (955)	437 (964)
	ASME B16.5	CL150	700 (27.56)	20	32 (1.26)	635 (25.00)						300 (661)	298 (657)	302 (666)
		CL300	775 (30.51)	24	35 (1.38)	659 (25.94)	762 (30.00)					490 (1080)	488 (1076)	492 (1085)
DN600 (24 in)	EN 1092 or DIN	PN10	780 (30.71)	20	30 (1.18)	725 (28.54)	800 (31.50)	458 (18.03)	449 (17.68)	608 (23.94)	30 (1.18)	284 (626)	282 (622)	286 (631)
		PN16	840 (33.07)		36 (1.42)	770 (30.31)						318 (701)	316 (697)	320 (706)
		PN25	845 (33.27)		39 (1.54)	770 (30.31)						460 (1014)	458 (1010)	462 (1019)
		PN40	890 (35.04)		26 (1.02)	705 (27.76)	890 (35.04)					600 (1323)	598 (1318)	602 (1328)
	JIS B2220	5K	770 (30.31)	24	27 (1.06)	715 (28.15)	800 (31.50)					275 (606)	273 (602)	277 (611)
		10K	795 (31.30)		33 (1.30)	730 (28.74)						306 (675)	304 (670)	308 (679)
	AS4087	PN16	825 (32.48)	16	30 (1.18)	756 (29.76)						382 (842)	380 (838)	384 (847)
		PN35	850 (33.46)	24	36 (1.42)	781 (30.75)						452 (996)	450 (992)	454 (1001)
	ASME B16.5	CL300	915 (36.02)	24	41 (1.61)	813 (32.00)						550 (1213)	548 (1208)	552 (1217)
		CL150	815 (32.09)	20	35 (1.38)	750 (29.50)						425 (937)	423 (933)	427 (942)

F-style sensor – DN 700 to DN 2400 (28 to 96 in)

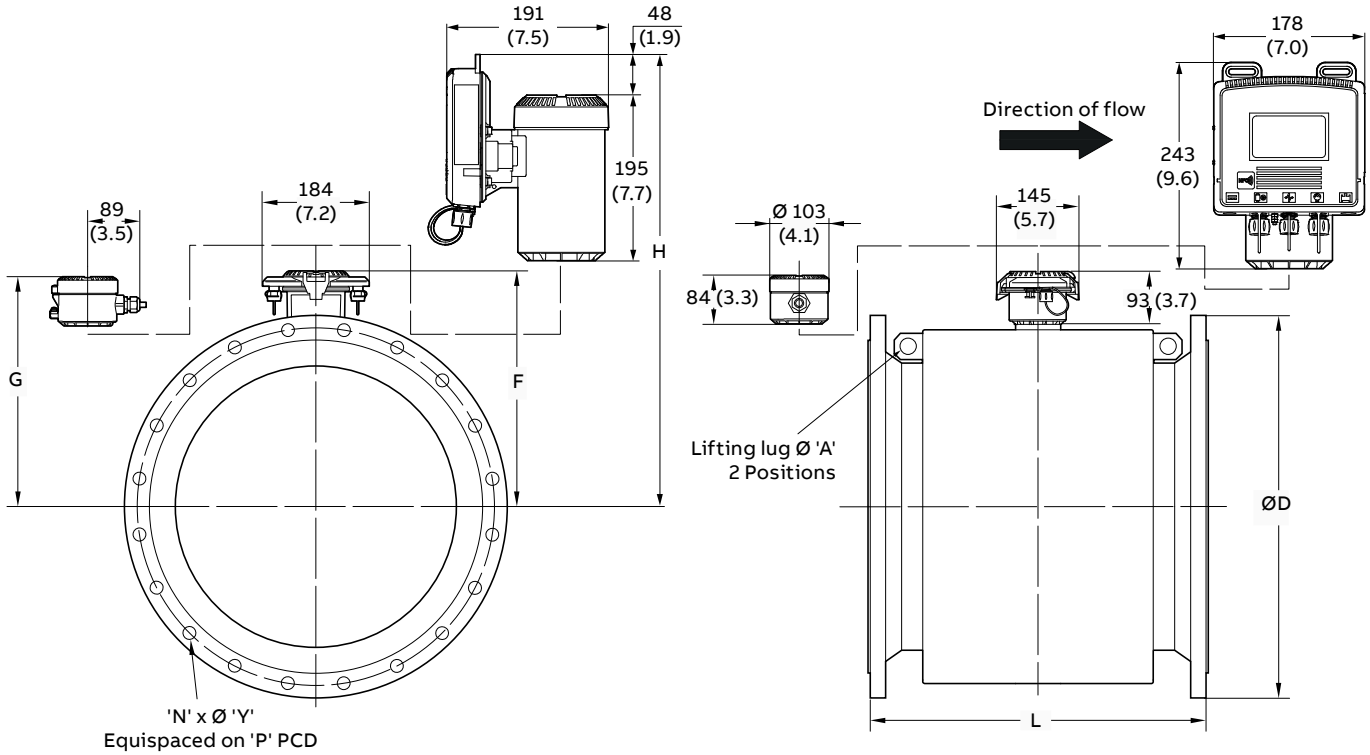


Figure 8 F-style sensor – DN 700 to DN 2400 (28 to 96 in)

Table 7 F-style sensor – DN 700 (28 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	Tx. height	T. box height	Tx. height	Lifting lug	Integral FEW411/ FEW431	Remote	Integral FEW451
			D	N	Y	P	L	F	G	H	A			
DN700 (28 in)	JIS	5K	875 (34.45)	24	27 (1.06)	820 (32.28)	700 (27.56)	497 (19.57)	492 (19.37)	647 (25.47)	30 (1.18)	213 (470)	211 (466)	215 (474)
		10K	905 (35.63)		33 (1.30)	840 (33.07)						251 (554)	249 (549)	253 (558)
	EN 1092 or DIN	PN6	860 (33.86)		26 (1.02)	810 (31.89)						187 (413)	185 (408)	189 (417)
		PN10	895 (35.24)		30 (1.18)	840 (33.07)						235 (519)	233 (514)	237 (523)
		PN16	910 (35.83)		36 (1.42)	840 (33.07)						270 (596)	268 (591)	272 (600)
		PN25	960 (37.80)		42 (1.65)	875 (34.45)	800 (31.50)					419 (924)	417 (920)	421 (929)
		PN40	995 (39.17)		48 (1.89)	900 (35.43)	910 (35.83)					632 (1394)	630 (1389)	634 (1398)
	AWWA C207	CLASS B	927 (36.50)	28	32 (1.26)	864 (34.02)	700 (27.56)					247 (545)	245 (541)	249 (549)
		CLASS D	927 (36.50)									270 (596)	268 (591)	272 (600)
		CLASS E	927 (36.50)		32 (1.26)	864 (34.02)	762 (30.00)					434 (957)	432 (953)	436 (962)
		CLASS F	1035 (40.75)		44 (1.73)	940 (37.01)						674 (1486)	672 (1482)	676 (1491)
	AS 4087	PN16	910 (35.83)	20	30 (1.18)	845 (33.27)	700 (27.56)					356 (785)	354 (781)	358 (790)
		PN35	935 (36.81)	24	36 (1.42)	857 (33.74)	910 (35.83)					584 (1288)	582 (1284)	586 (1292)
	AS 2129	TABLE D	910 (35.83)	20	30 (1.18)	845 (33.27)	910 (35.83)					308 (680)	306 (675)	310 (684)
		TABLE E			33 (1.30)		700 (27.56)					274 (605)	272 (600)	276 (609)
	ASME B16.47	CL150 SERIES A	925 (36.42)	28	35 (1.38)	864 (34.00)	790 (31.10)					454 (1001)	452 (997)	456 (1006)
		CL150 SERIES B	835 (32.87)	40	22 (0.87)	795 (31.31)	910 (35.83)					368 (812)	366 (807)	370 (816)
	ASME B16.47	CL300 SERIES A	1035 (40.75)	28	45 (1.75)	940 (37.00)	940 (37.01)					1002 (2210)	1000 (2205)	1004 (2214)
		CL300 SERIES B	920 (36.22)	36	35 (1.38)	857 (33.75)	910 (35.83)					680 (1500)	678 (1495)	682 (1504)

...Dimensions – sensors

...F-style sensor – DN 700 to DN 2400 (28 to 96 in)

Table 8 F-style sensor – DN 750 to DN 900 (30 to 36 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	Tx. height	T. box height	T. box height	Lifting lug	Integral FEW411/ FEW431	Remote	Integral FEW451
			D	N	Y	P	L	F	G	H	A			
DN750 (30 in)	JIS	JIS5K	945 (37.20)	24	33 (1.30)	880 (34.65)						245 (541)	243 (536)	247 (545)
		JIS10K	970 (38.19)			900 (35.43)						317 (699)	315 (695)	319 (704)
	AWWA C207	CLASS B	984 (38.74)	28	32 (1.26)	914 (35.98)	762 (30.00)					268 (591)	266 (587)	270 (596)
		CLASS D	984 (38.74)									322 (710)	320 (706)	324 (715)
		CLASS E	984 (38.74)		32 (1.26)							472 (1041)	470 (1037)	474 (1045)
		CLASS F	1092 (42.99)		44 (1.73)	997 (39.25)						755 (1665)	753 (1661)	757 (1669)
	AS 4087	PN16	995 (39.17)	20	33 (1.30)	927 (36.50)		523 (20.59)	518 (20.39)	673 (26.5)	30 (1.18)	410 (904)	408 (900)	412 (909)
		PN35	1015 (39.96)	28	36 (1.42)	940 (37.01)	990 (38.98)					713 (1572)	711 (1568)	715 (1577)
	AS 2129	TABLE D	995 (39.17)	20	33 (1.30)	927 (36.50)	990 (38.98)					390 (860)	388 (856)	392 (865)
		TABLE E	995 (39.17)		36 (1.42)		762 (30.00)					350 (772)	348 (768)	352 (777)
	ASME B16.47	CL150 SERIES A	985 (38.78)	28	35 (1.38)	914 (36.00)	830 (32.67)					505 (1114)	503 (1109)	507 (1118)
		CL150 SERIES B	885 (34.84)	44	22 (0.87)	846 (33.31)	990 (38.98)					368 (812)	366 (807)	370 (816)
	ASME B16.47	CL300 SERIES A	1090 (42.91)	28	48 (1.87)	997 (39.25)	975 (38.39)					1002 (2210)	1000 (2205)	1004 (2214)
		CL300 SERIES B	990 (38.98)	36	38 (1.50)	921 (36.25)	990 (38.98)					797 (1758)	795 (1753)	799 (1762)
DN800 (32 in)	JIS	JIS5K	995 (39.17)	24	33 (1.30)	930 (36.61)						280 (618)	278 (613)	282 (622)
		JIS10K	1020 (40.16)	28	33 (1.30)	950 (37.40)	800 (31.50)					328 (724)	326 (719)	330 (728)
	EN 1092 or DIN	PN6	975 (38.39)	24	30 (1.18)	920 (36.22)						239 (527)	237 (523)	241 (532)
		PN10	1015 (39.96)	34	33 (1.30)	950 (37.40)						312 (688)	310 (684)	314 (693)
		PN16	1025 (40.35)	28	39 (1.54)	950 (37.40)	800 (31.50)					366 (807)	364 (803)	368 (812)
		PN25	1085 (42.72)	24	48 (1.89)	990 (38.98)	950 (37.40)					599 (1321)	597 (1317)	601 (1325)
		PN40	1140 (44.88)		56 (2.20)	1030 (40.55)	1040 (40.94)					919 (2027)	917 (2022)	921 (2031)
	AWWA C207	CLASS B	1060 (41.73)	28	38 (1.50)	978 (38.50)	800 (31.50)					334 (737)	332 (732)	336 (741)
		CLASS D	1060 (41.73)									394 (869)	392 (865)	396 (874)
		CLASS E	1060 (41.73)		38 (1.50)	978 (38.50)	880 (34.65)	547 (21.54)	542 (21.34	697 (27.44)	30 (1.18)	591 (1303)	589 (1299)	593 (1308)
		CLASS F	1150 (45.28)		44 (1.73)	1054 (41.50)						886 (1954)	884 (1949)	888 (1958)
	AS 4087	PN16	1060 (41.73)	20	36 (1.42)	984 (38.74)	800 (31.50)					482 (1063)	480 (1059)	484 (1068)
		PN35	1060 (41.73)	28	36 (1.42)	984 (38.74)	1040 (40.94)					802 (1769)	800 (1764)	804 (1773)
	AS2129	TABLE D	1060 (41.73)	20			1040 (40.94)					440 (971)	438 (966)	442 (975)
		TABLE E	1060 (41.73)				800 (31.50)					410 (904)	408 (900)	412 (909)
	ASME B16.47	CL150 SERIES A	1060 (41.73)	28	41 (1.63)	978 (38.50)	950 (37.40)					674 (1486)	672 (1482)	676 (1491)
		CL150 SERIES B	940 (37.01)	48	22 (0.87)	900 (35.44)	1040 (40.94)					456 (1006)	454 (1001)	458 (1010)
	ASME B16.47	CL300 SERIES A	1150 (45.28)	28	51 (2.01)	1054 (41.50)	1120 (44.09)					1219 (2688)	1217 (2684)	1221 (2692)
		CL300 SERIES B	1055 (41.54)	32	41 (1.63)	978 (38.50)	1040 (40.94)					985 (2172)	983 (2168)	987 (2176)
DN900 (36 in)	JIS	JIS5K	1095 (43.11)	24	33 (1.30)	1030 (40.55)						347 (766)	345 (761)	349 (770)
		JIS10K	1120 (44.09)	28	33 (1.30)	1050 (41.34)						419 (924)	417 (920)	421 (929)
	EN 1092 or DIN	PN6	1075 (42.32)	24	30 (1.18)	1020 (40.16)	900 (35.43)					300 (662)	298 (657)	302 (666)
		PN10	1115 (43.90)	28	33 (1.30)	1050 (41.34)						396 (874)	394 (869)	398 (878)
		PN16	1125 (44.29)		39 (1.54)	1050 (41.34)						485 (1070)	483 (1065)	487 (1074)
		PN25	1185 (46.65)		48 (1.89)	1090 (42.91)	1040 (40.94)					757 (1669)	755 (1665)	759 (1674)
		PN40	1250 (49.21)		56 (2.20)	1140 (44.88)	1170 (46.06)					1219 (2688)	1217 (2684)	1221 (2692)
	AWWA C207	CLASS B	1168 (45.98)	32	38 (1.50)	1086 (42.76)	900 (35.43)	598 (23.54)	593 (23.35)	748 (29.45)	30 (1.18)	397 (876)	395 (871)	399 (880)
		CLASS D										436 (962)	434 (957)	438 (966)
		CLASS E										744 (1641)	742 (1636)	746 (1645)
		CLASS F	1270 (50.00)		51 (2.01)	1168 (45.98)						1064 (2346)	1062 (2342)	1066 (2351)
	AS 4087	PN16	1175 (46.26)	24	36 (1.42)	1092 (42.99)						686 (1513)	684 (1508)	688 (1517)
		PN35	1185 (46.65)	32	39 (1.54)	1105 (43.50)	1170 (46.06)					1103 (2432)	1101 (2428)	1105 (2437)
	AS 2129	TABLE D	1175 (46.26)	24	36 (1.42)	1092 (42.99)	1170 (46.06)					574 (1266)	572 (1262)	576 (1270)
		TABLE E					900 (35.43)					580 (1279)	578 (1275)	582 (1284)
	ASME B16.47	CL150 SERIES A	1170 (46.06)	32	41.3 (1.63)	1086 (42.75)	1120 (44.09)					933 (2057)	931 (2053)	935 (2062)
		CL150 SERIES B	1055 (41.54)	44	25.4 (1.00)	1010 (39.75)	1170 (46.06)					655 (1445)	653 (1440)	657 (1449)
	ASME B16.47	CL300 SERIES A	1270 (50.00)	32	54 (2.13)	1168 (46.00)	1180 (46.46)					1533 (3380)	1531 (3376)	1535 (3385)
		CL300 SERIES B	1170 (46.06)		44.5 (1.75)	1089 (42.87)	1170 (46.06)					1206 (2659)	1204 (2655)	1208 (2664)

...F-style sensor – DN 700 to DN 2400 (28 to 96 in)

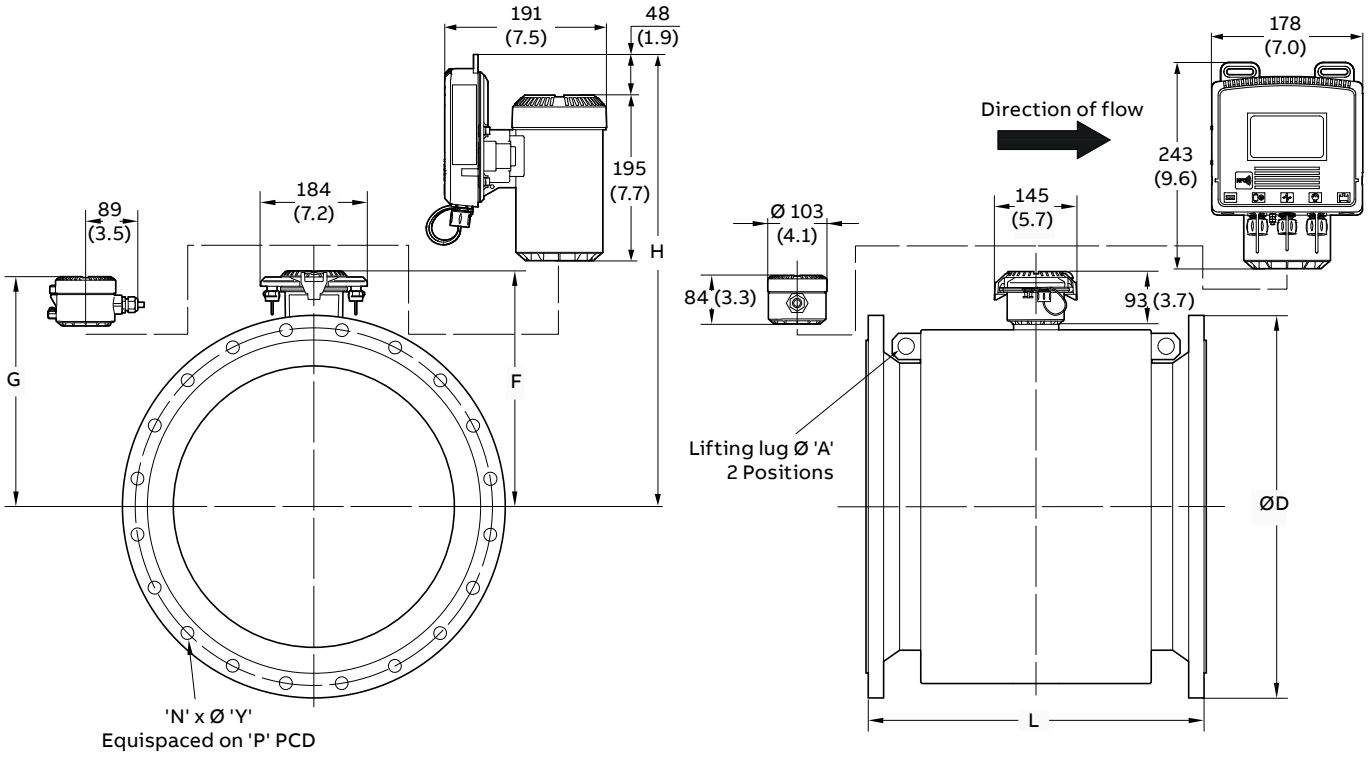


Figure 9 F-style sensor – DN 700 to DN 2400 (28 to 96 in)

Table 9 F-style sensor – DN 1000 (40 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	Tx. box height	Lifting lug			
			D	N	Y	P	L	F	G	H	A	Integral FEW411/ FEW431	Remote	Integral FEW451
DN1000 (40 in)	JIS	JIS5K	1195 (47.05)	28	33 (1.30)	1130 (44.49)	1000 (39.37)	648 (25.51)	643 (25.31)	798 (31.42)	30 (1.18)	407 (898)	405 (893)	409 (902)
		JIS10K	1235 (48.62)		39 (1.54)	1160 (45.67)						505 (1114)	503 (1109)	507 (1118)
	EN 1092 or DIN	PN6	1175 (46.26)		30 (1.18)	1120 (44.09)						348 (768)	346 (763)	350 (772)
		PN10	1230 (48.43)		36 (1.42)	1160 (45.67)						469 (1034)	467 (1030)	471 (1039)
		PN16	1255 (49.41)		42 (1.65)	1170 (46.06)						613 (1352)	611 (1348)	615 (1356)
		PN25	1320 (51.97)		56 (2.20)	1210 (47.64)	1170 (46.06)					1004 (2214)	1002 (2210)	1006 (2218)
		PN40	1360 (53.54)			1250 (49.21)	1300 (51.18)					1486 (3277)	1484 (3272)	1488 (3281)
	AWWA C207	CLASS B	1289 (50.75)	36	38 (1.50)	1200 (47.24)	1000 (39.37)					474 (1045)	472 (1041)	476 (1050)
		CLASS D	1289 (50.75)									618 (1363)	616 (1359)	620 (1367)
		CLASS E	1289 (50.75)									922 (2033)	920 (2029)	924 (2038)
		CLASS F	1378 (54.25)		51 (2.01)	1276 (50.24)						1300 (2867)	1298 (2862)	1302 (2871)
	AS 4087	PN16	1255 (49.41)	24	36 (1.42)	1175 (46.26)						740 (1632)	738 (1628)	742 (1636)
		PN35	1275 (50.20)	36	39 (1.54)	1194 (47.01)	1300 (51.18)					1316 (2902)	1314 (2897)	1318 (2906)
	AS 2129	TABLE D	1255 (49.41)	24	36 (1.42)	1175 (46.26)	1300 (51.18)					682 (1504)	680 (1500)	684 (1508)
		TABLE E	1255 (49.41)		39 (1.54)		1000 (39.37)					652 (1438)	650 (1434)	654 (1442)
	ASME B16.47	CL150 SERIES A	1290 (50.79)	36	41 (1.63)	1200 (47.25)	1090 (42.91)					1034 (2280)	1032 (2276)	1036 (2284)
		CL150 SERIES B	1175 (46.26)	44	29 (1.13)	1121 (44.13)	1300 (51.18)					809 (1784)	807 (1780)	811 (1788)
	ASME B16.47	CL300 SERIES A	1240 (48.82)	32	45 (1.75)	1156 (45.50)	1150 (45.28)					1287 (2838)	1285 (2833)	1289 (2842)
		CL300 SERIES B	1275 (50.20)	40		1191 (46.87)	1300 (51.18)					1560 (3440)	1558 (3435)	1562 (3444)

...Dimensions – sensors

...F-style sensor – DN 700 to DN 2400 (28 to 96 in)

Table 10 F-style sensor – DN 1050 to DN 1400 (42 to 56 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. height	Tx. height	Lifting lug			
			D	N	Y	P	L	F	G	H	A	Integral FEW411/ FEW431	Remote	Integral FEW451
DN1050 (42 in)	AWWA C207	CLASS B	1346 (52.99)	36	38 (1.50)	1257 (49.49)	1067 (42.01)	701 (27.6)	697 (27.44)	851 (33.5)	30 1.18)	559 (1233)	557 (1228)	561 (1237)
		CLASS D										614 (1354)	612 (1350)	616 (1359)
		CLASS E										1102 (2430)	1100 (2426)	1104 (2434)
		CLASS F	1448 (57.01)		51 (2.01)	1340 (52.76)						1522 (3356)	1520 (3352)	1524 (3360)
	ASME B16.47	CL150 SERIES A	1345 (52.95)		41.3 (1.63)	1257 (49.50)						1200 (2646)	1198 (2642)	1202 (2650)
		CL150 SERIES B	1225 (48.23)	48	28.6 (1.13)	1172 (46.13)	1365 (53.74)					910 (2007)	908 (2002)	912 (2011)
	ASME B16.47	CL300 SERIES A	1290 (50.79)	32	44.5 (1.75)	1207 (47.50)	1170 (46.06)					1432 (3158)	1430 (3153)	1434 (3162)
		CL300 SERIES B	1335 (52.56)	36	47.6 (1.87)	1245 (49.00)	1365 (53.74)					1804 (3978)	1802 (3973)	1806 (3982)
DN1100 (44 in)	JIS	JIS5K	1305 (51.38)	28	33 (1.30)	1240 (48.82)	1118 (44.02)	701 (27.60)	697 (27.44)	851 (33.5)	30 (1.18)	478 (1054)	476 (1050)	480 (1059)
		JIS10K	1345 (52.95)		39 (1.54)	1270 (50.00)						679 (1497)	677 (1493)	681 (1502)
	AWWA C207	CLASS B	1403 (55.24)	40	38 (1.50)	1315 (51.77)						605 (1334)	603 (1330)	607 (1339)
		CLASS D	1403 (55.24)									695 (1533)	693 (1528)	697 (1537)
		CLASS E	1404 (55.28)	40	38 (1.50)							1132 (2496)	1130 (2492)	1134 (2501)
		CLASS F	1505 (59.25)	36	51 (2.01)	1397 (55.00)						1640 (3616)	1638 (3612)	1642 (3620)
DN1200 (48 in)	JIS	5K	1420 (55.91)	32	33 (1.30)	1350 (53.15)	1200 (47.24)	753 (29.65)	748 (29.49)	903 (35.55)	30 (1.18)	653 (1440)	651 (1436)	655 (1445)
		10K	1465 (57.68)		39 (1.54)	1380 (54.33)						819 (1806)	817 (1802)	821 (1810)
	EN 1092 or DIN	PN6	1405 (55.31)		33 (1.30)	1340 (52.76)						538 (1187)	536 (1182)	540 (1191)
		PN10	1455 (57.28)		39 (1.54)	1380 (54.33)						753 (1661)	751 (1656)	755 (1665)
		PN16	1485 (58.46)		48 (1.89)	1390 (54.72)						981 (2163)	979 (2159)	983 (2168)
		PN25	1530 (60.24)		56 (2.20)	1420 (55.91)	1560 (61.42)					1654 (3647)	1652 (3643)	1656 (3651)
		PN40	1575 (62.01)		62 (2.44)	1460 (57.48)						2229 (4915)	2227 (4910)	2231 (4919)
	AWWA C207	CLASS B	1511 (59.49)	44	38 (1.50)	1422 (55.98)	1200 (47.24)					746 (1645)	744 (1641)	748 (1650)
		CLASS D	1511 (59.49)									886 (1954)	884 (1949)	888 (1958)
		CLASS E	1511 (59.49)		38 (1.50)	1422 (55.98)						1389 (3063)	1387 (3058)	1391 (3067)
		CLASS F	1651 (65.00)	40	51 (2.01)	1543 (60.75)						2300 (5071)	2298 (5067)	2302 (5076)
	AS 4087	PN16	1490 (58.66)	32	36 (1.42)		1200 (47.24)					1207 (2661)	1205 (2657)	1209 (2666)
	AS 2129	TABLE-D	1490 (58.66)	32	36 (1.42)	1410 (55.51)	1560 (61.42)					1118 (2465)	1116 (2461)	1120 (2470)
		TABLE-E	1490 (58.66)	32	39 (1.54)		1200 (47.24)					1085 (2393)	1083 (2388)	1087 (2397)
	AS 4087	PN35	1530 (60.24)	40	42 (1.65)	1441 (56.73)	1560 (61.42)					2211 (4875)	2209 (4871)	2213 (4879)
	ASME CL150 B 16.47	SERIES A	1510 (59.45)	44	41 (1.63)	1422 (56.00)	1320 (51.97)					1612 (3554)	1610 (3550)	1614 (3559)
		SERIES B	1390 (54.72)		32 (1.25)	1335 (52.56)	1560 (61.42)					1178 (2598)	1176 (2593)	1180 (2602)
	ASME CL300 B 16.47	SERIES A	1465 (57.68)	32	51 (2.01)	1372 (54.00)	1400 (55.12)					2051 (4522)	2049 (4518)	2053 (4527)
		SERIES B	1510 (59.45)	40	51 (2.01)	1416 (55.75)	1560 (61.42)					2446 (5393)	2444 (5389)	2448 (5397)
DN1350 (54 in)	AWWA C207	CLASS B	1683 (66.26)	44	44 (1.73)	1594 (62.76)	1350 (53.15)	848 (33.39)	843 (33.19)	998 (39.29)	45 (1.77)	942 (2077)	940 (2073)	944 (2082)
		CLASS D										1026 (2262)	1024 (2258)	1028 (2267)
		CLASS E										1834 (4044)	1832 (4039)	1836 (4048)
DN1400 (56 in)	EN 1092 or DIN	PN6	1630 (64.17)	36	36 (1.42)	1560 (61.42)	1400 (55.12)	848 (33.39)	843 (33.19)	998 (39.29)	45 (1.77)	774 (1707)	772 (1702)	776 (1711)
		PN10	1675 (65.94)		42 (1.65)	1590 (62.60)						1080 (2381)	1078 (2377)	1082 (2386)
		PN16	1685 (66.34)		48 (1.89)							1293 (2851)	1291 (2847)	1295 (2855)
		PN25	1755 (69.09)		62 (2.44)	1640 (64.57)	1820 (71.65)					2483 (5475)	2481 (5470)	2485 (5479)
		PN40	1795 (70.67)		62 (2.44)	1680 (66.14)						3202 (7060)	3200 (7055)	3204 (7064)
	ASME CL150 B 16.47	SERIES A	1745 (68.70)	48	48 (1.87)	1651 (65.00)	1500 (59.06)					2365 (5214)	2363 (5210)	2367 (5219)
		SERIES B	1600 (62.99)	60	32 (1.25)	1543 (60.75)	1820 (71.65)					1706 (3762)	1704 (3757)	1708 (3766)
	ASME CL300 B 16.47	SERIES A	1710 (67.32)	28	60 (2.37)	1600 (63.00)	1600 (62.99)					3166 (6980)	3164 (6976)	3168 (6985)
		SERIES B	1765 (69.49)	36	60 (2.37)	1651 (65.00)	1820 (71.65)					3873 (8539)	3871 (8535)	3875 (8543)

…F-style sensor – DN 700 to DN 2400 (28 to 96 in)

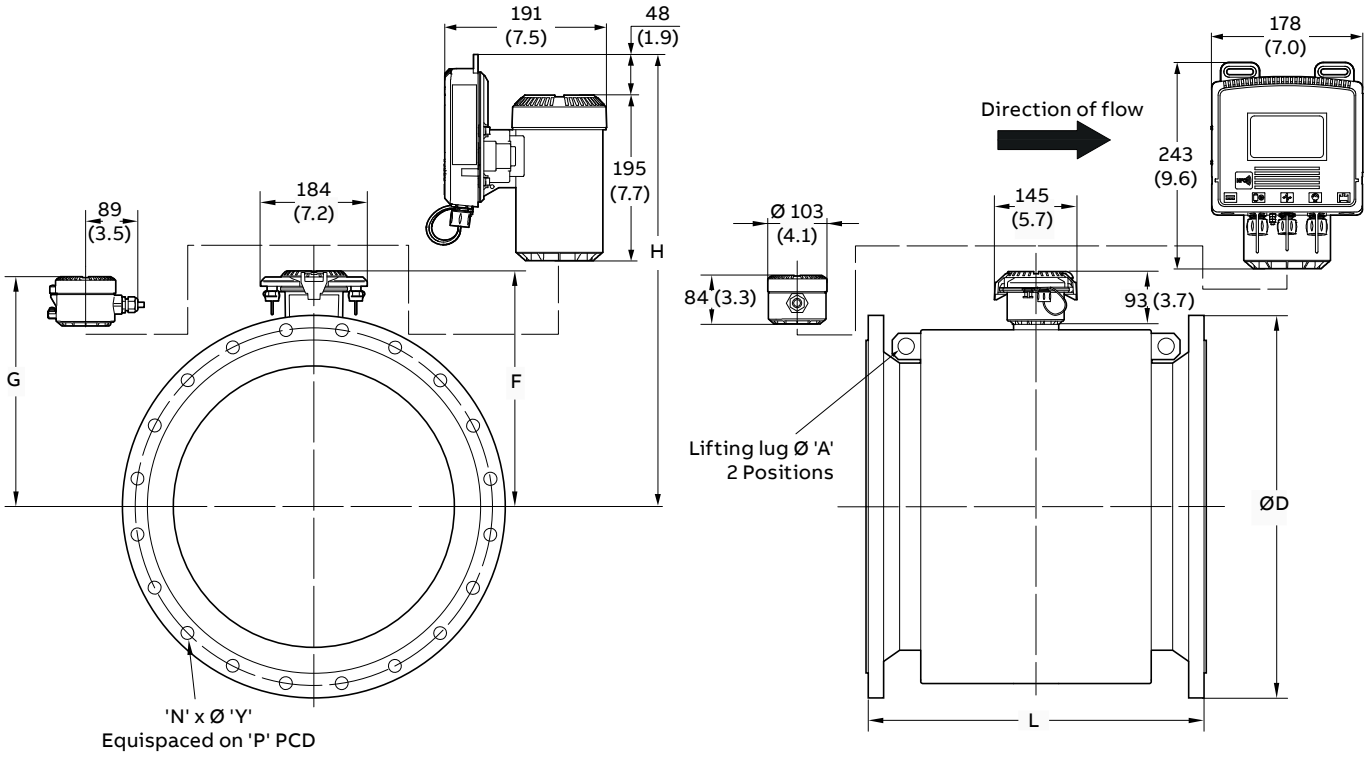


Figure 10 F-style sensor – DN 700 to DN 2400 (28 to 96 in)

...Dimensions – sensors

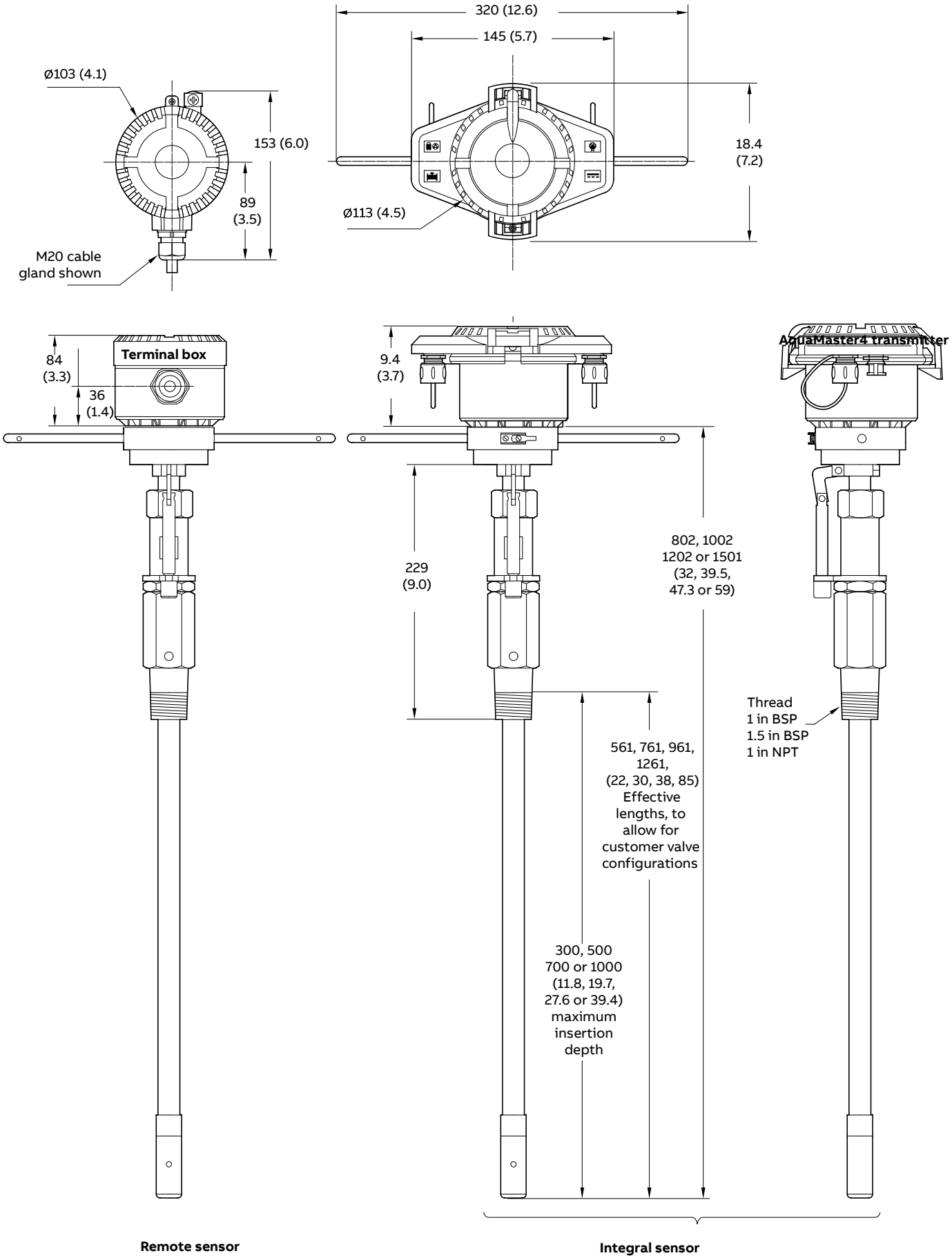
...F-style sensor – DN 700 to DN 2400 (28 to 96 in)

Table 11 F-style sensor – DN 1050 to DN 2400 (60 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. Height	Tx. Height	Lifting Lug	Integral FEW411/ FEW431	Remote	Integral FEW451
			D	N	Y	P	L	F	G	H	A			
DN1500 (60 in)	JIS	5K	1730 (68.11)	36	33 (1.30)	1660 (65.35)	1524 (60.00)	958 (37.72)	953 (37.52)	1108 (43.62)	45 (1.77)	1137 (2507)	1135 (2503)	1139 (2512)
		10K	1795 (70.67)	40	45 (1.77)	1700 (66.93)						1568 (3457)	1566 (3453)	1570 (3462)
	AWWA C207	CLASS B	1854 (72.99)	52	44 (1.73)	1759 (69.25)						1290 (2844)	1288 (2840)	1292 (2849)
		CLASS D	1854 (72.99)									1569 (3460)	1567 (3455)	1571 (3464)
		CLASS E	1854 (72.99)									2497 (5505)	2495 (5501)	2499 (5510)
	ASME CL150 B 16.47	SERIES A	1855 (73.03)		47.6 (1.87)							2847 (6277)	2845 (6273)	2849 (6281)
		SERIES B	1725 (67.91)		35 (1.38)	1662 (65.44)	1950 (76.77)					2031 (4478)	2029 (4474)	2033 (4482)
	ASME CL300 B 16.47	SERIES A	1810 (71.26)	32	60 (2.37)	1702 (67.00)	1640 (64.57)					3717 (8195)	3715 (8191)	3719 (8199)
		SERIES B	1880 (74.02)	40	60 (2.37)	1764 (69.44)	1950 (76.77)					4181 (9218)	4179 (9214)	4183 (9222)
DN1600 (64 in)	EN 1092 or DIN	PN6	1830 (72.05)	40	36 (1.42)	1760 (69.29)	1600 (62.99)	959 (37.76)	954 (37.56)	1109 (43.66)	45 (1.77)	1033 (2278)	1031 (2273)	1035 (2282)
		PN10	1915 (75.39)		48 (1.89)	1820 (71.65)						1509 (3327)	1507 (3323)	1511 (3332)
		PN16	1975 (77.76)		56 (2.20)	1820 (71.65)						1955 (4311)	1953 (4306)	1957 (4315)
		PN25	1930 (75.98)		62 (2.44)	1860 (73.23)	2080 (81.89)					3201 (7057)	3199 (7053)	3203 (7062)
		PN40	2025 (79.72)		70 (2.76)	1900 (74.80)						4375 (9646)	4373 (9641)	4377 (9650)
DN1650 (66 in)	AWWA C207	CLASS B	2032 (80.00)	52	44(1.75)	1930(75.98)	1650 (64.96)	1009 (39.72)	1004 (39.53)	1159 (45.63)	45 (1.77)	1497 (3301)	1495 (3296)	1499 (3305)
		CLASS D	2032 (80.00)									1763 (3887)	1761 (3883)	1765 (3892)
DN1800 (72 in)	EN 1092 or DIN	PN6	2045 (80.51)	44	39 (1.54)	1970 (77.56)	1800 (70.87)	1074 (42.28)	1069 (42.09)	1224 (48.19)	45 (1.77)	1356 (2990)	1354 (2986)	1358 (2994)
		PN10	2115 (83.27)		48 (1.89)	2020 (79.53)						1949 (4297)	1947 (4293)	1951 (4302)
		PN16	2130 (83.86)		56 (2.20)							2524 (5565)	2522 (5561)	2526 (5569)
		PN25	2195 (86.42)		70 (2.76)	2070 (81.50)	2340 (92.12)					4422 (9749)	4420 (9745)	4424 (9754)
	AWWA C207	CLASS B	2197 (86.50)	60	44 (1.73)	2096 (82.52)	1800 (70.87)					1833 (4042)	1831 (4037)	1835 (4046)
		CLASS D										2147 (4734)	2145 (4729)	2149 (4738)
DN1950 (78 in)	AWWA C207	CLASS B	2362 (92.99)	64	51(2.01)	2261(89.02)	1950 (76.77)	1184 (46.61)	1179 (46.42)	1334 (52.52)	45 (1.77)	2312 (5098)	2310 (5093)	2314 (5102)
		CLASS D										2684 (5918)	2682 (5913)	2686 (5922)
DN2000 (80 in)	EN 1092 or DIN	PN6	2265 (89.17)	48	42 (1.65)	2180 (85.83)	2000 (78.74)	1184 (46.61)	1179 (46.42)	1334 (52.52)	45 (1.77)	1781 (3927)	1779 (3923)	1783 (3931)
		PN10	2325 (91.54)		48 (1.89)	2230 (87.80)						2580 (5688)	2578 (5684)	2582 (5693)
		PN16	2345 (92.32)		62 (2.44)							3230 (7121)	3228 (7117)	3232 (7126)
		PN25	2425 (95.47)		70 (2.76)	2300 (90.55)	2600 (102.36)					5896 (12999)	5894 (12995)	5898 (13003)
DN2100 (84 in)	AWWA C207	CLASS B	2534 (99.76)	64	51(2.01)	2426 (95.51)	2100 (82.68)	1288 (50.71)	1283 (50.51)	1438 (56.61)	45 (1.77)	2570 (5666)	2568 (5662)	2572 (5671)
		CLASS D										2942 (6486)	2940 (6482)	2944 (6491)
DN2200 (88 in)	EN 1092 or DIN	PN6	2475 (97.44)	52	42 (1.65)	2390 (94.09)	2200 (86.61)	1288 (50.71)	1283 (50.51)	1438 (56.61)	45 (1.77)	2446 (5393)	2444 (5389)	2448 (5397)
		PN10	2550 (100.39)		56 (2.20)	2440 (96.06)						3202 (7060)	3200 (7055)	3204 (7064)
DN2400 (96 in)	EN 1092 or DIN	PN6	2685 (105.71)	56	42 (1.65)	2600 (102.36)	2400 (94.49)	1388 (54.65)	1283 (50.51)	1538 (60.55)	45 (1.77)	2846 (6275)	2844 (6270)	2848 (6279)
		PN10	2760 (108.66)		56 (2.20)	2650 (104.33)						4111 (9064)	4109 (9059)	4113 (9068)

Table 12 F-style sensor – DN 1500 to DN 2400 (42 to 96 in)

Dimensions – insertion flowmeter

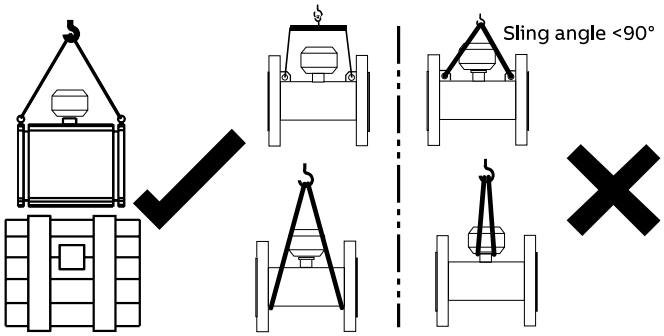


Installation requirements – sensor

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.

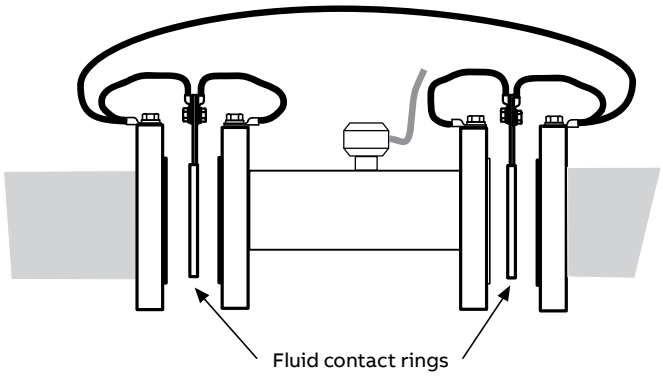
Unpacking the flowmeter

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 of the sensor cable as this causes damage and invalidates the warranty.

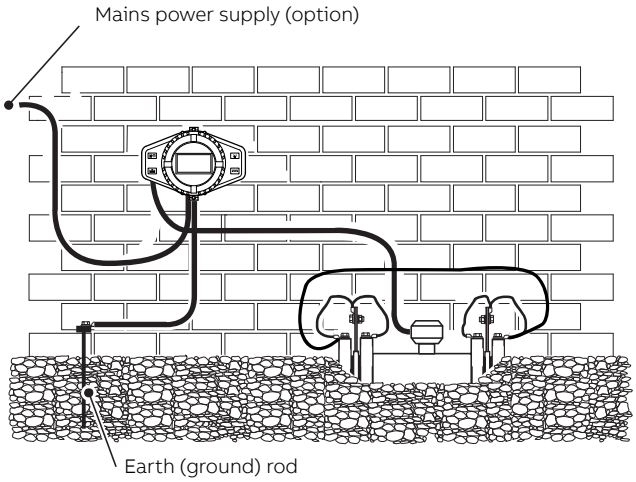


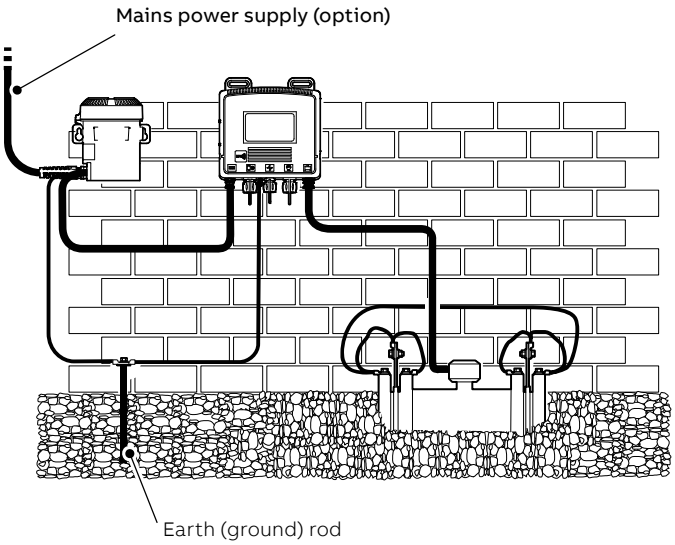
Grounding

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).



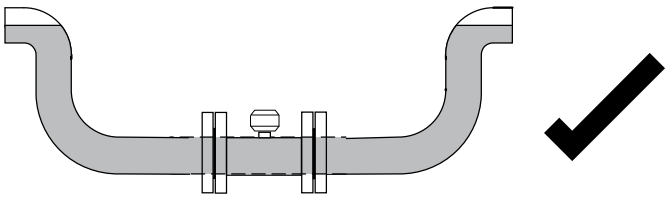
Note. The grounding arrangements shown below are applicable to both cathodic and non-cathodic protected installations.





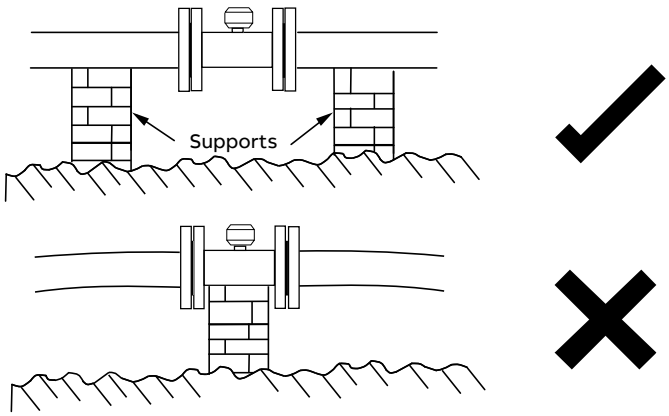
Mounting

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

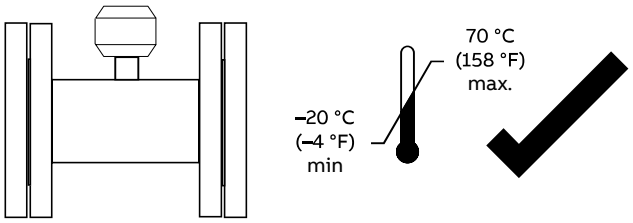


The flow direction must correspond to the identification plate. The flowmeter measures the flowrate in both directions. Forward flow is the factory setting.

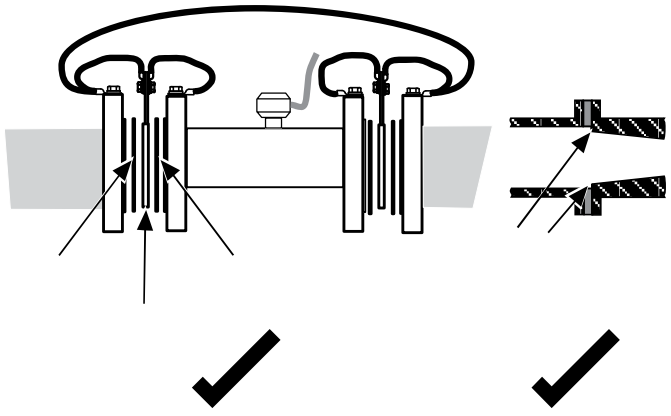
The flowmeter must be installed without mechanical tension (torsion, bending). If necessary, support the pipeline.



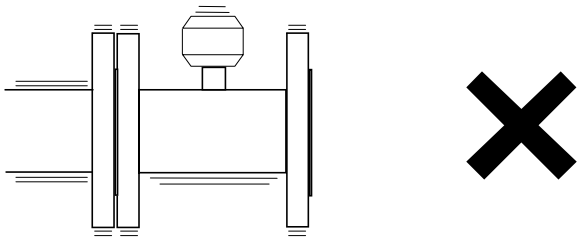
The flange seal material must be compatible with the fluid and fluid temperatures.



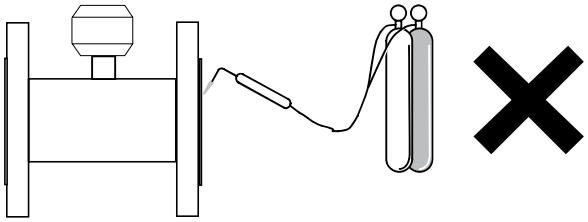
Seals must not extend into the flow area as this causes turbulence that adversely influences flowmeter accuracy.



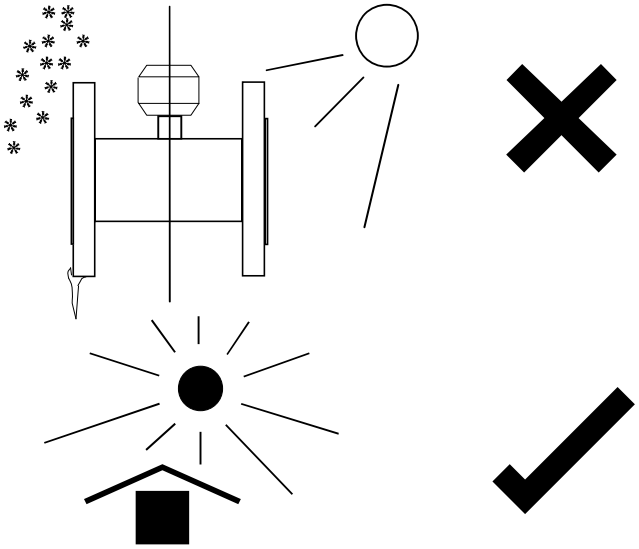
The pipeline must not exert any forces and torques on the flowmeter (for example, vibration).



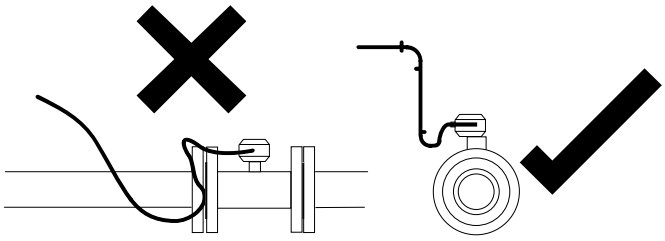
The flowmeter must not be submitted to localized heating during installation; take care to remember this is a measuring instrument.



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

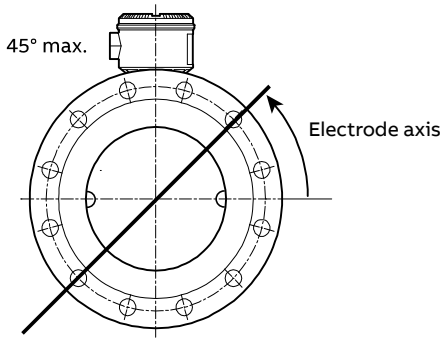


The cable to the flowmeter must be installed neatly or within a conduit. Both loose or conduit installations must have a u-bend below terminal connection box height to enable any water to run off thus avoiding any capillary action into the flowmeter sensor.



Electrode axis

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



Installation requirements – transmitter (41X/43X)

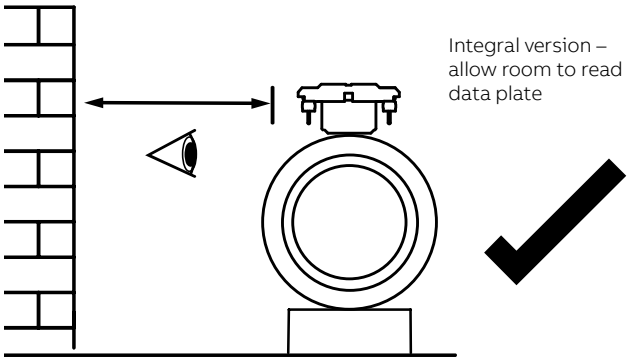


Figure 11 Siting

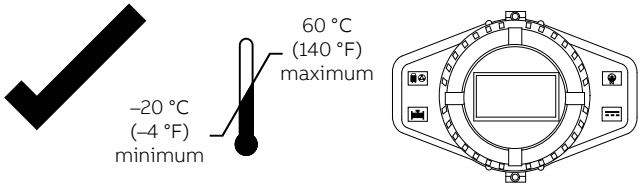


Figure 12 Within temperature limits

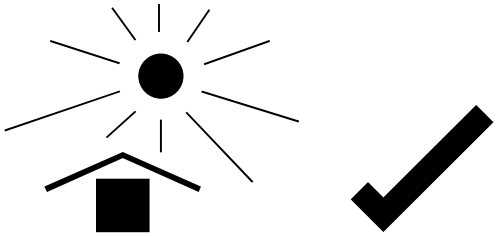


Figure 13 Shade

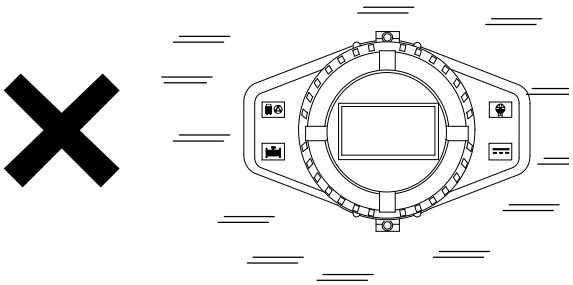


Figure 14 Vibration

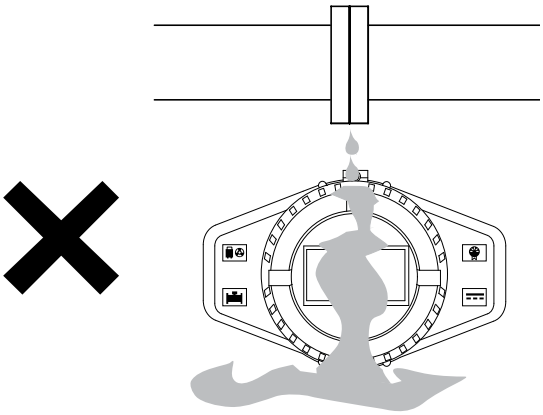


Figure 15 Spillage

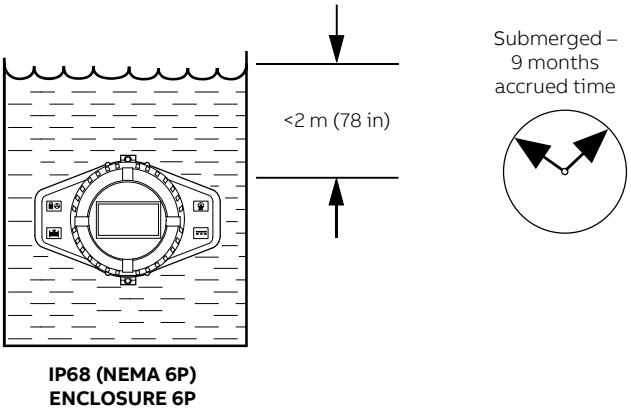


Figure 16 Within environmental rating

Installation conditions – FET 450

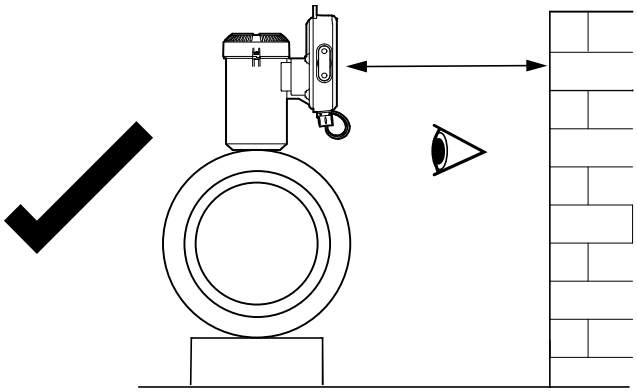


Figure 17 Siting

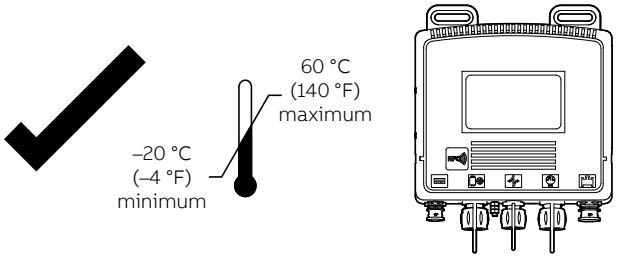


Figure 18 Within temperature limits

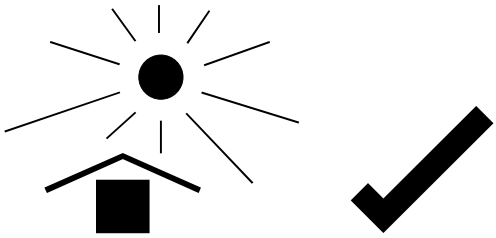


Figure 19 Shade

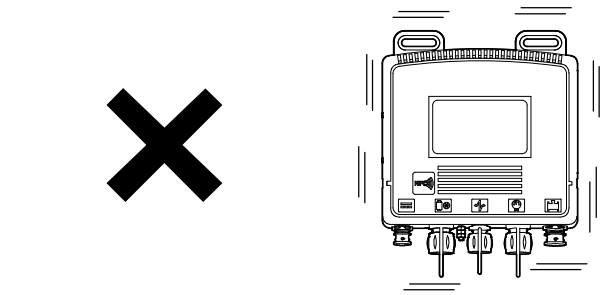


Figure 20 Vibration

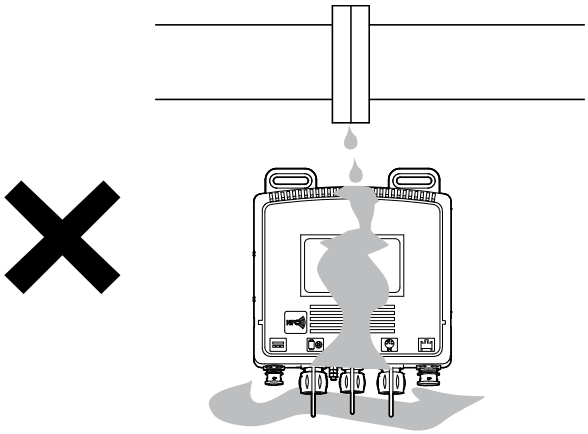


Figure 21 Spillage

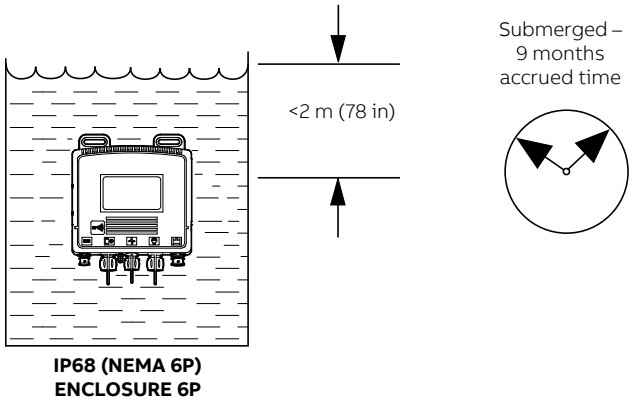


Figure 22 Within environmental rating

...Installation requirements – FET 450

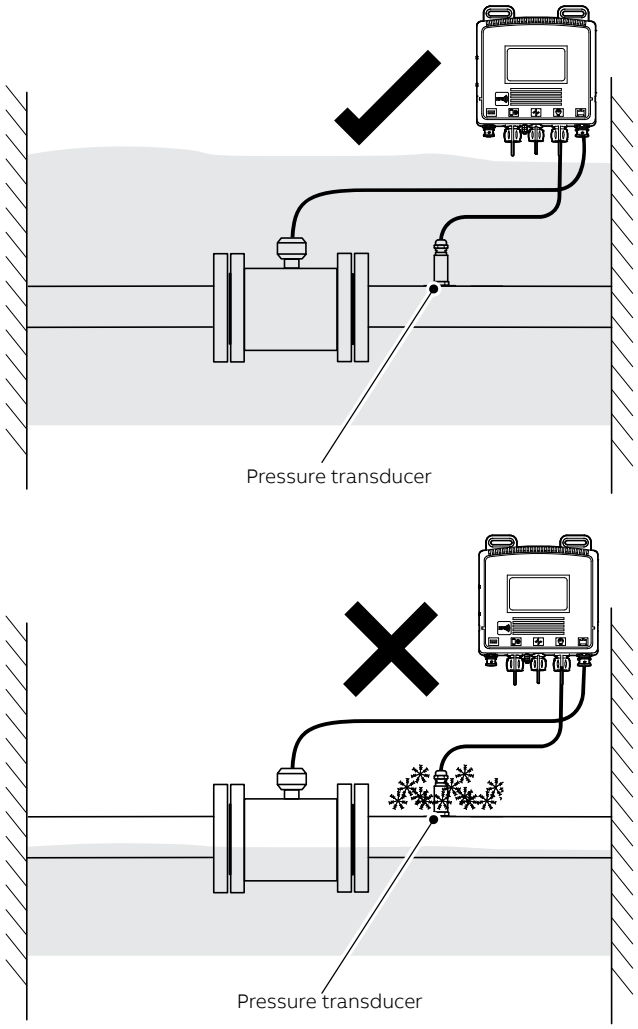


Figure 23 Pressure transducer – protect from frost

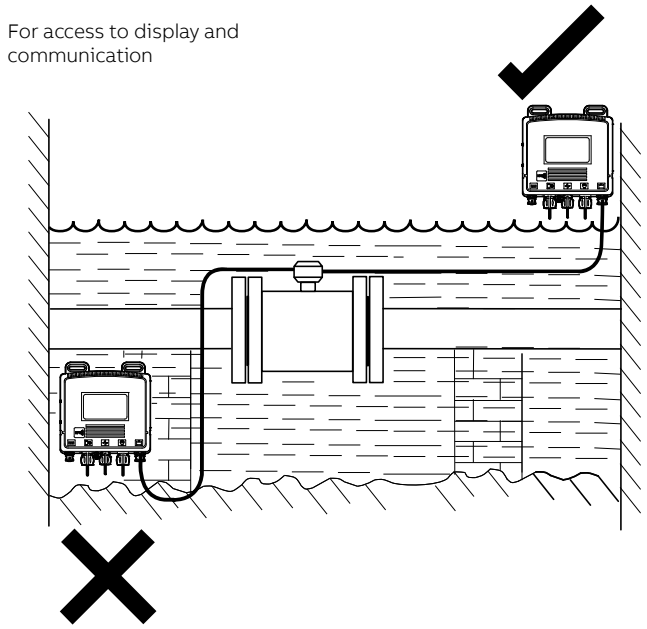


Figure 24 Access to transmitter

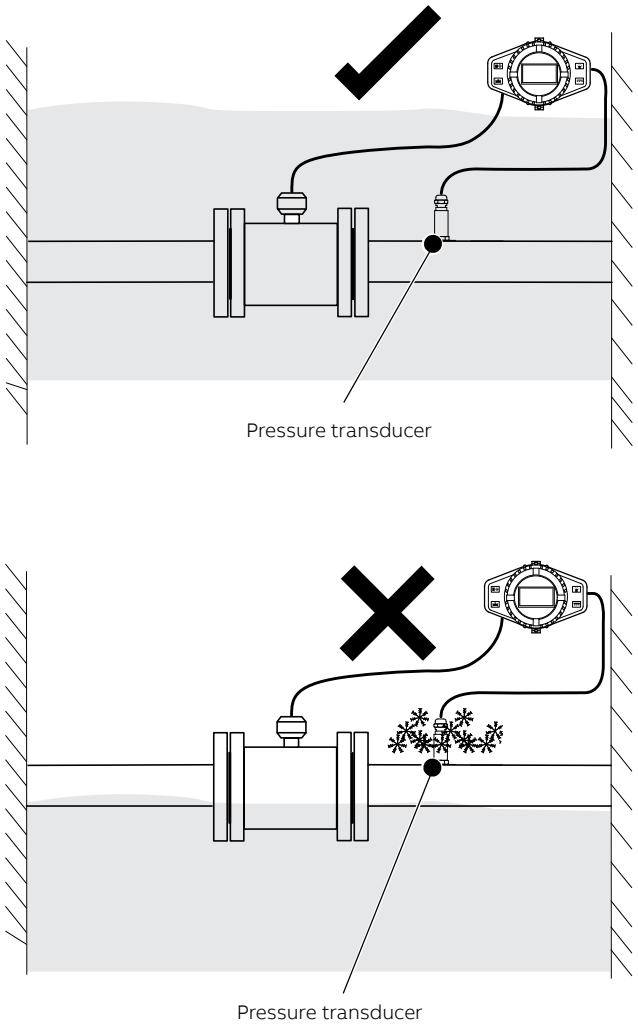


Figure 25 Pressure transducer – protect from frost

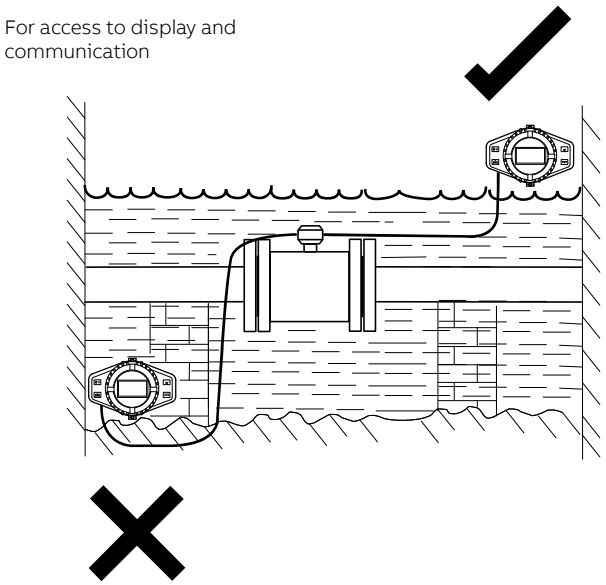


Figure 26 Access to transmitter

AquaMaster4 series differences

		AquaMaster4		
	Features	**41X (standard)**	**43X (advanced)**	**45X (premium)**
Mounting	Integral	✔	✔	✔
	Remote	✔	✔	✔
Sensors	Full bore flanged rubber DN250 to DN2400	✔	✔	✔
	Virtual full bore flanged polypropylene DN40 to DN200	✔	✔	✔
	Reduced bore flanged rubber DN40 to DN600	✔	✔	✔
	Probe 300 to 1000 mm	✔	✔	
Measurement	Class 2/0.5 % calibration	✔		
	Class 2/0.4 % calibration		✔	✔
	Class 1 calibration		✔	✔
	Class 2/0.2 % calibration		✔	✔
	Extended range class 1 and 2 calibration		✔	✔
	Totalizer	✔	✔	✔
	Pressure		✔	✔
	Internal logger		✔	✔
Power	AC (100 to 230 V, 50 or 60 Hz)		✔	✔
	Battery	✔	✔	✔
	Renewable (solar/wind)		✔	✔
Outputs	Digital outputs	✔	✔	✔
	Modbus		✔	✔
	Sensus compatible	✔	✔	
	Mobile communications			✔
Special application needs	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 virtual full 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
Sensor and transmitter										
Standard integral flowmeter	FEW411									
Standard remote flowmeter	FEW412									
Advanced integral flowmeter	FEW431									
Advanced remote flowmeter	FEW432									
Premium integral flowmeter	FEW451									
Premium remote flowmeter	FEW452									
Sensor only										
Standard remote sensor	FEW418									
Advanced remote sensor	FEW438									
Premium remote sensor	FEW458									
Sensor style/liner material										
Full bore/rubber liner		F								
Virtual full bore/polypropylene liner		V								
Reduced bore/rubber liner		R								
Probe/PEEK		A								
Meter size										
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)			0400							
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 …

...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
	See page 53									
Process connection type										
ANSI/ASME B16.5/16.47 series B Class 150				A1						
ANSI/ASME B16.5/16.47 series B Class 300				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 (⅛ in pressure tap) – probe only				N1						
1½ in BSP coupling (⅛ in pressure tap) – probe only				N2						
1 in NPT coupling (⅛ 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						
Process connection material										
Carbon steel					B					
Stainless steel carrier (probe only)					J					
Brass seal carrier (probe only)					K					
Without (probe only)					U					
Measuring electrodes material										
Stainless steel 316L (1.4404)						R				
Super austenitic steel (1.4529)						U				
Other						Z				
Grounding accessories										
Without							A			
2 grounding rings (standard)							E			
Protection class – transmitter/sensor										
IP68, NEMA 6P/IP68, NEMA 6P – integral, remote cable not fitted and not potted (IP68 only after potting by others)								80		
IP68, NEMA 6P/IP68, NEMA 6P – remote mount cable fitted and potted								81		
Power supply										
Battery powered – battery not fitted									B	
Battery powered – battery fitted									L	
AC + internal back-up									K	
AC + external back-up – battery not fitted									H	
AC + external back-up – battery fitted									J	
External renewable energy + internal back-up									R	
External renewable energy + internal + external back-up – battery not fitted									M	
External renewable energy + internal + external back-up – battery fitted									N	
Outputs										
Modbus + pulse output *										M4
Pulse output										B1
Sensus communication protocol compatible + pulse output *										S1
4G										C1
4G + pulse output										C2
4G + Modbus + pulse output										C4
nB-IoT										J1
nB-IoT + pulse output										J2
nB-IoT Modbus + pulse output										J4
Without (FEW411, FEW412 and sensor only)										Y0

* With 3KXF221400L0XXX FEW4 sensor cable – see **Accessories** on page 60.

Options – add to order code as required	
Logger and protocol	
Internal logger option	LPN**
Internal Logger with MQTT + Sparkplug B	LPQ
Calibration type (3 test points as standard)	
Class 2.5 calibration – FEW411 and FEW412 only	RCS
Class 2/0.5 % factory calibration – FEW411 and FEW412 only	RCC
Class 2/0.4 % factory calibration – standard with FEW43X and FEW45X only	RCD[1]
Class 2/0.2 % factory calibration – option with FEW43X and FEW45X only	RCB[2]
Class 1 factory calibration – option with FEW43X and FEW45X only	RCF[2]
Extended range Class 2 calibration – option with FEW43X and FEW45X only	RCM[3]
Extended range Class 1 calibration – option with FEW43X and FEW45X only	RCN[3]
2 % factory calibration (probe only)	RCW
Number of test points	
1	TV1
5	TV5
Signal cable length and type	
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
Additional cables	
Sensus cable, 5 m	SR1
Sensus cable, 20 m	SR4
Renewable energy cable, 10 m	SP2
Accessories	
1½ in ball valve	AB
RS485 lead with MIL connector for Modbus	AT
NFC to Wall mount Coupler 5 m cable	AJ
NFC to Wall mount Coupler, 10 m cable	AK
NFC to USB, 10 m cable	AL
NFC to USB, 20 m cable	AM
Display protective cover	
Display protective cover without NFC	AD1
Display protective cover with NFC, 5 m cable	AD2
Display protective cover with NFC, 20 m cable	AD3
Mobile Communication Accessories	
Remote antenna 5 m	G7
Remote antenna 10 m	G8
Mobile Communication Territory	
USA, Canada & Mexico	GTA
China	GTC
Australia, Argentina, Columbia, Chile, Brazil, Bolivia Peru & Panama*	GTD
Rest of the world	GTZ
Pressure span	
2000 kPa/20 bar/300 psi	PS3
4000 kPa/40 bar/580 psi	PS4
Pressure transducer	
Remote, cable length 10 m (33 ft)	PT5
Remote, cable length 20 m (65 ft)	PT6
Other usage certifications[5]	
Measuring Instruments Directive (MID)	CM1
OIML R49	CM2
NMI M10/R49	CM3[4]
UL Fire Service approval	CMF
PAC	CMP

[1] Calibration option RCD will have a reduced R (Q3/Q1) value without verification and are dependent on optional selection " Other Usage certification - CM2/CM3", refer to table 12 & 13
[2] Calibration option RCB/RCF will have a reduced R (Q3/Q1) value with verification and are dependent on optional selection " Other Usage certification - CM1/CM2/CM3", refer to table 12 & 13
[3] Calibration options RCM/RCN will have a extended R (Q3/Q1) value with verification and are dependent on optional selection "Other Usage certification - CM1/CM2/CM3", refer to page 22 & 26
[4] Calibration option RCS will have R (Q3/Q1) value without verification and are dependent on optional selection " Other Usage Certification - CM3" refer to page 22 & 26.
[5] If no selection made, standard factory calibration/verification.

*Contact ABB Sales/Support for any Latin American countries not specified above
**For FEW45X, the default protocol would be FTPS/FTP

...Ordering information

...Electromagnetic flowmeter

Potable water approvals	
WRAS - cold water approval*	CWA
NSF-61#	CWC
AZ/NZS 4020*	CWE
ACS#	CWF
WRAS - 60 °C water approval*	CWK
WRAS - 50 °C water approval*	CWN
Without	CWY
Other options	
With customer property label	KL
Documentation language	
German	M1
Spanish	M3
French	M4
English	M5
Chinese	M6
Polish	M9
Italian	M2
Portuguese	MA
Turkish	MT
Transmitter Software Function Package	
Backward-compatible to legacy AquaMaster Sensors (for FEW452 only)	NFL

* Material approval
#Meter Approval

Transmitter

Product coding field number	1,2,3,4,5,6	7	8,9
Transmitter only			
Standard remote transmitter	FET412		
Advanced remote transmitter	FET432		
Premium remote transmitter	FET452		
Power supply			
Battery powered – battery not fitted		B	
Battery powered – battery fitted		L	
AC + internal back-up		K	
AC + external back-up – battery not fitted		H	
AC + external back-up – battery fitted		J	
External renewable energy + internal back-up		R	
External renewable energy + internal + external back-up – battery not fitted		M	
External renewable energy + internal + external back-up – battery fitted		N	
Outputs			
Modbus			M4
Pulse output			B1
Sensus communication protocol compatible			S1
4G			C1
4G + pulse output			C2
4G + Modbus + pulse output			C4
nB-IoT			J1
nB-IoT + pulse output			J2
nB-IoT + Modbus output + pulse output			J4
Without (FEW411 and FEW412 only)			Y0

Options – add to order code as required	
Logger and protocol	
Internal logger option	LPN
Internal Logger with MQTT + Sparkplug B	LPQ
Additional cables	
Sensus cable, 5 m	SR1
Sensus cable, 20 m	SR4
Renewable energy cable, 10 m	SP2
Accessories	
RS485 lead with MIL connector for Modbus	AT
NFC to Wall mount Coupler, 5 m cable	AJ
NFC to Wall mount Coupler, 10 m cable	AK
NFC to USB, 10 m cable	AL
NFC to USB, 20 m cable	AM
Display protective cover	
Display protective cover without NFC	AD1
Display protective cover with NFC, 5 m cable	AD2
Display protective cover with NFC, 20 m cable	AD3
Mobile Communication Accessories	
Remote antenna 5 m	G7
Remote antenna 10 m	G8
Mobile Communication Territory	
USA, Canada & Mexico	GTA
China	GTC
Australia, Argentina, Columbia,Chile, Brazil ,Bolivia, Peru & Panama*	GTD
Rest of the world	GTZ
Pressure span	
2000 kPa/20 bar/300 psi	PS3
4000 kPa/40 bar/580 psi	PS4
Pressure transducer	
Remote, cable length 10 m (33 ft)	PT5
Remote, cable length 20 m (65 ft)	PT6
Other usage certifications	
OIML R49	CM2
NMI M10	CM3
Documentation language	
German	M1
Spanish	M3
French	M4
English	M5
Chinese	M6
Polish	M9
Italian	M2
Portuguese	MA
Turkish	MT
Transmitter Software Function Package	
Backward-compatible to legacy AquaMaster Sensors (for FET452 only)	NFL

...Ordering information

...Transmitter

Probe bore gauge tool

	1,2,3,4	5	6,7,8,9
Probe bore gauge tool	APBGT		
Housing			
R1 housing		2	
Bore size			
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
Standard integral transmitter generic	F E T 4 1 9		
Standard remote transmitter generic	F E T 4 1 0		
Advanced integral transmitter generic	F E T 4 3 9		
Advanced remote transmitter generic	F E T 4 3 0		
Power supply			
Battery powered – battery not fitted		B	
AC + internal back-up		K	
External renewable energy + internal back-up		R	
Outputs			
Modbus			M4
Pulse output			B1
Sensus communication protocol compatible			S1
Without			Y0

Additional codes to be added as required	MT
Logger and protocol	
Internal logger option	LPN
Pressure span	
2000 kPa/20 bar/300 psi	PS3
4000 kPa/40 bar/580 psi	PS4
Others	PSZ
Pressure transducer	
Remote, cable length 10 m (33 ft)	PT5
Remote, cable length 20 m (65 ft)	PT6
Documentation language	
German	M1
Spanish	M3
French	M4
English	M5
Chinese	M6
Polish	M9
Italian	M2
Portuguese	MA
Turkish	MT

Calibration/flow accuracy specification table

Calibration of the flowmeter to different calibration types and other usage certifications is done to meet the following values of R (Q3/Q1) for sizes DN40 to DN600.

Table 13 Calibration/verification of calibration values for "Other Usage Certification" MID (CM1)/OIML (CM2), Reduced Bore Sensor sizes DN40 - 600

	Reduced bore sensor			
	Mains powered		Battery/renewable energy powered	
DN	Class 2	Class 1	Class 2	Class 1
40	250	200	160	100
50	250	200	160	100
65	250	200	160	100
80	250	200	160	100
100	250	200	160	100
125	250	200	160	100
150	250	200	160	100
200	250	200	160	100
250	250	200	160	100
300	250	200	160	100
350	250	200	63	63
400	160	200	63	63
450	160	200	63	63
500	160	200	63	40
600	160	200	63	40

Table 14 Calibration/verification of calibration values for "Other Usage Certification" MID (CM1)/OIML (CM2), Full Bore Sensor sizes DN40 - 600

	Full bore sensor			
	Mains powered		Battery/renewable energy powered	
DN	Class 2	Class 1	Class 2	Class 1
40	200	125	80	63
50	200	125	80	63
65	200	125	80	63
80	200	125	80	63
100	200	125	80	63
125	200	125	80	63
150	200	125	80	63
200	200	125	80	63
250	200	125	80	63
300	200	125	80	63
350	80	80	80	63
400	80	80	80	63
450	80	80	80	63
500	80	80	80	63
600	80	80	80	63
700	80	80	40	40
750	80	80	40	40
800	80	80	40	40
900	63	40	40	-
1000	63	40	40	-
1050	63	40	40	-
1100	63	-	40	-
1200	63	-	40	-

Accessories

Ordering code	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/pulse/Modbus cable 5 m (15 ft approx.)
3KXF221400L0200	FEW4 sensor/pulse/Modbus cable 10 m (30 ft approx.)
3KXF221400L0300	FEW4 sensor/pulse/Modbus cable 20 m (66 ft approx.)
3KXF221400L0400	FEW4 sensor/pulse/Modbus cable 30 m (98 ft approx.)
3KXF221400L0500	FEW4 sensor/pulse/Modbus 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 preamp board and potting kit
3KXF208400L2900	AquaMaster 4 – demonstration kit (FEX41X/FEX43X)
3KXF221400L1800	FEW4 terminal box maintenance kit
3KXF208400L3000	AM4 antitamper security kit
3KXF208400L3100	AM4 remote transmitter mounting bracket kit
3KXF221400L1900	FEW4 earth strap kit
3KXF208400L3700	External battery PSU with batteries not fitted for Tx (FET450)
3KXF208400L3800	External battery PSU with batteries fitted for Tx (FET450)
3KXF208400L3900	AC PSU with D-cell batteries not fitted for Tx (FET450)
3KXF208400L4000	AC PSU with D-cell batteries fitted for Tx (FET450)
3KXF208400L4100	Renewable PSU with D-cell batteries not fitted for Tx (FET450)
3KXF208400L4200	Renewable PSU with D-cell batteries fitted for Tx (FET450)
3KXF208400L5200	NFC to USB, 10 m cable for FEX450
3KXF208400L5300	NFC to USB, 20 m cable for FEX450

Ordering code	Description
3KXF208400L4400	NFC to wall mount coupler, 5 m (FEX450)
3KXF208400L4500	NFC to wall mount coupler, 20 m (FEX450)
3KXF208400L4600	Battery holder sub-assembly for AC/Ren operated Tx (FET450)
3KXF208400L4700	Battery holder subassembly for battery operated Tx (FET450)
3KXF208400L4800	Demo kit for AM4 Mobile Comms with NB-IOT for China
3KXF208400L4900	Demo kit for AM4 Mobile Comms with 4G for Europe and Asia
3KXF208400L5000	Demo kit for AM4 Mobile Comms with 4G for North America
3KXF208400L5100	Demo kit for AM4 Mobile Comms with 4G for Australia
3KXF208400L5600	FET450 PSU Mounting Bracket
3KXF208400L5800	External Remote Antenna with 5 m cable
3KXF208400L5900	External Remote Antenna with 10 m cable
3KXF208400L6000	Battery Holder for External Battery PSU
3KXF208400L6100	Battery Holder for AC Mains and Renewable PSU

Acknowledgements

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- Modbus is a registered trademark of Schneider Electric USA, Inc.
- 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.

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