

IOMaster FPD510

Compact integral orifice flowmeter

Low-cost measurement of small flow rates



Introduction

The IOMaster FPD510 flowmeter is a compact integral orifice flowmeter designed for the measurement of clean liquids and gases in pipelines of DN15, DN25 or DN40 (½, 1 and 1½ in.). The meter combines an integral orifice sensor with an integral isolating/equalizing manifold and transmitter in a single, leak tested and configured assembly. IOMaster is available both with and without upstream and downstream pipework and each unit can be fitted with any one of a number of orifice plates of different bores.

This User Guide provides installation, connection, start-up and basic setup details for the system, with emphasis on the flow sensor. IOMaster is available with either a 364DS or 266DSH DP transmitter or a 267CS multivariable transmitter.

This User Guide should be used in conjunction with the following publications:

364DS DP transmitter:
User Guide – IM/364

266DSH DP transmitter:
User Guide HART– OI/266/HART-EN
User Guide Foundation Fieldbus – OI/266/FF-EN
Foundation Fieldbus Additional Instructions –
OI/266/FF/ADD-EN
User Guide Profibus PA – OI/266PA-EN

267CS Multivariable transmitter:
User Guide – 267C/269C
Communication Description-Profibus –
PA/DP – 41/15-110-EN_03
Communication Description-Foundation Fieldbus –
PA/DP – M/265/7/9/ADD/FF-EN_01
Communication Description-Modbus – 42/15-727-EN

The Company

We are an established world force in the design and manufacture of measurement products for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

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1 Safety

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

1.1 Health & Safety

Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

- The relevant sections of these instructions must be read carefully before proceeding.
- Warning labels on containers and packages must be observed.
- Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
- Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and / or temperature.
- Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
- When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant Material Safety Data Sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.



1.2 Electrical Safety – CEI / IEC 61010-1:2001-2














This equipment complies with the requirements of CEI / IEC 61010-1:2001-2 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500, NIST and OSHA.

If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

1.3 Symbols – CEI / IEC 61010-1:2001-2

One or more of the following symbols may appear on the equipment labelling:

	Protective earth (ground) terminal.
	Functional earth (ground) terminal.

	Direct current supply only.
	Alternating current supply only.
	Both direct and alternating current supply.
	The equipment is protected through double insulation.
	This symbol, when noted on a product, indicates a potential hazard which could cause serious personal injury and / or death. The user should reference this instruction manual for operation and / or safety information.
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and / or electrocution exists and indicates that only individuals qualified to work with hazardous voltages should open the enclosure or remove the barrier.
	This symbol indicates that the marked item can be hot and should not be touched without care.
	This symbol indicates the presence of devices sensitive to electrostatic discharge and indicates that care must be taken to prevent damage to them.
	This symbol identifies a risk of chemical harm and indicates that only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol indicates the need for protective eye wear.
	This symbol indicates the need for protective hand wear.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems. In conformity with European local and national regulations, European electrical equipment users must now return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.
	Products marked with this symbol indicates that the product contains toxic or hazardous substances or elements. The number inside the symbol indicates the environmental protection use period in years.

1.4 Pressure Equipment Safety

Warning.

- The Pressure Equipment described in this manual is supplied, where appropriate, in accordance with the European Directive 97/23/EC and is designed to work in pressurized systems. Take care when installing all equipment and follow the instructions given. Failure to do this could result in damage to equipment and create possible hazards to operators and other equipment. Only use the equipment on the process for which it is designed. Install the equipment into a system that has been designed to allow for venting or draining of the process. For the necessary safety requirements refer to the appropriate instructions in this manual.
- Do not exceed the pipe vibration levels stated in the Specification (see Section 6, page 12). Excessive vibration could result in damage to the equipment and create possible hazards to other equipment and operators.

1.5 User Guidelines

Correct use includes the following:

- Operation within the technical limit values.
- Observing and following the information provided on permissible media (fluids).
- Observing and following the instructions provided in the operating manuals.
- The following uses are not permitted:
 - Operation as a flexible adaptor in piping; for example, to compensate for pipe offsets, pipe vibrations and/or pipe expansions.
 - Use as a climbing aid; for example, for assembly purposes.
 - Use as a support for external loads; for example, as a support for piping.
 - Material gain; for example, by painting over the type plate or welding or soldering on parts.
 - Repairs, modifications, supplements or the installation of spare parts. These are permitted only if performed as described in the operating manual. More extensive work must be approved by ABB – the Company accepts no liability for unauthorized work.

The operating, maintenance and repair conditions that are stated in this manual must be observed. The Company accepts no liability for damage caused by usage that is incorrect or unprofessional.

1.6 Permissible Process Media (fluids)

Process media may be used only if:

- It can be assured that the physical and chemical properties of the pressure-bearing materials that come into contact with the process medium are not reduced from that required for operational safety, during the expected lifetime of the equipment.
- Process media with unknown properties for erosion and/or corrosion may be used only if the operator can perform regular and suitable tests to assure the safe condition of the equipment.

1.7 Technical Limit Values

The equipment is intended for use only within the technical limit values specified on the data plate and in the Specification (see Section 6, page 12), including those for:

- The maximum working pressure.
- The maximum and minimum operating temperatures.
- The maximum vibration level stated in the Specification – see Section 6, page 12.

In addition, all connected pipework must be installed as it was designed, to ensure that there is no possibility of leakage or any undue stresses or strain acting upon it.

1.8 Safety Precautions

Instructions and procedures in this manual may require special precautions to ensure the safety of personnel performing the operations. Explosions could result in death or serious injury; therefore refer to the **Warnings** in the transmitter Operating Instructions (Transmitter operating manuals IM/364 Rev. 2 [V Design Level 1] SOI-266-XC-D-05-2011 [V Design Level 2] IM/267C/269C Rev. A [M Design Level 1]) before performing any operation in this manual.

1.9 Potential Safety Hazards

The following potential safety hazards are associated with operating the system:

- Electrical (line voltage)
- Product (FPD510) weight

2 Installation

2.1 General

2.1.1 Upstream Pipe Lengths

The integral orifice element with flanged connections is supplied with suitable lengths of upstream and downstream pipe for installation.

The integral orifice element with threaded connections must have a length of straight unrestricted pipe on the upstream and downstream side of the element. The recommended minimum straight length on the upstream side of the element depends on the pipe diameter, orifice diameter, and the fitting at the end of the straight run. Minimum upstream lengths are shown in Table 2.1.

The recommended minimum length of downstream straight pipe run is 6 pipe diameters (6D) for all pipe fittings.

Pipe Size mm (inches)	Orifice Diameter mm (in.)	Tee or Elbow	Reducer or Expander	Valves or Regulators	2 Elbows on Different Planes
12.5 (1/2)	0.50 (0.020)	6D	8D	16D	14D
	0.88 (0.035)	7D	9D	19D	16D
	1.65 (0.065)				
	2.87 (0.113)				
	3.81 (0.150)	9D	10D	28D	22D
	4.97 (0.196)				
	6.85 (0.270)				
8.63 (0.340)					
25 (1)	3.81 (0.150)	6D	9D	18D	16D
	6.85 (0.270)	6D	8D	14D	12D
	0.50 (0.020)				
	0.88 (0.035)				
	1.65 (0.065)	6D	8D	18D	16D
	2.87 (0.113)				
	4.97 (0.196)				
	8.63 (0.340)	12D	12D	19D	22D
	12.70 (0.500)				
	15.54 (0.612)				
18.66 (0.735)					
40 (1 1/2)	12.70 (0.500)	6D	8D	18D	16D
	15.54 (0.612)	6D	8D	20D	17D
	19.05 (0.750)	7D	9D	24D	19D
	23.31 (0.918)	8D	10D	28D	22D
	28.62 (1.127)	13D	13D	36D	30D

Table 2.1 Minimum Upstream Straight Pipe Length Required for Various Flow Obstructions

D=

- 15.79 mm (0.622 in.) for 1/2 inch pipe size
- 26.64 mm (1.049 in.) for 1 inch pipe size
- 40.89 mm (1.61 in.) for 1 1/2 inch pipe size

2.1.2 Weight

Refer to Specification section on page 12.

2.1.3 Dimensions

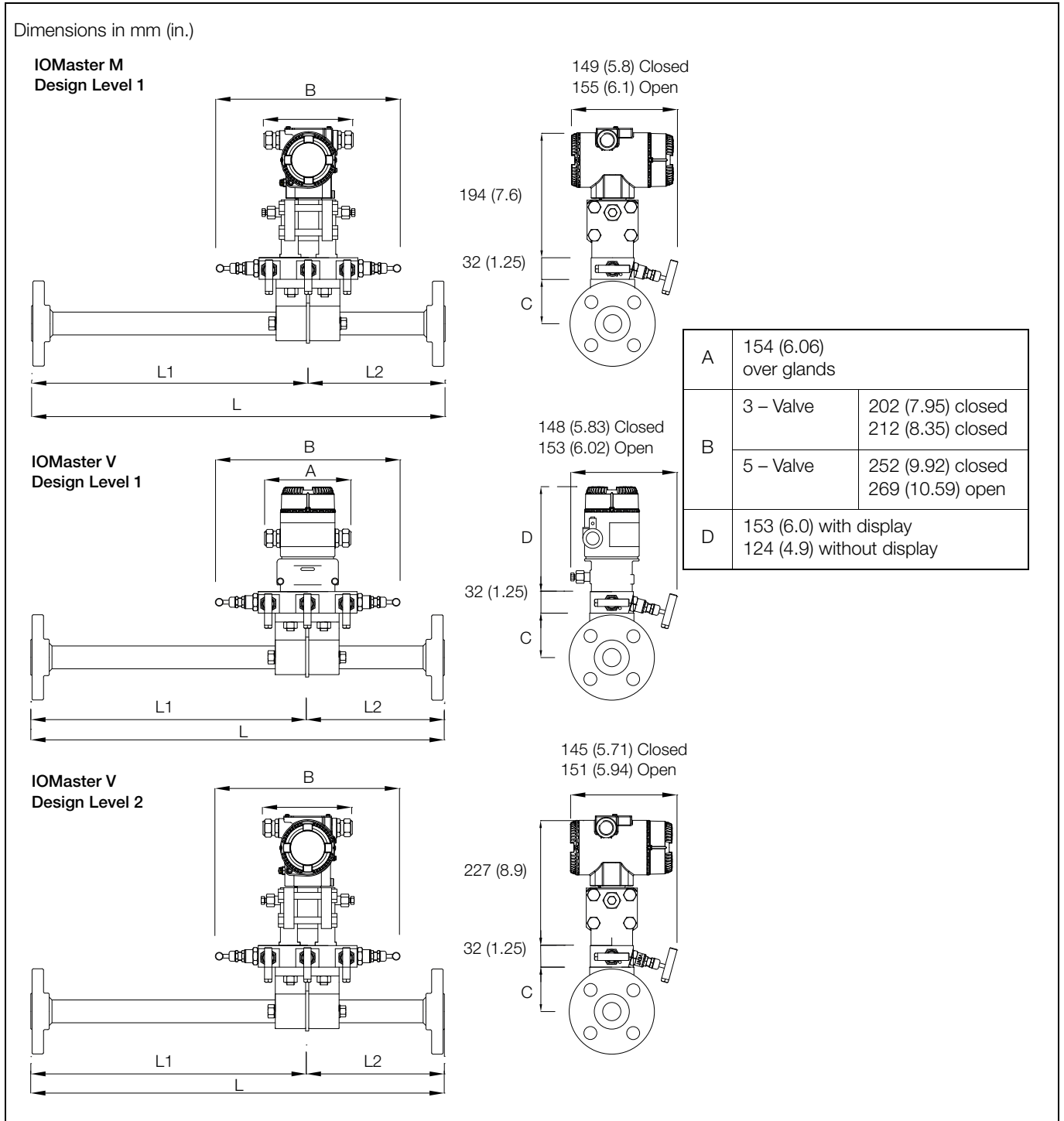


Fig. 2.1 FPD510 IOMaster Dimensions

Size	C	L	L1	L2
12.5 (1/2)	63.5 (2 1/2)	609.6 ± 4.8 (24 ± 3/16)	406.4 (16)	203.2 (8)
25 (1)	63.5 (2 1/2)	609.6 ± 4.8 (24 ± 3/16)	406.4 (16)	203.2 (8)
40 (1 1/2)	76.2 (3)	965.2 ± 4.8 (38 ± 3/16)	762 (30)	203.2 (8)

Table 2.2 Sizing Table – Dimensions in mm (in.)

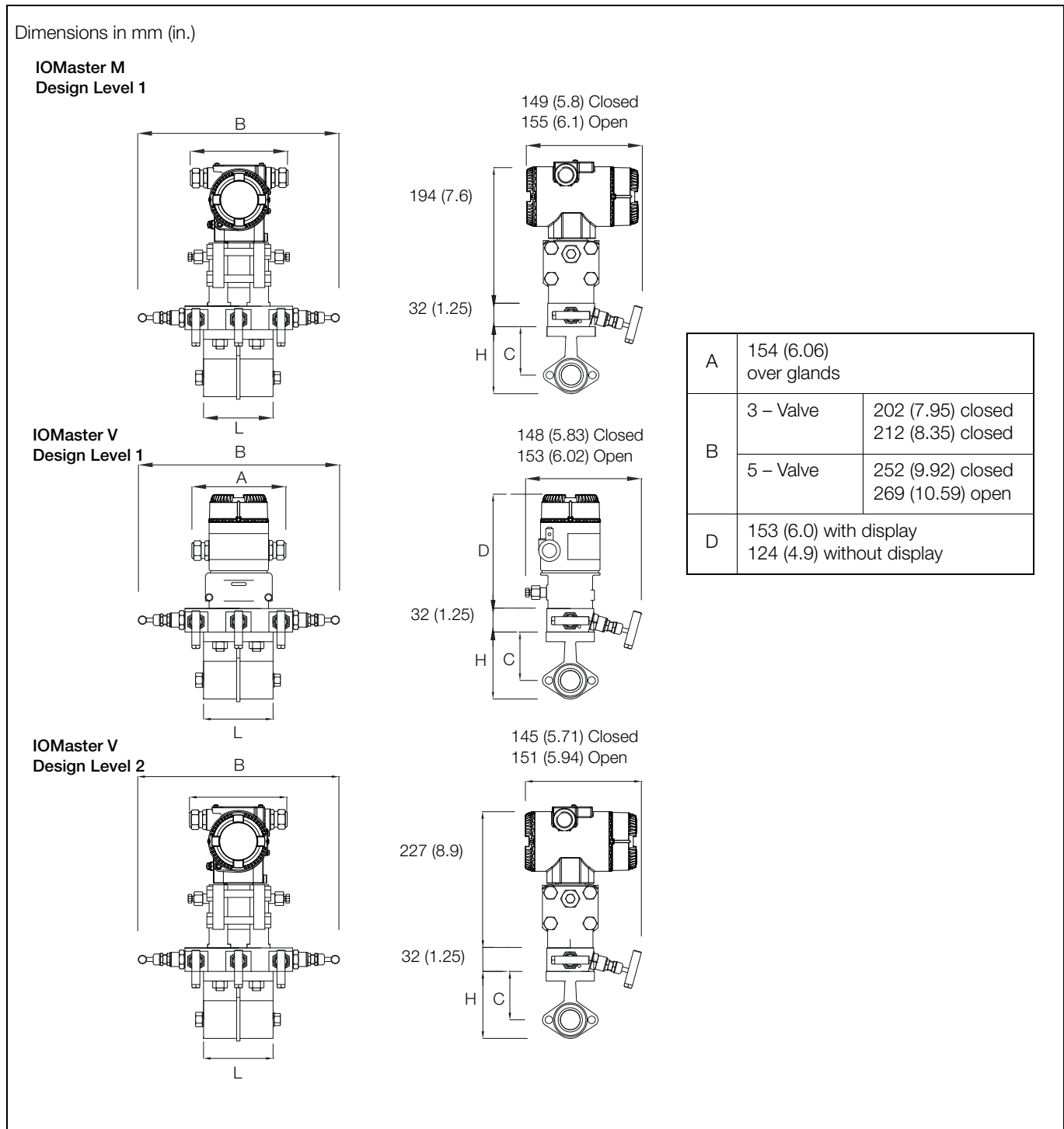


Fig. 2.2 FPD510 IOMaster Dimensions

Size	C	L	H
12.5 (1/2)	63.5 (2 1/2)	93.67 (3 11/16)	88.9 (3 1/2)
25 (1)	63.5 (2 1/2)	93.67 (3 11/16)	88.9 (3 1/2)
40 (1 1/2)	76.2 (3)	103.19 (4 1/16)	109.54 (4 5/16)

Table 2.3 Sizing Table – Dimensions in mm (in.)

2.2 Meter Orientation

Caution. When installing IOMaster, ensure that the drain/vent valves are positioned to direct the process medium away from personnel and equipment when it is removed during drain and vent operations.

For all meter orientations, ensure the arrow on the meter body is aligned correctly with the direction of flow in the pipeline.

2.2.1 Horizontal Pipe Mounting – Gas Applications

To ensure that condensate drains back into the pipe, mount the meter **above** the pipe, at least 45 degrees above the horizontal – see Fig. 2.3.

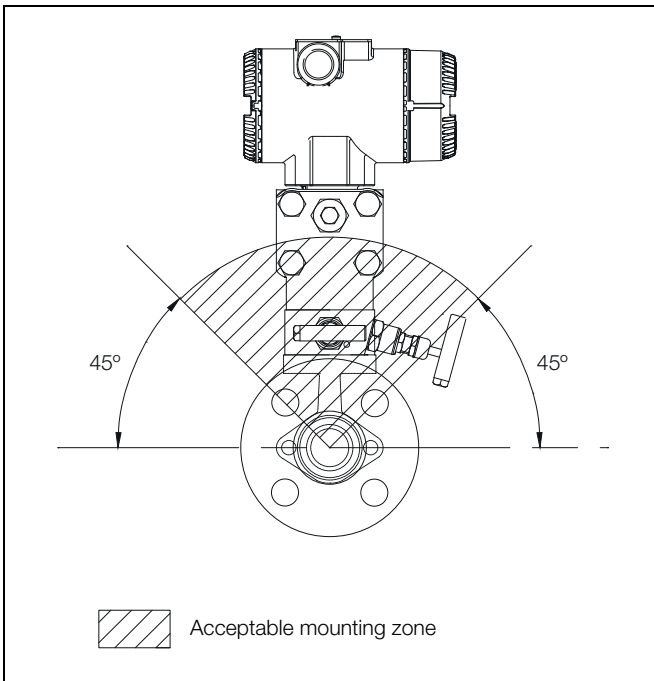


Fig. 2.3 Horizontal Pipe Mounting – Gas Applications

2.2.2 Horizontal Pipe Mounting – Liquid & Steam Applications

To ensure that gases vent back into the pipe, mount the meter **below** the pipe, at least 45 degrees below the horizontal – see Fig. 2.4.

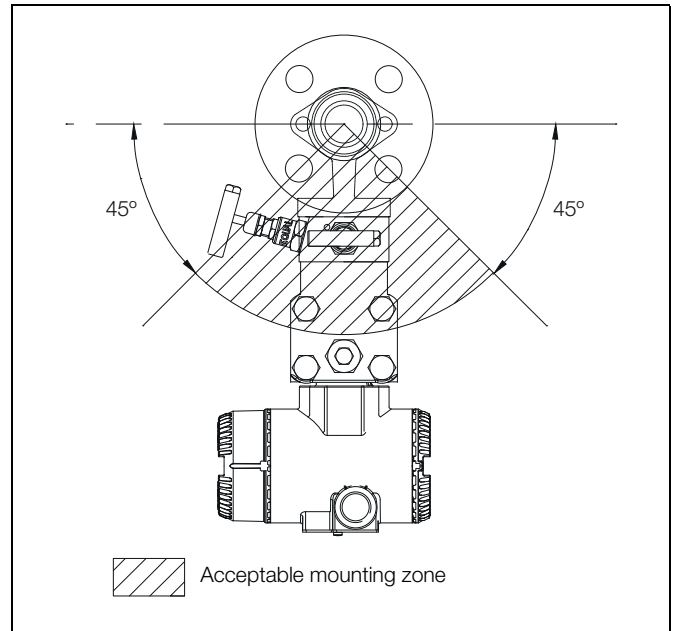


Fig. 2.4 Horizontal Pipe Mounting – Liquid & Steam applications

**2.2.3 Vertical Pipe Mounting – Liquid & Gas Applications
(Upward Flow)**

Install the meter as shown in Fig. 2.5.

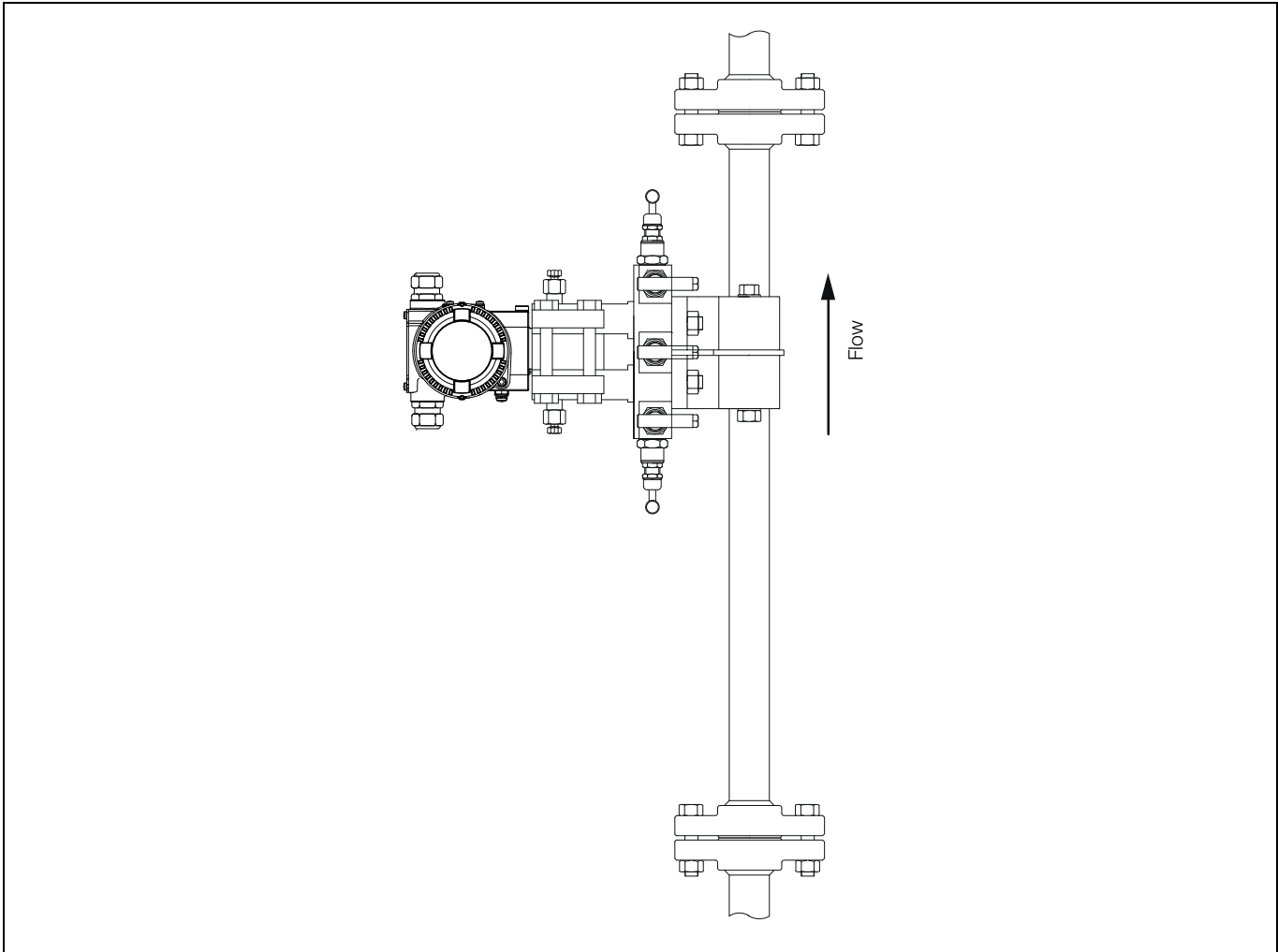


Fig. 2.5 Vertical Pipe Mounting – Liquid and Gas Applications (Upward Flow)

2.3 Mechanical Installation

Note. Before installation, read Section 1.4, page 3 General Safety Information.

Caution. Neither the transmitter nor the valve handles are designed to support the weight of the meter. Do not lift the meter by the valve handles or transmitter. Lift only by the main body of the meter.

2.3.1 Installation of Threaded Connection Version

1. Remove all packaging/ protection caps and check that the meter is clean and free of any damage or debris.
2. Check the Tag number of the meter to ensure it is the correct unit for the location.
3. Position the meter in the pipeline ensuring that the flow enters from the side stamped INLET (upstream) on the orifice plate and it is orientated as detailed in Section 1.6, page 3.
4. Install using suitable pipe work for the pressure and temperature of the process into the both sides of the meter. These should use the correct type of thread and be sealed using a suitable sealant and tightened correctly for the thread type.

2.3.2 Installation of Flanged Connection Version

1. Remove all packaging/ protection caps and check that the meter is clean and free of any damage or debris.
2. Check the Tag number of the meter to ensure it is the correct unit for the location and the flange rating is the same as the mating flanges.
3. When mounting the meter, be sure to position it so that the flow enters from the side stamped INLET (Upstream) on the orifice plate and it is orientated as detailed in Section 1.6, page 3.
4. Position the meter in-between the mating flanges and fit sufficient bolts into the lower part of the flanges to retain the meter in place.
5. Place the correct gaskets in-between the flanges on both sides of the meter and align them to ensure they do not protrude into the pipe bore.
6. Fit the remainder of the bolts and evenly tighten all of the bolts hand-tight.
7. Determine the maximum tightening torque according to the relevant flange specifications.
8. Tighten each bolt to the correct torque in a diagonally opposing pattern, first to 30% of the maximum torque, then to 60% and finally to the maximum torque.

2.4 Remote RTD Installation

When the optional ABB Remote RTD assembly (or any other RTD Assembly) is used, weld a mounting boss to the pipeline at a location 6 diameters down stream of the centreline of the orifice plate – see Fig. 2.6.

Drill and tap the boss to accommodate the RTD assembly (typically $\frac{3}{4}$ in. NPT for the ABB remote RTD assembly) – see Fig. 2.6.

Alternative RTD assemblies may be used and installation method modified to suit, but the 6 diameter downstream separation distance between the RTD and orifice plate must be maintained.

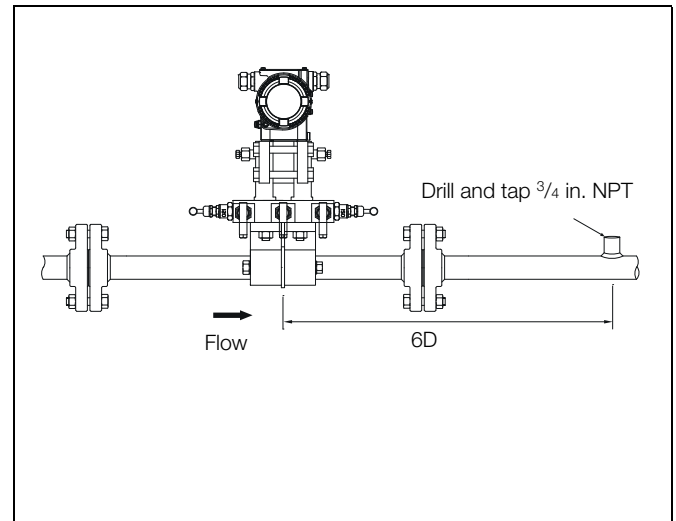


Fig. 2.6 Remote RTD installation

3 Configuration

Note. If the meter has been supplied pre-configured by ABB, do not change parameter settings as this will cause erroneous meter readings.

To configure the IOMaster, refer to the transmitter Operating Instructions (Transmitter operating manuals IM/364 Rev. 2 [V Design Level 1] SOI-266-XC-D-05-2011 [V Design Level 2] IM/267C/269C Rev. A [M Design Level 1]).

4 Commissioning

4.1 Gas and Liquid Service

Caution. During the following procedure, wear Personal Protection Equipment appropriate for the process.

1. Install IOMaster as described in Section 2.3, page 9:
 - for horizontal pipe mounting – gas, refer to Fig. 2.3.
 - for horizontal pipe mounting – liquid, refer to Fig. 2.4.
 - for vertical pipe mounting – liquid or gas, refer to Fig. 2.5.
2. Ensure the pipeline is full.
3. Gradually bring the pipeline up to normal operating pressure, checking for any leaks in the system. If leaks are detected, de-pressurize the pipeline and repair as necessary observing all local health and safety and environmental requirements.
4. When the system is at normal operating pressure and flow established, bleed the IOMaster impulse lines using the drain/vent valves. Collect and dispose of any bleed liquids in accordance with the local environmental regulations.

Caution. Ensure the drain/vent valves are positioned so that process fluid is directed down and away from personnel when it is removed during the drain/vent operation.

The differential pressure transmitter is normally supplied zeroed at atmospheric conditions (unless otherwise specified). To ensure correct operation, it must be zeroed at the normal operating pressure of the process.

To zero the transmitter:

1. Ensure the pipeline is at the normal operating pressure and that the transmitter power supply is on.
2. Close the high pressure (HP) and low pressure (LP) isolation valves.
3. Open the equalization valve. The transmitter should now indicate a value close to zero.
4. Zero the differential pressure transmitter – refer to the transmitter's Operating Instructions (Transmitter operating manuals IM/364 Rev. 2 [V Design Level 1] SOI-266-XC-D-05-2011 [V Design Level 2] IM/267C/269C Rev. A [M Design Level 1]).
5. Open the HP and LP isolation valves.
6. Close the equalization valve. The transmitter should now indicate flow. For information on fault diagnosis, refer to Section 5.1, page 11.

4.2 Steam Service

Note. Fill the impulse lines with water or condensate to ensure correct operation and to protect the transmitter from excessive temperatures.

1. Referring to Fig. 2.4, install IOMaster as described in Section 2.3, page 9.
2. Ensure the process pipeline is empty and de-pressurized.
3. Connect a suitable water supply to the pipeline.
4. Open the drain/vent valves.

Caution. Ensure the drain/vent valves are positioned to direct process fluid down and away from personnel when they are opened during the drain/vent operation.

5. Open the HP and LP isolation valves and allow water to flow **slowly** into the impulse lines until an air-free flow is obtained from the drain/vent valves, indicating that the impulse lines are full.
6. Close the HP and LP isolation valves.
7. Close the drain/vent valves and disconnect the water supply.
8. Gradually bring the pipeline up to normal operating pressure, checking for any leaks in the system. If leaks are detected, de-pressurize the pipeline and repair as necessary observing all local health and safety and environmental requirements.

The differential pressure transmitter is normally supplied zeroed at atmospheric conditions (unless otherwise specified). To ensure correct operation, it must be zeroed at the normal operating pressure of the process.

To zero the transmitter:

1. Ensure the pipeline is at the normal operating pressure and that the transmitter power supply is on.
2. Close the HP and LP isolation valves.
3. Open the manifold equalization valve. The transmitter should now indicate a value close to zero.
4. Zero the differential pressure transmitter – refer to the transmitter's Operating Instructions (Transmitter operating manuals IM/364 Rev. 2 [V Design Level 1] SOI-266-XC-D-05-2011 [V Design Level 2] IM/267C/269C Rev. A [M Design Level 1]).
5. Open the HP and LP isolation valves.
6. Close the equalization valve. The transmitter should now indicate flow. For information on fault diagnosis, refer to Section 5.1, page 11.

5 Operation and Maintenance

5.1 Troubleshooting

Refer to the differential pressure transmitter's Operating Instructions (IM/267C/269C, IM/364 and SOI-266-XC-D) for procedures to be followed when error messages are shown on the transmitter display.

For other suspected problems, complete the following checks to ensure correct installation.

Direction of flow	Ensure the flow direction is in accordance with the arrow on the meter. If not, remove and reinstall the meter correctly.
Mounting orientation	Ensure the meter is correctly oriented to the pipework with regard to flow direction, pipeline and nature of the fluid. Incorrect orientation can lead to metering errors and in some cases may damage the meter.
Zeroing of the transmitter	Zero the differential pressure transmitter during installation and commissioning – see Section 4, page 10.
Manifold valves	The meter is either fitted with 3 or 5 valves. All valves are labelled with either Isolate, vent or equalise. During measurement, ensure all isolate valves are fully open and the Vent and Equalise valves are fully closed.
Setup/configuration of the meter	Ensure the 4 to 20 mA output of the meter is correctly set and that any receiving equipment is configured for the same flowrate range. Refer to the differential pressure transmitter's Operating Instructions (IM/267C/269C, IM/364 and SOI-266-XC-D) for information on how to check the loaded configuration.

Table 5.1 Troubleshooting Checks

5.2 Dismantling / Removing the Meter from the Line

Caution. Neither the transmitter nor the valve handles are designed to support the weight of the meter. Do not lift the meter by the valve handles or transmitter. Lift only by the main body of the meter.

Always observe the plant safety regulations. Before beginning work, ensure pipework is depressurized and empty.

5.2.1 Threaded Connection

- Unscrew pipework from threaded connection and remove from the line.

5.2.2 Flanged Connection

1. Loosen the flange securing bolts and/or nuts and partially separate the flanges

2. Remove the bolts to enable the meter, together with the gaskets to be lifted clear, ensuring that no part of the meter is damaged.

1. Loosen the flange securing bolts and/or nuts and partially separate the flanges
2. Remove the bolts to enable the meter, together with the gaskets to be lifted clear, ensuring that no part of the meter is damaged.

5.3 Examination

Note.

- The frequency of examination depends upon the abrasive or corrosive nature of the process fluid, for example:
 - Steam – annually
 - Clean fluid – every 2 or 3 years.
- In the case of a new process or plant, examine the meter during each routine maintenance period until the wear of each installation, relative to others, can be assessed.

Examine the meter in accordance with the instructions in Section 2.3, page 9.

5.4 Reassembly

Reassemble the meter in accordance with the instructions in Section 2.3, page 9.

5.5 Remotely Mounted RTD Replacement

To replace the RTD:

1. Ensure the transmitter is powered-down.
2. Remove the transmitter termination cover.
3. Disconnect the RTD wiring from the terminals and remove it from the cable entry.
4. Unscrew the RTD assembly from the thermowell. **DO NOT** remove the thermowell from the pipeline.

Caution. If there is **any** suspicion that process pressure has penetrated the thermowell, *completely depressurize the pipeline before removing the RTD assembly*. Additional precautions relating to the nature of the process fluid may also be required.

5. Screw the replacement RTD assembly into the thermowell.
6. Route the RTD wiring through the cable entry and reconnect to the appropriate terminals – refer to the transmitter Operating Instructions (IM/267C/269C).
7. Power-up the transmitter.

6 Specification – General

Fluids

Liquids, gases and saturated steam

Line sizes

15, 25 and 40 mm (1/2, 1 and 1 1/2 in.)

Output signal

- Two-wire, 4 to 20 mA, selected for square-root output
- Low flow cut-off facility
- HART® communication provides digital process variable (% , mA or engineering units) superimposed on 4 to 20 mA signal, with protocol based on Bell202 FSK standard
- Optional Profibus PA, Foundation Fieldbus or Modbus communications

Accuracy

Calibrated

IOMaster V Beta:

<0.1	2.65 %
0.1 ... 0.2	1.6 %
0.2 ... 0.6	1.25 %
0.6 ... 0.8	1.8 %

IOMaster M Beta:

<0.1	2.7 %
0.1 ... 0.2	1.8 %
0.2 ... 0.6	1.5 %
0.6 ... 0.8	2.0 %

Repeatability

±0.2%

Pressure rating

Threaded

1/2 in. and 1 in. NPT:

- 20684 kPa at 149 °C (3000 psig at 300 °F)

1 1/2 in. NPT:

- 10 500 kPa at 149 °C (1500 psig at 300 °F)

Flanged

1/2 in., 1 in. and 1 1/2 in.:

- as flange rating

Temperature rating

149 °C (300 °F) max

7 Specification – Physical

Construction materials

Body

316 stainless steel

Orifice plate

316 stainless steel; Hastelloy-C1

Sealing gasket

Silicate ceramic filled TFE

Orifice bores

1/2 in.

0.020, 0.035, 0.065, 0.113, 0.150, 0.196, 0.270, 0.340 in.

1 in.

0.020, 0.035, 0.065, 0.113, 0.150, 0.196, 0.270, 0.340, 0.500,
0.612, 0.735 in.

1 1/2 in.

0.500, 0.612, 0.750, 0.918, 1.127 in.

Pipe schedule (where pipework selected)

40, 80

Manifold

Integral 3-valve manifold (optional 5-valve manifold)

Material certification

Construction materials 316 SST with 316 SST orifice plate or with 316 SST and Hastelloy C orifice plate conform to NACE Standard MR-0175-88.

Conformance is on process wetted materials only and does not include bolting.

DS/FPD510-EN

Weights

Size in mm (in.)	Flange rating	Weight in kg (lb)
15 (1/2)	No flange/pipework	9 (19.8)
	ANSI 150 schedule 40	10.5 (23.1)
	ANSI 150 schedule 80	11 (24.3)
	ANSI 300 schedule 40	10.5 (23.1)
	ANSI 300 schedule 80	11 (24.3)
	NP16 schedule 40	10.5 (23.1)
	NP16 schedule 80	10.5 (23.1)
	NP40 schedule 40	10.5 (23.1)
	NP40 schedule 80	11 (24.3)
25 (1)	No flange/pipework	9 (19.8)
	ANSI 150 schedule 40	11.5 (25.4)
	ANSI 150 schedule 80	12 (26.5)
	ANSI 300 schedule 40	12.5 (27.6)
	ANSI 300 schedule 80	13 (28.7)
	NP16 schedule 40	12 (26.5)
	NP16 schedule 80	12.5 (27.6)
	NP40 schedule 40	12 (26.5)
	NP40 schedule 80	12.5 (27.6)
40 (1 1/2)	No flange/pipework	9 (19.8)
	ANSI 150 schedule 40	15 (33.1)
	ANSI 150 schedule 80	16 (35.3)
	ANSI 300 schedule 40	16 (35.3)
	ANSI 300 schedule 80	17.5 (38.6)
	NP16 schedule 40	15 (33.1)
	NP16 schedule 80	16.5 (36.4)
	NP40 schedule 40	15.5 (34.2)
	NP40 schedule 80	16.5 (36.4)

DP span

Sensor code	Upper range limit (URL)	Minimum span
A	1 kPa	0.05 kPa
	10 mbar	0.5 mbar
	4 in. H ₂ O	0.2 in. H ₂ O
B	4 kPa	0.2 kPa
	40 mbar	1.4 mbar
	16 in. H ₂ O	0.56 in. H ₂ O
C	6 kPa	0.2 kPa
	60 mbar	2 mbar
	24 in. H ₂ O	0.8 in. H ₂ O
E	16 kPa	0.54 kPa
	160 mbar	1.6 mbar
	64 in. H ₂ O	0.65 in. H ₂ O
F	40 kPa	0.4 kPa
	400 mbar	4 mbar
G	160 in. H ₂ O	1.6 in. H ₂ O
	65 kPa	0.65 kPa
	650 mbar	6.5 mbar
H	260 in. H ₂ O	2.6 in. H ₂ O
	160 kPa	1.6 kPa
	1600 mbar	16 mbar
L	642 in. H ₂ O	6.4 in. H ₂ O
	250 kPa	2.5 kPa
	2500 mbar	25 mbar
	1000 in. H ₂ O	10 in. H ₂ O

Notes

Products and customer support

Automation Systems

For the following industries:

- Chemical & Pharmaceutical
- Food & Beverage
- Manufacturing
- Metals and Minerals
- Oil, Gas & Petrochemical
- Pulp and Paper

Drives and Motors

- AC and DC Drives, AC and DC Machines, AC Motors to 1kV
- Drive Systems
- Force Measurement
- Servo Drives

Controllers & Recorders

- Single and Multi-loop Controllers
- Circular Chart and Strip Chart Recorders
- Paperless Recorders
- Process Indicators

Flexible Automation

- Industrial Robots and Robot Systems

Flow Measurement

- Electromagnetic Flowmeters
- Mass Flowmeters
- Turbine Flowmeters
- Wedge Flow Elements

Marine Systems & Turbochargers

- Electrical Systems
- Marine Equipment
- Offshore Retrofit and Refurbishment

Process Analytics

- Process Gas Analysis
- Systems Integration

Transmitters

- Pressure
- Temperature
- Level
- Interface Modules

Valves, Actuators and Positioners

- Control Valves
- Actuators
- Positioners

Water, Gas & Industrial Analytics Instrumentation

- pH, Conductivity and Dissolved Oxygen Transmitters and Sensors
- Ammonia, Nitrate, Phosphate, Silica, Sodium, Chloride, Fluoride, Dissolved Oxygen and Hydrazine Analyzers
- Zirconia Oxygen Analyzers, Katharometers, Hydrogen Purity and Purge-gas Monitors, Thermal Conductivity

Customer support

We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

UK

ABB Limited
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

USA

ABB Inc.
Tel: +1 215 674 6000
Fax: +1 215 674 7183

Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification. Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:

- A listing evidencing process operation and alarm logs at time of failure.
- Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

Contact us

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Note

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