

StackFlowMaster FPD580 TORBAR probe Stack gas metering systems

Measurement made easy



Introduction

This publication provides commissioning instructions for the StackFlowMaster TORBAR sensor. The sensor is used in conjunction with an ABB differential pressure transmitter type 267CS and an ABB manual interface unit (type A) or an ABB automatic interface unit (type B, C or D).

For more information

Further publications for the StackFlowMaster stack gas monitoring systems are available for free download from www.abb.com (see links and reference numbers below) or by scanning this code:



search for or click on:

StackFlowMaster FPD581, FPD583 and FPD585 Operating instructions	OI/FPD580-EN
StackFlowMaster FPD580 transmitter and interface unit A Commissioning instructions	CI/FPD580/B-EN
StackFlowMaster FPD580 transmitter and interface unit B / C / D Commissioning instructions	CI/FPD580/C-EN
2600T Series Pressure Transmitters Operating instructions	IM/267C/269C

Health & 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.

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.

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.














Safety standards

This product has been designed to satisfy the requirements of IEC61010-1:2010 3rd edition '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.

Symbols

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 indicates the need for protective eye wear.
	This symbol indicates the need for protective hand wear.
	Recycle separately from general waste under the WEEE directive.

Manual handling

Caution. Take care when unpacking and installing a StackFlowMaster – use appropriate manual handling techniques.

- The TORBAR probe measures up to 10 m (32.8 ft.) in length; the weight varies with length.

Product recycling and disposal (Europe only)



Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August 2005. To conform to European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

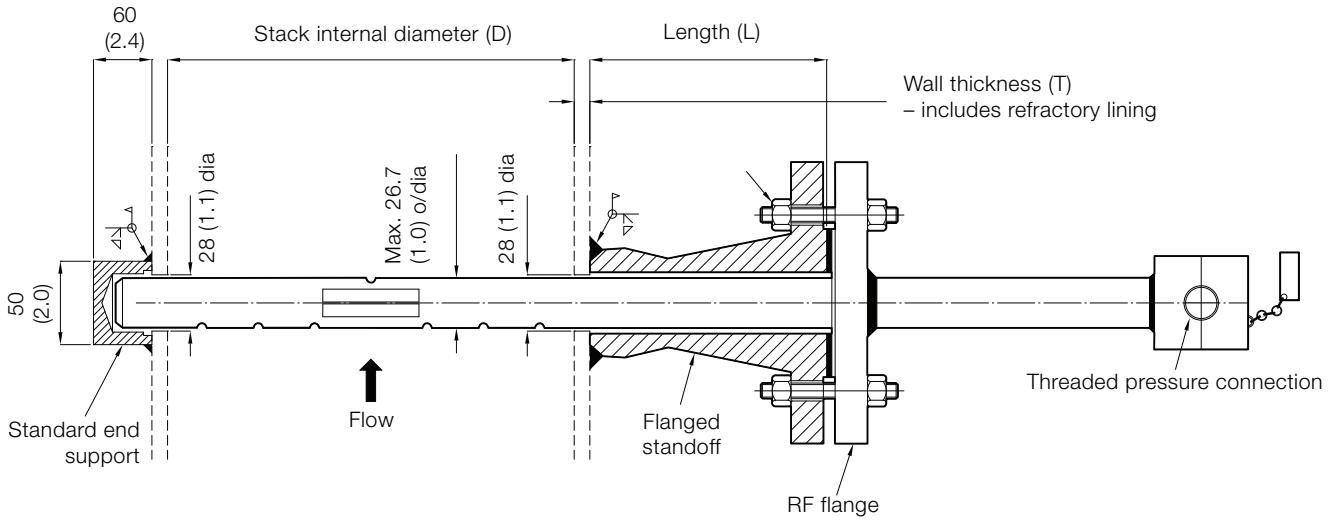
ABB is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible.

Note. For return for recycling, contact the equipment manufacturer or supplier for instructions on how to return end-of-life equipment for proper disposal.

1 Dimensions

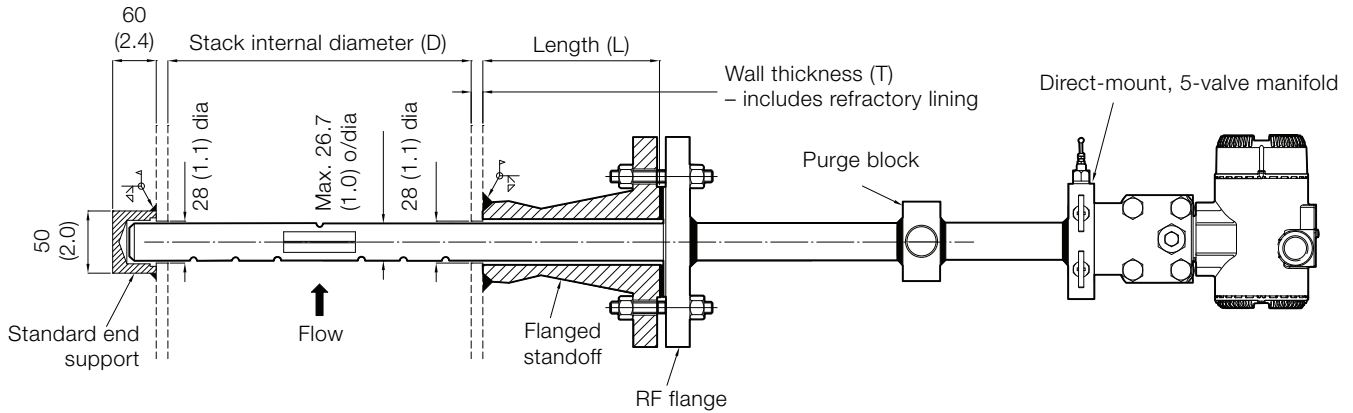
Probe – 25 mm (1.0 in.) diameter with weldcup end support (for remote transmitter)

Dimensions in mm (in.)



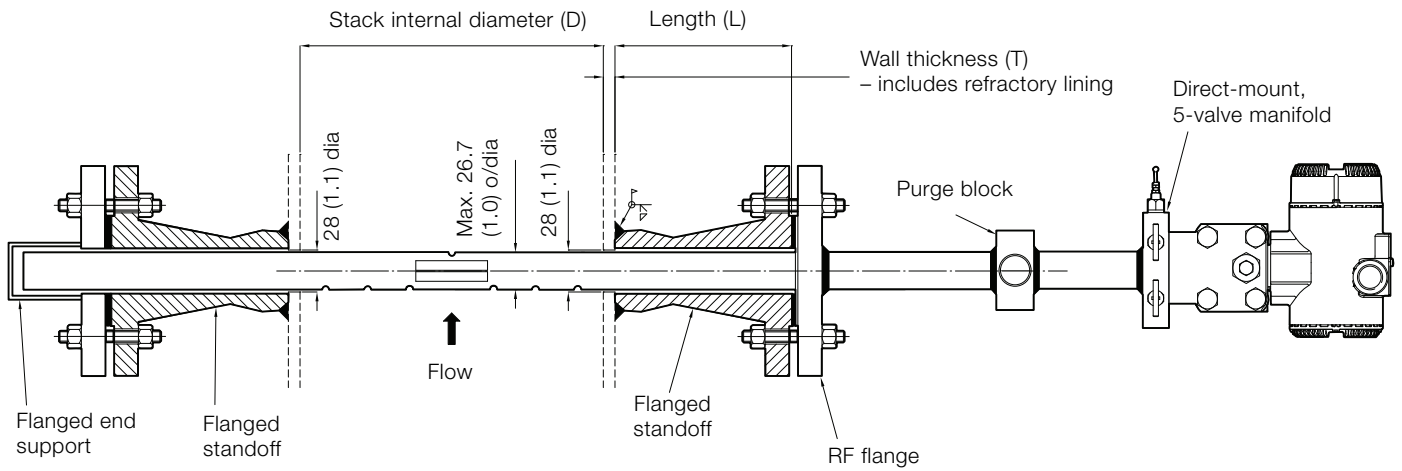
Probe – 25 mm (1.0 in.) diameter with weldcup end support (with integral transmitter)

Dimensions in mm (in.)



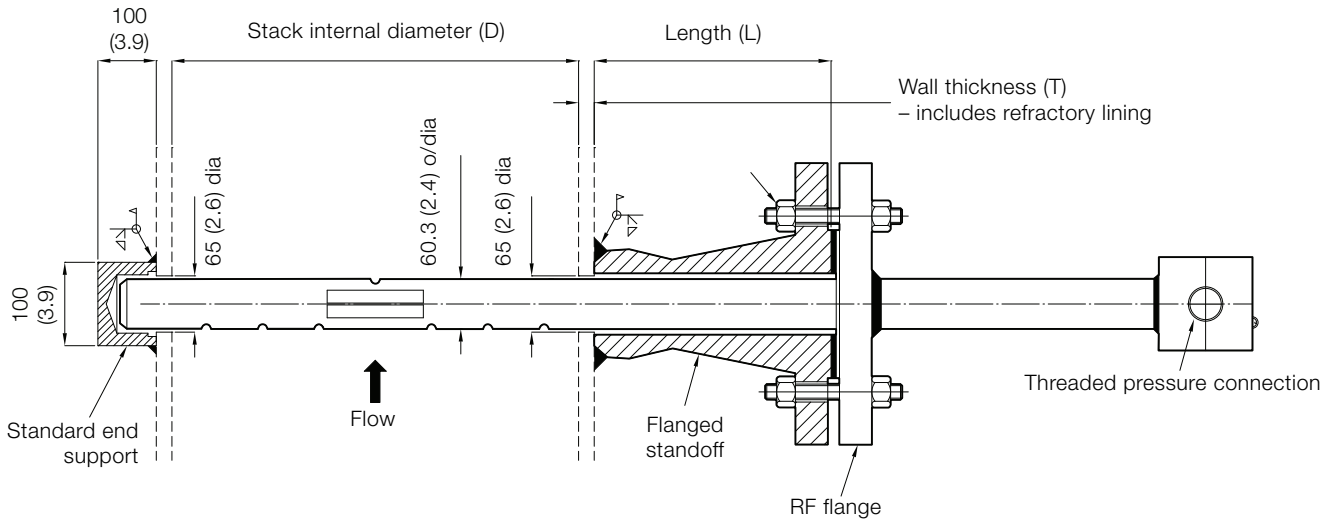
Probe – 25 mm (1.0 in.) diameter with flanged end support (with integral transmitter)

Dimensions in mm (in.)



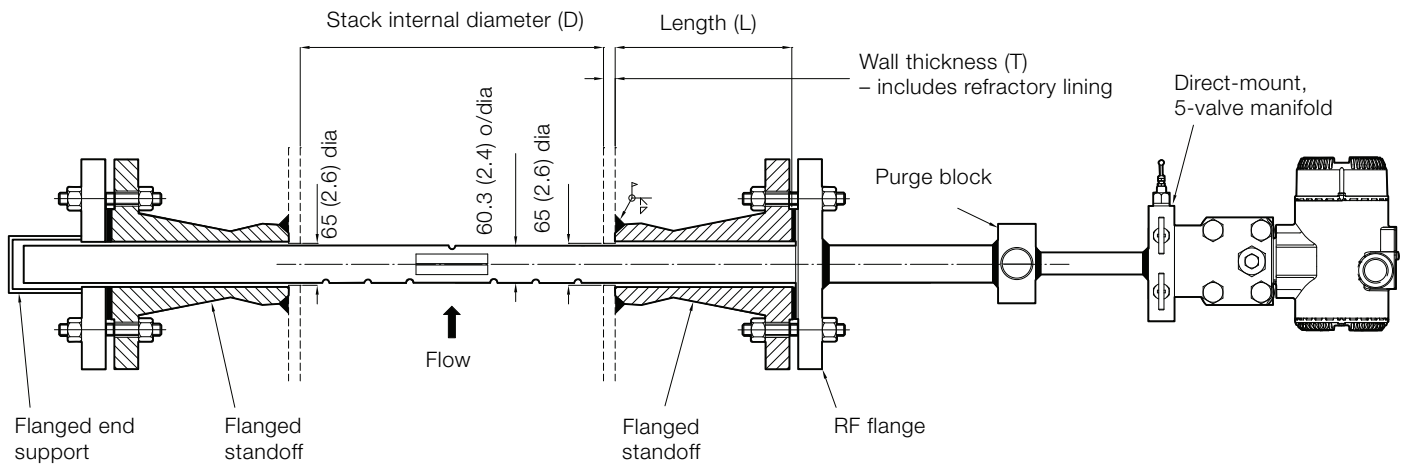
Probe – 60 mm (2.4 in.) diameter with weldcup end support (for remote transmitter)

Dimensions in mm (in.)



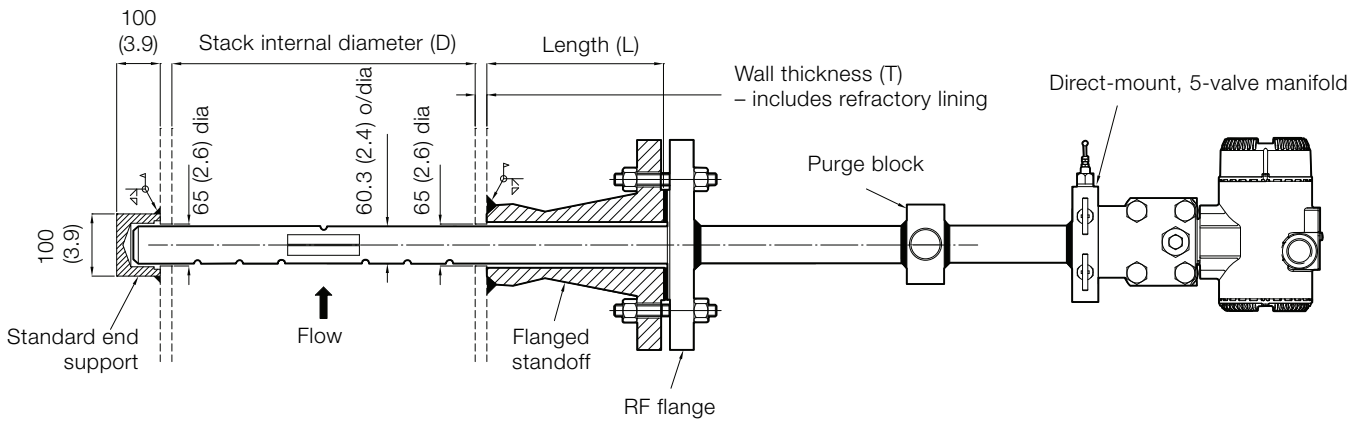
Probe – 60 mm (2.4 in.) diameter with flanged end support (for integral transmitter)

Dimensions in mm (in.)



Probe – 60 mm (2.4 in.) diameter with weldcup end support (with integral transmitter)

Dimensions in mm (in.)



2 Installation requirements

Select a location with sufficient access and clearance to install and remove TORBAR (refer to a relevant standard – for example, EN15259).

Referring to Fig. 1, install TORBAR:

- at right angles to the stack wall
- across the stack diameter
- aligned with the stack axis
- Where an end support is used, ensure both installation points are in line and 180° from each other – use laser measurement whenever possible

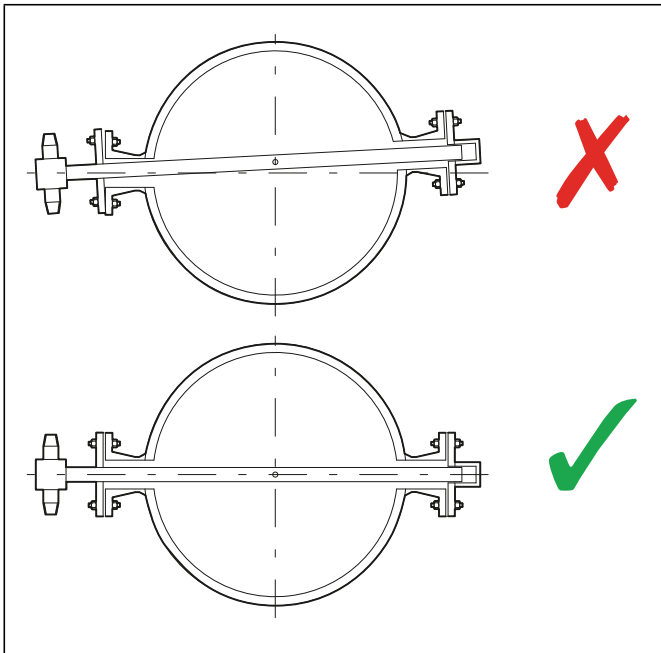


Fig. 1 TORBAR alignment (viewed from above)

To ensure an equal head of gas in both impulse pipes, the TORBAR probe is designed so that the impulse pipes are in the horizontal plane when the TORBAR is installed.

The direction of flow is indicated by a flow arrow on the integral manifold or head.

Do not install TORBAR where it would be susceptible to vibration. Vibration distorts the output signal and effects the structural limits of the TORBAR.

3 Flanged pipe fitting (stand-off) installation

Install the flanged pipe fitting (stand-off) as follows:

1. Select the required insertion position and mark the stack.

Warning. Before drilling into the stack, reduce the stack pressure to a safe level and remove all hazardous material

2. Drill a 6 mm (0.24 in) pilot hole at the marked position, then drill to the appropriate size – see Table below:

Probe type	Probe design	Min. hole size in mm (in.)
F3, F4, F5	No bayonet fitting (TP3)	28 (1.1)
F5	Bayonet fitting (TP3)	51 (2.0)
G3, G5	No two-piece construction (TP2) or bayonet fitting (TP3)	65 (2.6)
G5	Two-piece construction (TP2) and / or bayonet fitting (TP3)	92 (3.6)

Hole size

3. Referring to Fig. 2:
 - a. Place the flanged pipe fitting (stand-off) (A) centrally over the drilled hole and align it correctly to the axis of the stack (angle X) according to the number of bolt holes in the flange. Ensure it is perpendicular to the stack axis and square to the stack plane.
 - b. Use suitable spacers (B) to raise the flanged pipe fitting (stand-off) off the stack to establish the necessary gap for full-penetration welding.
 - c. Tack-weld at four points (C) midway between the crotch and the skirt sections of the fitting.
 - d. Using a suitable piece of pipe, ensure the flanged pipe fitting (stand-off) is correctly aligned with the stack (see Fig. 1, page 4) and concentric with the hole.
 - e. Remove the spacers (B).
 - f. Apply a full penetration root run completely around the base of the flanged pipe fitting (stand-off) at the clearly-defined weld preparation line (D).
 - g. Make reinforcing welds at the crotch bevelled areas (E) of the flanged pipe fitting (stand-off) to provide maximum weld at the crotch tapering to a minimum at the skirt (F).

Caution. Weld only the bevelled portion of the flanged pipe fitting (stand-off) to prevent the integrity of the weld being compromised by any notch effect.

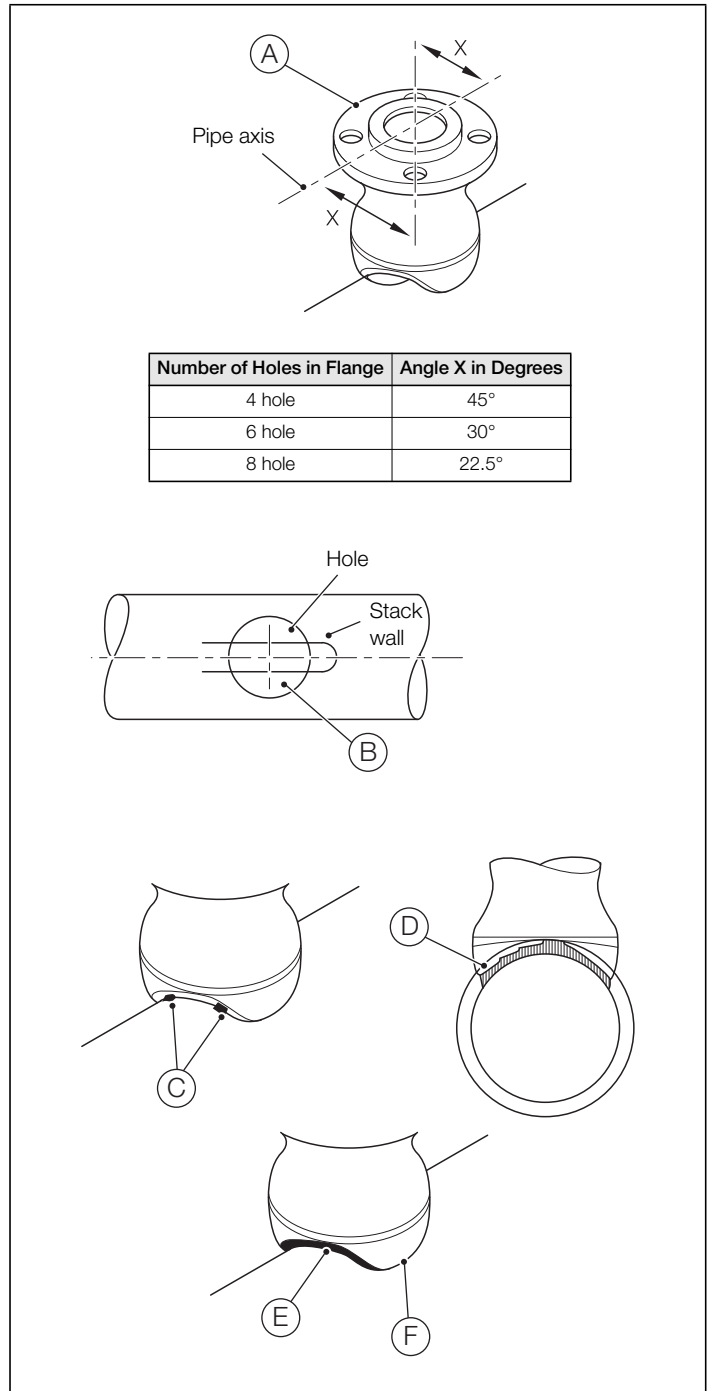


Fig. 2 Flanged pipe fitting (stand-off) installation

4. For F5 and G5 probe types, measure 180° around the stack to locate the installation point of the end support stand-off. Repeat steps 2 and 3.

4

Installing the TORBAR

Probe type F3 / G3 – flanged process connection without end support

Install the TORBAR as follows:

1. Install the flanged pipe fitting (stand-off) – see Section ②, page 7.
2. Position the gasket onto the TORBAR flange and carefully insert the TORBAR through the flanged pipe fitting (stand-off) until the two flanges mate squarely.
3. Turn the TORBAR until the flow arrow is positioned correctly.
4. Fit the flange securing bolts and tighten equally and evenly, observing correct procedures appropriate to the flange.
5. Check the TORBAR is installed correctly and aligned.

Probe type F4 – flanged process connection with end support

Install the TORBAR as follows:

1. Install the flanged pipe fitting (stand-off) – see Section ②, page 7.
2. Measure exactly 180° around the stack circumference and mark the stack.
3. Drill a 6 mm (0.24 in) pilot hole at the marked position, then drill to 33 mm (1.3 in.).
4. Insert the TORBAR through the flanged pipe fitting (stand-off) into the stack and check that the tip protrudes through the hole in the opposite stack wall when the two flanges mate squarely.
5. Position the end-support cup over the tip of the TORBAR, ensuring the tip is concentric with the hole and tack-weld the end-support cup in place.
6. Remove the TORBAR and complete the support cup full-penetration weld.
7. Position the gasket on the TORBAR flange and carefully insert the TORBAR through the flanged pipe fitting (stand-off) until the two flanges mate squarely, ensuring the tip of the TORBAR enters the end-support cup.
8. Turn the TORBAR until the flow arrow is positioned correctly.
9. Fit the flange securing bolts and tighten equally and evenly, observing correct procedures appropriate to the flange.
10. Check the TORBAR is installed correctly and aligned.

Probe type F5 / G5 – flanged process connection with flanged end support fitting

Install the TORBAR as follows:

1. Install the flanged pipe fitting (stand-off) – see Section ②, page 7.
2. Insert the TORBAR through the flanged pipe fitting (stand-off) into the stack and check that the tip protrudes through the hole in the opposite stack wall when the two flanges mate squarely.
3. Position the flanged pipe fitting (stand-off) over the tip of the TORBAR, ensuring the tip enters, and is concentric with, the end support stub.
4. Remove the TORBAR.
5. Position the gasket on the TORBAR flange and carefully insert the TORBAR through the flanged pipe fitting (stand-off) until the two flanges mate squarely, ensuring the tip of the TORBAR protrudes from the opposite flanged pipe fitting (stand-off).
6. Turn the TORBAR until the flow arrow is positioned correctly.
7. Fit the flange securing bolts and tighten equally and evenly, observing correct procedures appropriate to the flange.
8. Check the TORBAR is installed correctly and aligned.
9. Position a gasket on the flanged end support fitting, ensuring the integral support cup faces the tip of the TORBAR.
10. Fit the flanged end support fitting to the flanged pipe fitting (stand-off), ensuring the tip of the TORBAR enters the external support cup.
11. Fit the flange securing bolts and tighten equally and evenly, observing correct procedures appropriate to the flange.

Probe type TP2 – 2-piece construction, assembly before installation

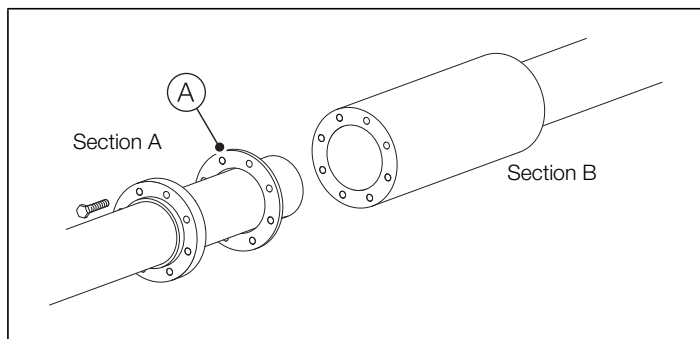


Fig. 3 2-piece probe assembly

Referring to Fig. 3:

1. Place the sealing gasket (A) over the extension sealing face on Section A.
2. Identify the upstream measurement holes on Section B and rotate Section A to align the upstream measurement holes of both sections.
3. Slide Section A onto Section B ensuring the hole alignment is maintained.
4. Insert and hand-tighten all connection screws.
5. Tighten the connection screws evenly to ensure effective gasket sealing.
6. Using suitable adhesive tape (for example, insulation tape that can be removed without leaving deposits) cover / block the upstream holes.
7. Connect a pneumatic pressure tester to the upstream fitting, apply a pressure of 20 mbar to the probe assembly and maintain for a minimum of 2 minutes. Ensuring the sealing tape remains in place, check the probe for leaks.

Note. Ensure all sealing tape is removed before installing the probe.

Probe type TP2 – 2-piece construction, assembly during installation

Referring to Fig. 3:

1. Place the sealing gasket (A) over the extension sealing face on Section A.

Note. During step 2, support Section A with a suitable brace to prevent it falling into the stack.

2. Partially insert Section A into the stack.
3. Identify the upstream measurement holes on Section B and rotate Section A to align the upstream measurement holes of both sections.
4. Slide Section A onto Section B ensuring the hole alignment is maintained.
5. Insert and hand-tighten all connection screws.
6. Tighten the connection screws evenly to ensure effective gasket sealing.
7. Insert the assembled TORBAR fully into the stack.

Probe type TP3 – bayonet fitting

Referring to Fig. 4, install the probe as follows:

1. Follow the installation steps in step 8 of *Probe type F5 / G5 – flanged process connection with flanged end support fitting*, on page 9.
2. Place the end support with bayonet fitting over the TORBAR.
3. Once past the locks, turn the end support anti-clockwise until the arrow is facing in the direction of the flow. It is imperative that the arrow is orientated correctly in order for the Bayonet fitting to work.
4. Fit the flange securing bolts and tighten equally and evenly, observing correct procedures appropriate to the flange.

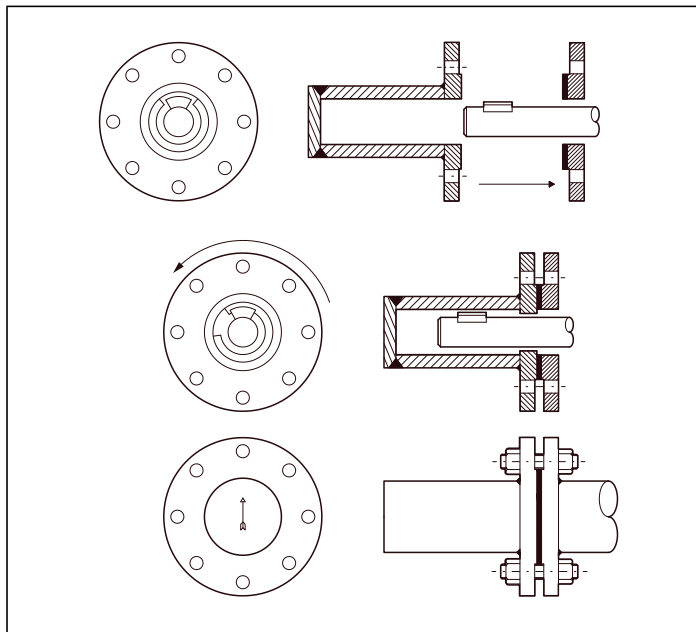


Fig. 4 Bayonet fitting installation details

Notes

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