

ATS430 turbidity sensor

Retractable insertion assembly



Measurement made easy

1 Introduction

This publication details installation procedures for the retractable insertion assembly that can be used with an ATS430 turbidity sensor. This accessory is used when the sensor is installed under pressure or when the user wants to calibrate the sensor without having to stop the process.

These procedures must be performed by suitably trained personnel and in accordance with the information given.

2 Tools / Items required

- Spanner suitable for 27 mm hex head nut
- Adjustable spanner suitable for fitted flanges
- Hook spanner (supplied)
- Padlock (customer-supplied)
- Flange to BS EN 1092-1, Type 01B, DN50, PN16, StSt 316L or similar (customer-supplied)
- Flange bolts: M16 x 50 (qty. 8) / M16 plain washer (qty. 8 – customer-supplied)
- O-ring spares kit ATS4000788
- Bearing / circlip / o-ring spares kit ATS4000796
- Gaskets (customer-supplied)
- Operating Instruction OI/ATS430E-EN and Operating Instruction OI/AWT440-EN
- Circlip pliers suitable for 30 mm circlip

3 Health & Safety

3.1 Document symbols

Symbols that appear in this document are explained below:



WARNING – Bodily injury

This symbol in conjunction with the signal word 'WARNING' indicates a potentially dangerous situation. Failure to observe this safety information may result in death or severe injury.



IMPORTANT (NOTE)

This symbol indicates operator tips, particularly useful information or important information about the product or its further uses. The signal word 'IMPORTANT (NOTE)' does not indicate a dangerous or harmful situation.

3.2 Safety precautions

Be sure to read, understand and follow the instructions contained within this document before and during use of the equipment. Failure to do so could result in bodily harm or damage to the equipment.



Warning – Bodily injury Installation, operation, maintenance and servicing must be performed:

- by suitably trained personnel only
- in accordance with the information provided in this manual
- in accordance with relevant local regulations.

3.3 Potential safety hazards

Retractable insertion assembly – high pressure

The installed assembly operates at high pressure.

Aztec ATS430 sensor – electrical

The sensor operates on 24 V DC.

There are no hazardous voltages present in the sensor.

3.4 Product symbols

Symbols that may appear on this product are shown below:



Current supply only.



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.



Recycle separately from general waste under the WEEE directive.

3.5 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.



IMPORTANT (NOTE) For return for recycling, please contact the equipment manufacturer or supplier for instructions on how to return end-of-life equipment for proper disposal.

3.6 Restriction of Hazardous Substances (RoHS)



The ABB Industrial Automation, Measurement & Analytics, UK, fully supports the objectives of the EU ROHS directive, 2011/65/EU. Electrical Electronic Equipment in scope and specifically not exempted, within class 9, industrial Monitoring and Control Equipment placed on the market after July 22nd 2017 will be compliant. For evidence of compliance please contact your ABB sales advisor.

4 Pre-installation requirements

4.1 Operating conditions

4.1.1 Environmental

Ambient temperature range: 0 to 55 °C (32 to 131 °F).

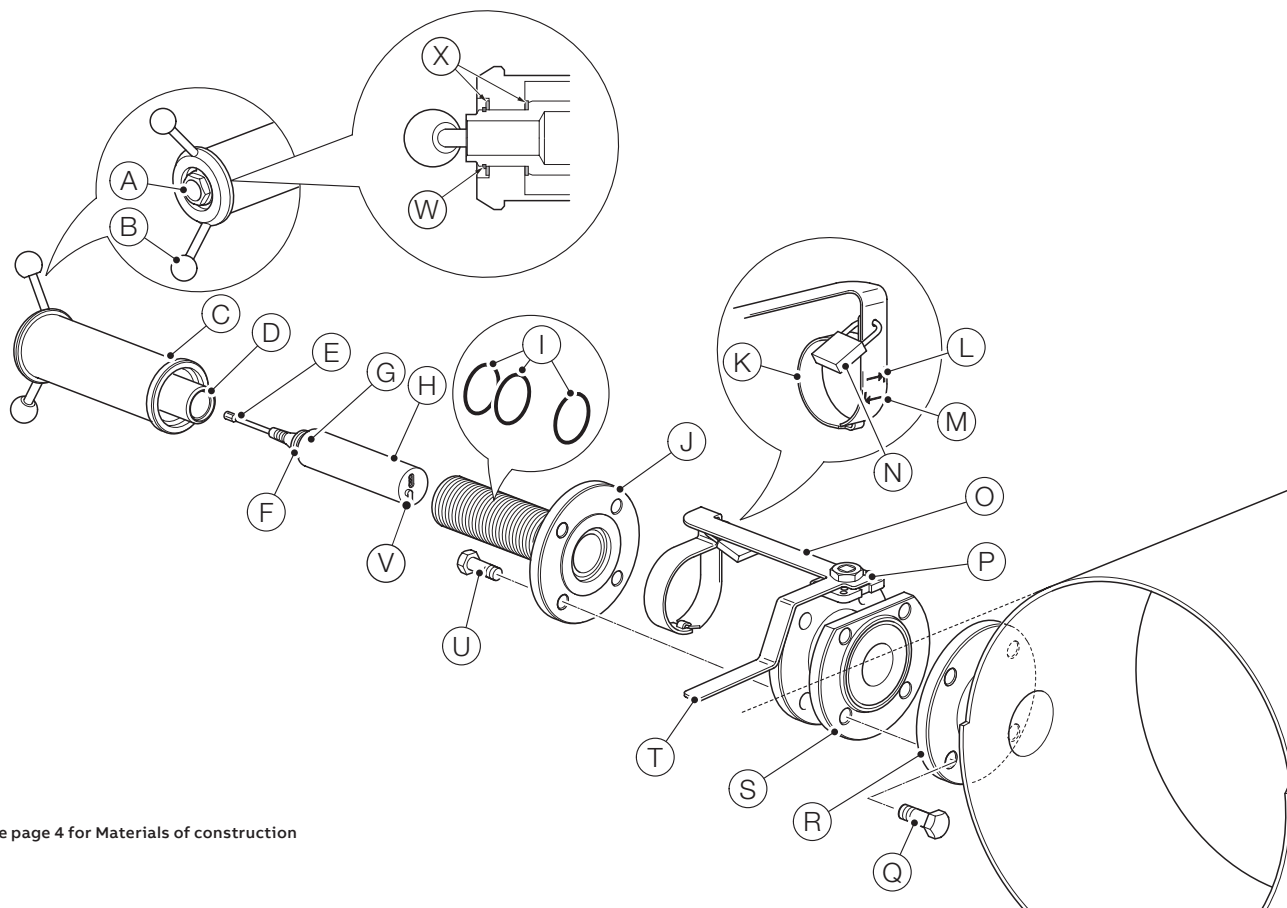
4.1.2 Process

Sample pressure: maximum pressure 10 bar (145 psi).

Sample temperature: 0 to 60 °C (32 to 140°F).

4.2 Retractable insertion assembly – overview

Key to main components*



*See page 4 for Materials of construction

Item	Mounting option
(A)	Hex feature
(B)	Capstan handles
(C)	Insertion assembly
(D)	Extension tube
(E)	Sensor cable
(F)	O-ring (sensor – spares kit ATS4000796)
(G)	Sensor tightening holes
(H)	ATS430 sensor
(I)	O-ring (threaded flange adaptor – internal)
(J)	Threaded flange adaptor
(K)	Locking clamp
(L)	Stop label (3 rd stop position)

Item	Mounting option
(M)	Label (maintenance position)
(N)	Padlock (customer-supplied)
(O)	Ball valve handle
(P)	Valve locking collar (valve shown in open position)
(Q)	Bolts / washers – flange to ball valve (customer-supplied)
(R)	Flange welded to pipe / vessel (customer-supplied)
(S)	Ball valve
(T)	1 st stop position marker on ball valve handle
(U)	Bolts / washers (customer-supplied) – threaded flange adaptor to ball valve
(V)	Sensor wiper (if fitted)
(W)	Circlip (30 mm)
(X)	Bearing washers

4.3 Materials of construction

- Ball valve assembly (ATS4000789):
 - Body material: 1.4408
 - Ball material: 1.4408
 - Ball seal material: TFM 1600
 - Spindle material: 1.4401
 - Spindle seal material: PTFE
 - Spindle o-ring material: FPM (FKM)
 - Handle: 316 stainless steel
 - Labels: vinyl
- Threaded adaptor assembly (ATS4000786):
 - Body: 316 stainless steel
 - O-rings: Viton
- Hot tap assembly (ATS4000770):
 - Extension tube: 316 stainless steel
 - Outer sleeve: free machining brass CZ121 / CW614N
 - Bearing washer: Nylon 6
 - Capstan handles: 316 stainless steel
 - Ball knob: black thermoplastic
 - Circlip: stainless steel

4.4 Dimensions



IMPORTANT (NOTE)

- The length of the complete assembly depends on the dimensions of the flange connection (customer-supplied).
- Once in the maintenance position, an additional space of 220 mm (8.66 in.) is required when removing the sensor from the assembly.

Dimension in mm (in.).

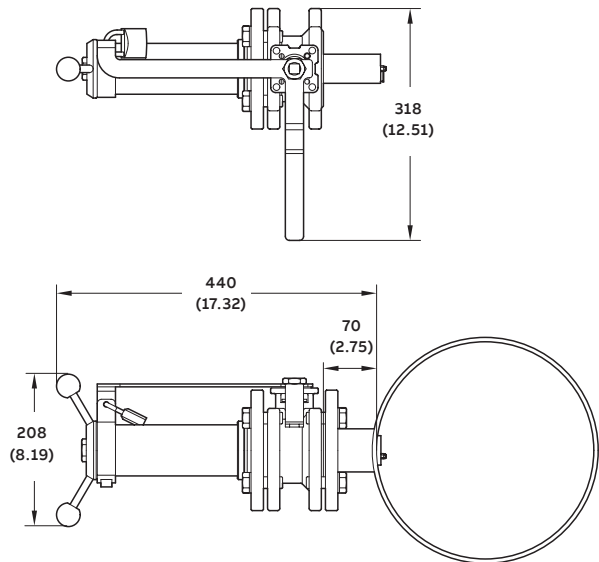


Fig. 4.2 Measuring position dimensions

Dimension in mm (in.).

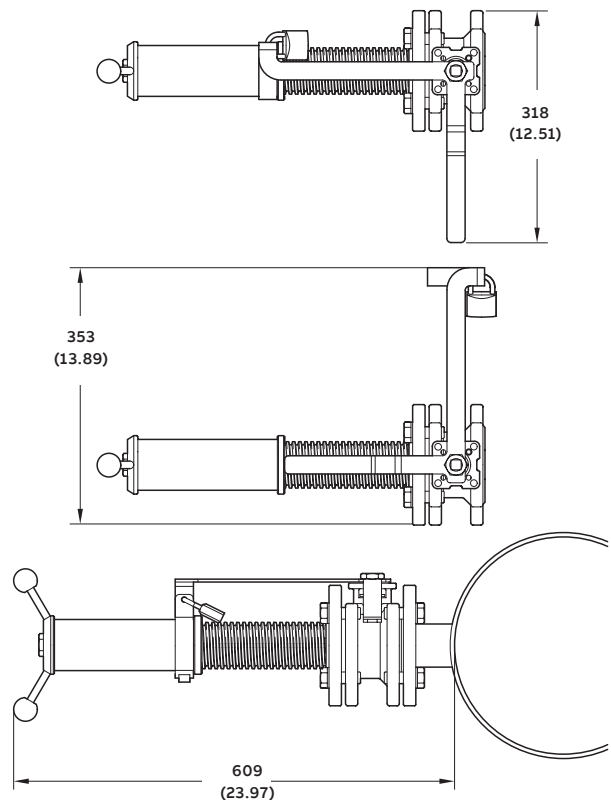


Fig. 4.3 Maintenance position dimensions

4.5 Positioning

The sensor face must be at least 50 mm (2 in.) away from any surface to reduce the effect of reflections from the internal surfaces of the pipe / vessel.

It is recommended that the sensor is installed on a vertical pipe or on the side of a horizontal pipe. It is not advisable to install the sensor on the top or bottom of a horizontal pipe, due to potential exposure to air and settled solids, respectively – see Fig. 4.4:

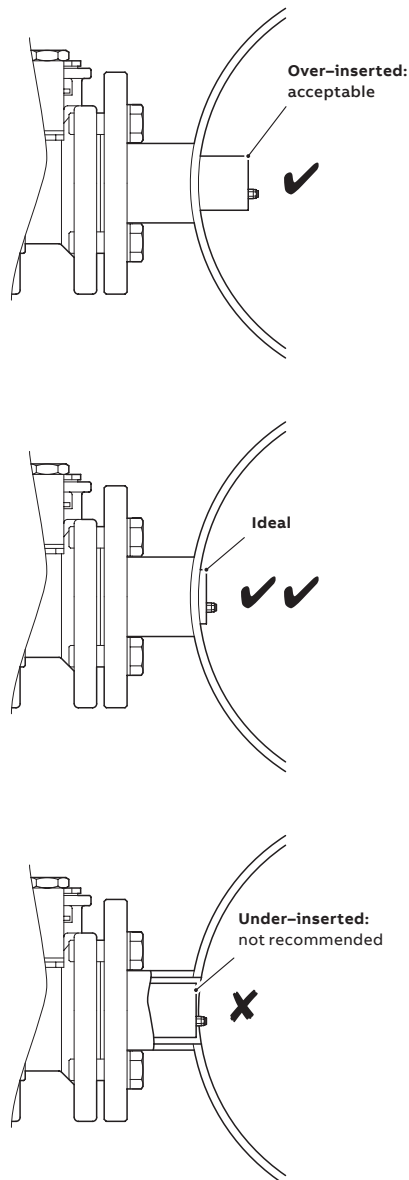
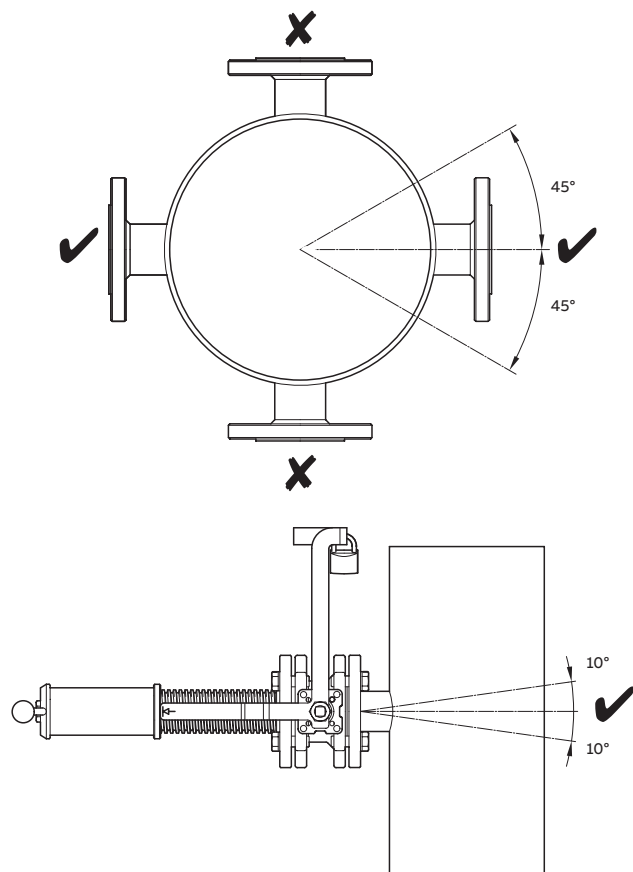


Fig. 4.5 Examples of over and under insertion of the sensor

Fig. 4.4 Recommended installation positions

Ensure the sensor is not under inserted into the pipe or vessel as this could result in inaccurate readings. Over-insertion of the sensor is preferential to under-insertion – see Fig. 4.5. Care must be taken when deciding on the position of the retractable insertion assembly. The stability of the turbidity readings may be affected if the flow is turbulent or if there is outgassing due to a reduction of pressure.

5 Installation



WARNING – Bodily injury

Putting any type of device into a pressurized vessel (the pipe) can be dangerous. If the pressure in the line is high (typically 4 bar [58 psi] or more), care must be used in both installing and removing the probe. The retractable insertion assembly **enables removal and insertion** of the sensor up to a pressure of 10 bar (145 psi). To reduce the risk of working at high pressure, it is advisable to reduce the pressure in the process line when installing or removing the sensor.

This assembly must be installed only:

- by suitably trained personnel only
- in accordance with the information provided in this document
- in accordance with relevant local regulations

5.1 Stage 1: first fix

1. Ensure the flange is installed in a suitable location – refer to Section 4, page 3.
2. Referring to Fig. 5.1:



IMPORTANT (NOTE)

Distance (X) from flange sealing face to pipe I/D must not exceed 70 mm (2.75 in.).

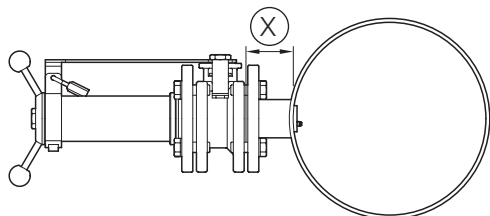


Fig. 5.1 Maximum distance – flange sealing face to pipe I/D

5.2 Stage 2: attaching the ball valve to the flange / pipe



WARNING – Bodily injury

Check to confirm all parts are present and undamaged before installing the assembly. Failure to observe these safety conditions / requirements may result in death or severe injury.

Referring to Fig. 5.2:

1. Attach ball valve (S) to flange (R) using suitable gaskets and bolts (Q) (customer supplied) for the process sample.
2. Pressure test the weld flange arrangement and ball valve.



IMPORTANT (NOTE)

If required, the pipe / vessel can now be tapped to access the process pipe under pressure.

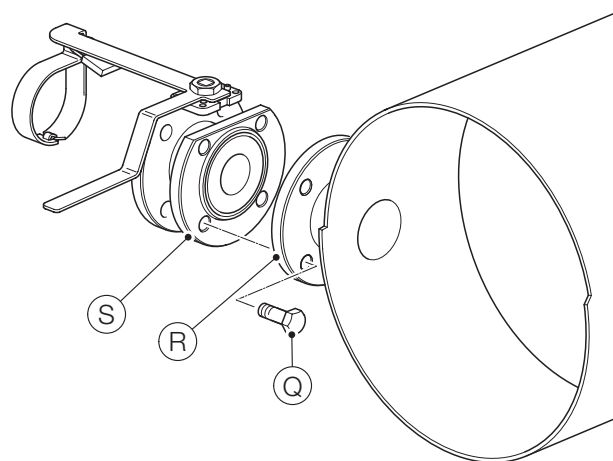


Fig. 5.2 Attaching the ball valve to the flange / pipe

5.3 Stage 3: attaching the assembly to the ball valve

Referring to Fig. 5.3:

1. Ensure 3 O-rings (I) in threaded adaptor (J) are in good condition, clean and free of dirt and grit.
2. Attach threaded flange adaptor (J) to ball valve (S) using suitable gaskets and bolts (U) (customer supplied) for the process sample.
3. Inspect condition of O-ring F (O-ring spares kit ATS4000788) on sensor (H).
4. Feed sensor cable (E) through extension tube (D).
5. Tighten sensor (H) against extension tube (D) using (supplied) hook spanner on sensor tightening holes (G) and the 27 mm hex feature (A) on insertion assembly (C).
6. Make note of the position of the sensor wiper (V) (if fitted) with respect to the hex feature (A) on the handle end. The wiper arm should be positioned to be in-line with the sample flow (if present).



IMPORTANT (NOTE)

To reduce the risk of air bubbles forming on the windows, it is advisable to align the wiper with the direction of the flow.

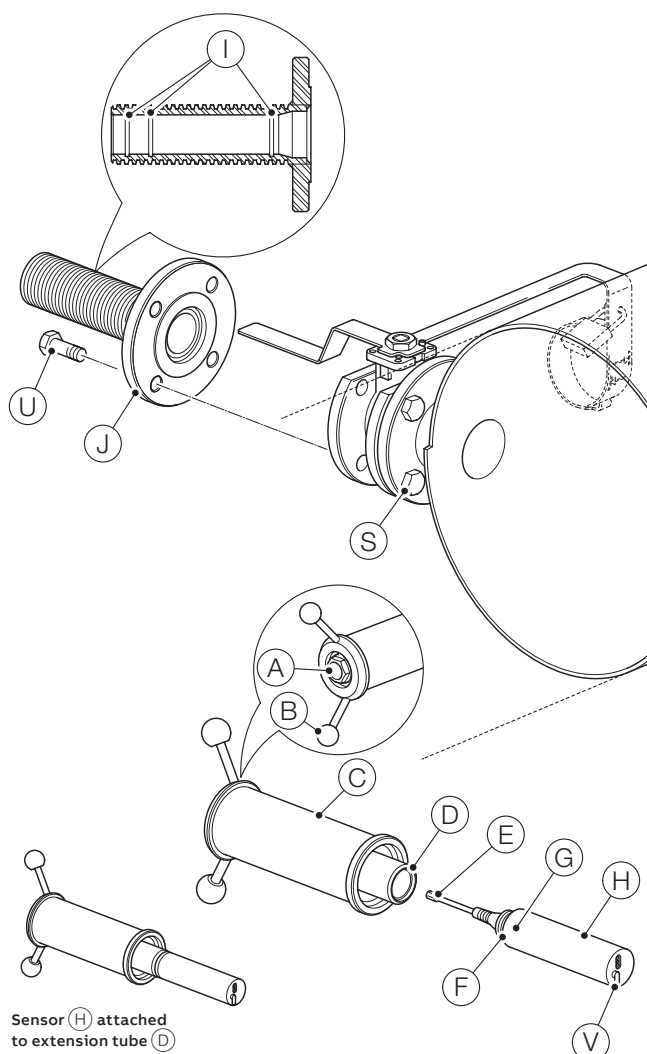


Fig. 5.3 Stage 3 – attaching the assembly to the ball valve

5.4 Stage 4: sensor insertion

1. Ensure sensor windows and wiper (if fitted) are clean.



CAUTION – Damage to equipment

The bore of the threaded adaptor must be free from any debris or residual fluid. Failure to completely clear the bore may result in excessive pressure or damage to the equipment.

Referring to Fig. 5.4:

2. Insert sensor (H) (with attached insertion assembly (C)) into threaded flange adaptor by hand – some force may be required to overcome enclosed pressure.
3. Rotate insertion assembly (C) (approximately 2 turns) up to 1st stop position (T) using capstan handles (B).

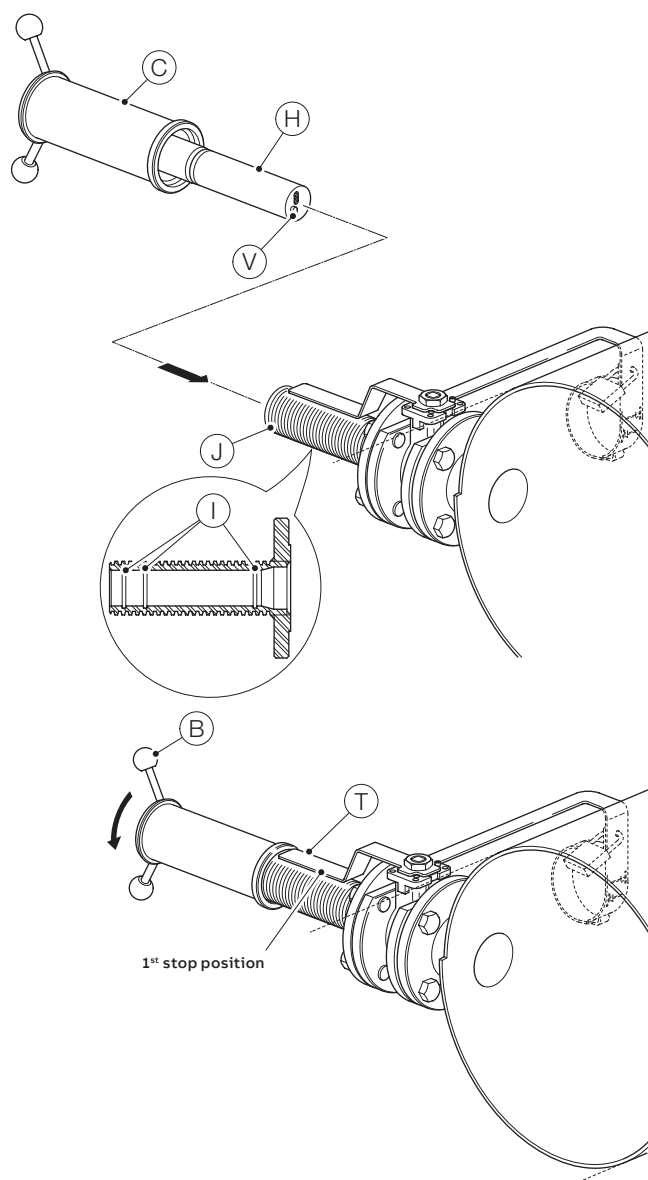


Fig. 5.4 Sensor positioned in retractable insertion assembly with ball valve closed to the process

Referring to Fig. 5.5:



WARNING – Bodily injury

The system is pressurized from step 4 onwards.

4. Rotate ball valve handle (O) 90° counter-clockwise to open the ball valve (2nd stop position).



WARNING – Bodily injury

The system is now pressurized.

5. Engage locking clamp (K) and secure with a padlock (N) (or similar).
6. Screw sensor attachment using capstan handles (B) until it comes to a stop against the 3rd stop as indicated on label (L).
7. If required, align wiper (V) with sample flow using the mark on hex feature (A).

The sensor is now in the measuring position.

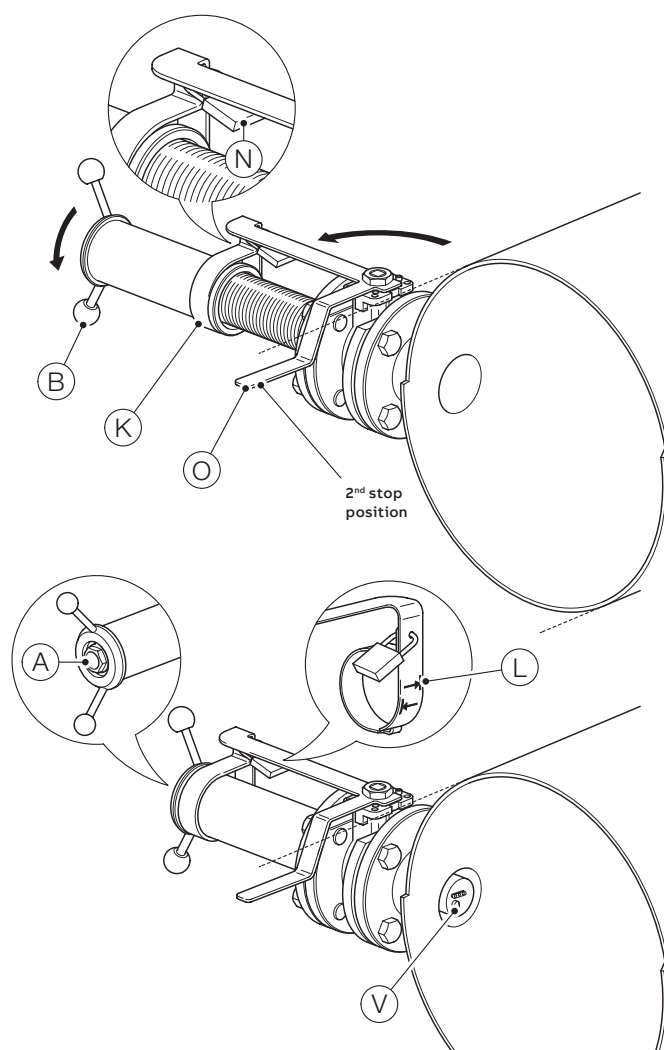


Fig. 5.5 Sensor in measuring position

6 Sensor maintenance



WARNING – Bodily injury

Putting any type of device into a pressurized vessel (the pipe) can be dangerous. If the pressure in the line is high (typically 4 bar [58 psi] or more), care must be used in both installing and removing the probe. The retractable insertion assembly **enables removal and insertion** of the sensor up to a pressure of 10 bar (145 psi). To reduce the risk of working at high pressure, it is advisable to reduce the pressure in the process line when installing or removing the sensor.

This assembly must be installed only:

- by suitably trained personnel only
- in accordance with the information provided in this document
- in accordance with relevant local regulations

6.1 Removing the sensor for calibration or cleaning



System still pressurized



WARNING – Bodily injury

The system is pressurized during steps 1 and 2..



WARNING – Bodily injury

A small amount of sample (20 ml [0.67 fl oz / US]) will be present in the assembly when the sensor is removed from the system.

Referring to Fig. 6.1:

1. Unscrew insertion assembly (C) to the maintenance position (M) as indicated on valve handle (O).
2. Unlock / remove padlock (N) (if fitted) and disconnect locking clamp (K).
3. Rotate ball valve handle (O) 90 ° clockwise to the 1st stop position.



WARNING – Bodily injury

The valve is now closed and the system should be isolated.

4. Lock valve in closed position (P) if required using location holes provided.
5. Unscrew threaded assembly (C) (D) to end of thread.
6. Remove sensor / insertion assembly (H) / (C) from threaded flange adaptor (J).



WARNING – Bodily injury

A slight vacuum is created so the sensor needs to be pulled out of the assembly.

7. The sensor can now be cleaned and calibrated – refer to ATS430 Operating Instruction OI/ATS430E-EN.



IMPORTANT (NOTE)

The sensor does not have to be removed from the extension tube to use the ABB calibration accessories.

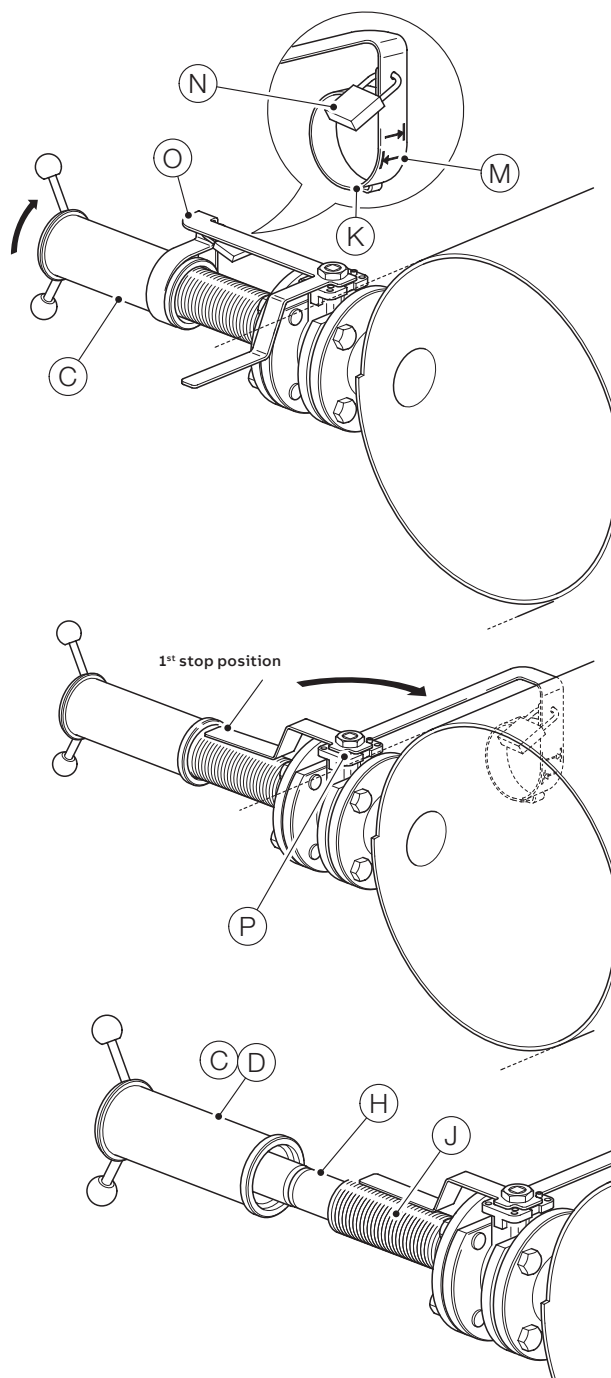


Fig. 6.1 Sensor in maintenance position

6.2 Inserting the sensor into the measurement position

Referring to Fig. 6.2:

1. Ensure 3 o-rings (I) in threaded adaptor (J) are in good condition, clean and free of dirt and grit.
2. Ensure sensor windows and wiper (V) (if fitted) are clean.



CAUTION – Damage to equipment

The bore of the threaded adaptor must be free from any debris or residual fluid. Failure to completely clear the bore may result in excessive pressure or damage to the equipment.

3. Insert sensor (H) (with attached insertion assembly (C)) by hand – some force may be required to overcome enclosed pressure. Rotate assembly (approximately 2 turns) up to 1st stop position (T) using capstan handles (B).

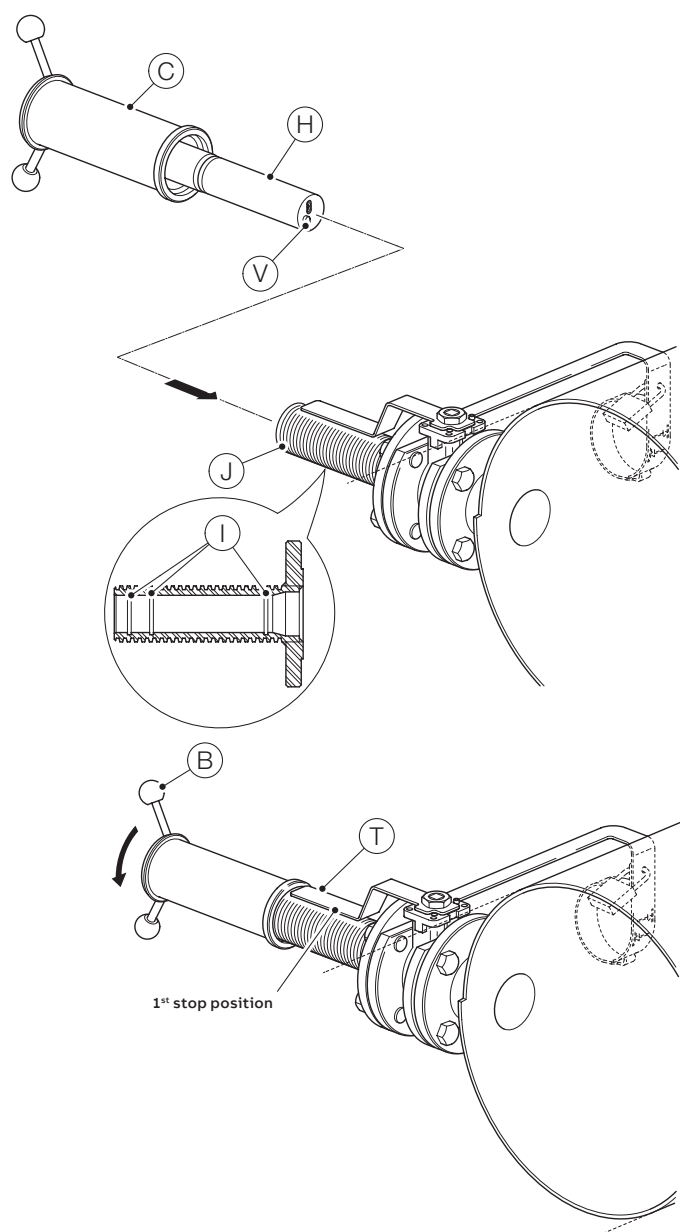


Fig. 6.2 Sensor positioned in retractable insertion assembly with ball valve closed to the process

Referring to Fig. 6.3:



WARNING – Bodily injury

The system is pressurized from step 4 onwards.

4. Rotate ball valve handle (O) 90° counter-clockwise to open the ball valve (2nd stop position).



WARNING – Bodily injury

The system is now pressurized.

5. Engage locking clamp (K) and secure with a padlock (N) (or similar).
6. Screw sensor attachment using capstan handles (B) until it comes to a stop against the 3rd stop as indicated by label (L).
7. If required, align wiper (V) with sample flow using the mark on hex feature (A).

The sensor is now in the measuring position.

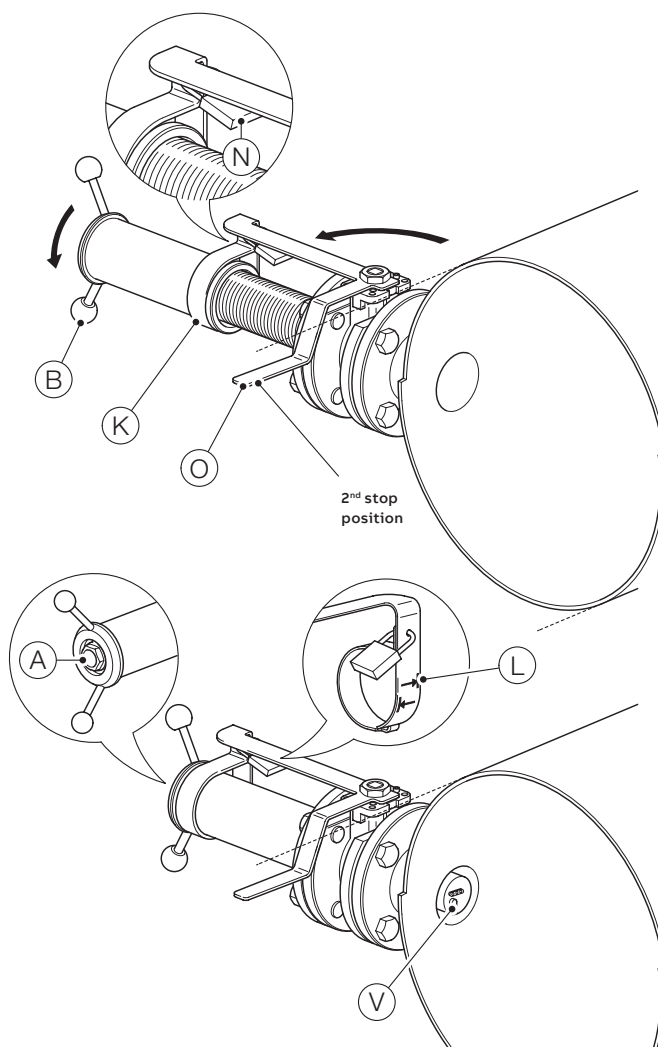


Fig. 6.3 Sensor in measuring position

7 Assembly maintenance



WARNING – Bodily injury

Putting any type of device into a pressurized vessel (the pipe) can be dangerous. If the pressure in the line is high (typically 4 bar [58 psi] or more), care must be used in both installing and removing the probe. The retractable insertion assembly **enables removal and insertion** of the sensor up to a pressure of 10 bar (145 psi). To reduce the risk of working at high pressure, it is advisable to reduce the pressure in the process line when installing or removing the sensor.

This assembly must be installed only:

- by suitably trained personnel only
- in accordance with the information provided in this document
- in accordance with relevant local regulations

7.1 O-ring replacement

If the 3 o-rings fitted to the threaded adaptor internal bore are missing or damaged, new ones must be fitted. These o-rings are supplied as part of bearing replacement kit ATS4000796.

To replace o-rings:

1. Refer to Section 6.1, page 9 to remove the sensor from the housing.

Referring to Fig. 7.1:

2. Loosen and remove bolts (U). Retain fixings for reassembly.
3. Remove any damaged o-rings (I) and fit new o-rings into threaded adaptor (J).
4. Refer to Section 6.2, page 10 to re-assemble the sensor and prepare it for operation.

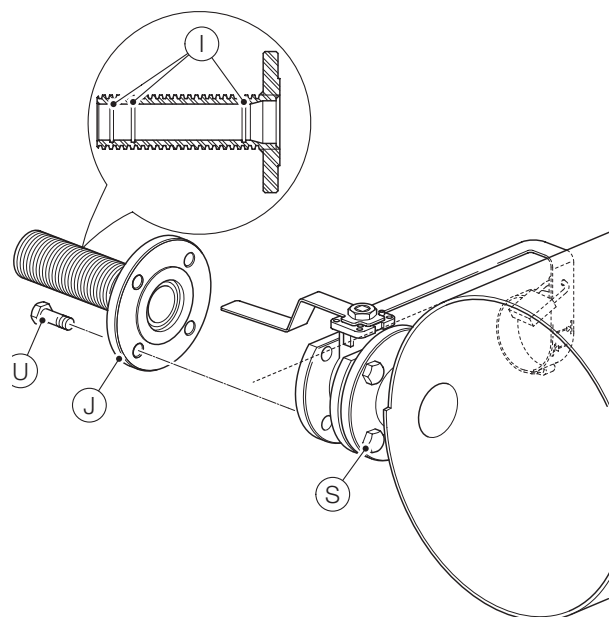


Fig. 7.1 Replacing o-rings in threaded adaptor

7.2 Bearing replacement

If the 2 bearing washers and circlip mounted to the insertion assembly are missing or damaged, new ones must be fitted during sensor maintenance, before fitting the assembly. These items are supplied as part of bearing replacement kit ATS4000796.

To replace bearing washers:

1. Refer to Section 6.1, page 9 to remove the sensor from the housing and remove insertion assembly (C) with extension tube (D).

Referring to Fig. 7.2:

2. Use circlip pliers to remove circlip (W). Discard circlip.
3. Remove extension tube (D) and remove bearing washers (X) (either side of insertion assembly shoulders).
4. Locate new bearing washers and refit extension tube (D) into insertion assembly (C).
5. Use circlip pliers to fit a new 30 mm circlip.
6. Refer to Section 6.2, page 10 to re-assemble the sensor and prepare it for operation.

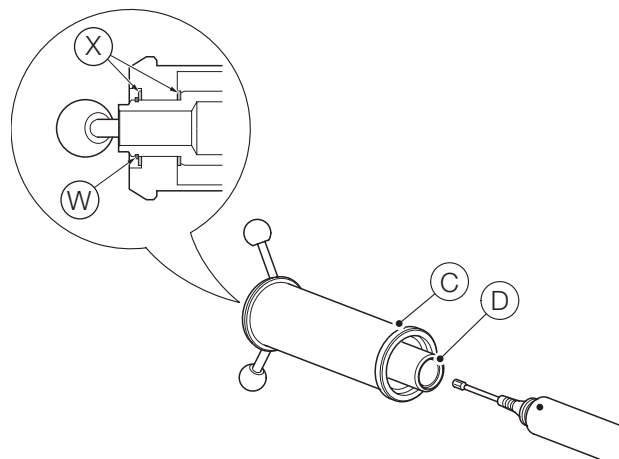


Fig. 7.2 Replacing insertion assembly bearing washers and circlip

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