

Installation Instructions

Replacement of measurement components

JT33 TDLAS gas analyzer



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1 Overview of spare part sets

This manual is designed to guide service technicians and maintenance personnel through the safe and effective replacement of key components using certified spare part kits. Each kit listed in this manual is engineered to ensure compatibility, reliability, and performance in accordance with Endress+Hauser standards.

These Installation Instructions do not replace the Operating Instructions included in the scope of product. It is a part of the Operating Instructions and serves as a reference for replacing solenoid, pneumatic, and manual valves utilized for validation in the measuring device.

1.1 Measuring components overview

This manual provides an overview of available spare part kits, including their contents, part numbers for ordering, and installation guidelines. To maintain equipment integrity and warranty, only genuine Endress+Hauser parts should be used. Certain components must be replaced only by trained personnel familiar with the product. For compatibility verification and additional support, refer to the Endress+Hauser Device Viewer.

The JT33 is a tunable diode laser absorption spectroscopy (TDLAS) gas analyzer system comprised of a controller, spectrometer, and a sample conditioning system. This document lists the replaceable kits related to the spectrometer and provides instructions for their replacement.

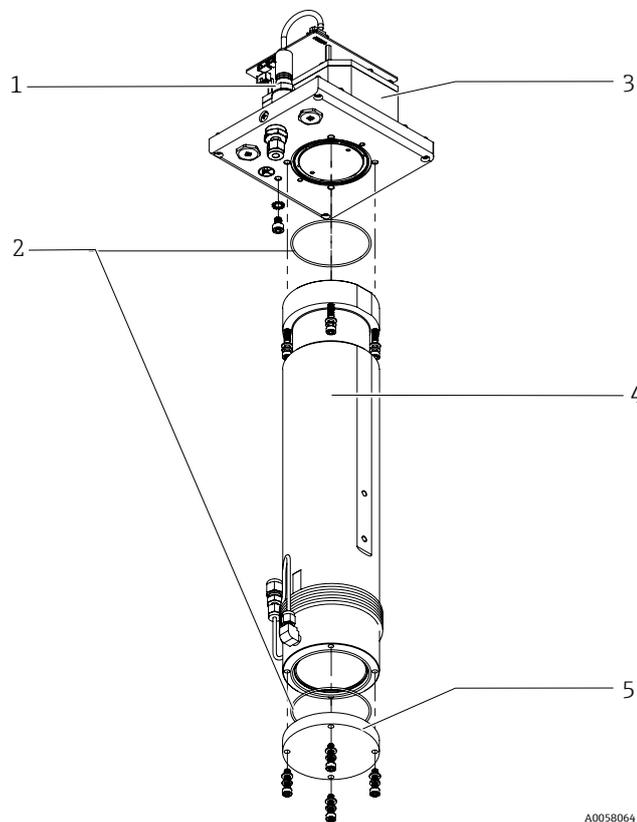


Figure 1. JT33 TDLAS analyzer measurement components

#	Part Number	Description
1	70188825	Digital pressure sensor; refer to <i>Digital pressure sensor kit (part number 70188825)</i> → and <i>Pressure sensor replacement</i> → .
2	71656069	JT33 spectrometer seals; refer to <i>Spectrometer seals kit (part number 71656069)</i> → .
3	71655802	Optical head assembly; refer to <i>Optical head enclosure kit (part number 71655802)</i> → .
4	71656062 OR 71656066	Measurement cell and optical head; refer to <i>Optical head and measurement cell kit for spectrometer 1 (part number 71656062)</i> and <i>spectrometer 2 (part number 71656066)</i> → and <i>Spectrometer replacement</i> → .

#	Part Number	Description
5	71656065	JT33 far mirror kit; refer to <i>Far mirror kit (part number 71656065)</i> →  and <i>Mirror cleaning and replacement</i> →  .

-  The order number of the spare part set (on the product label on the package) can differ from the production number (on the label directly on the spare part).
-  You can locate the spare parts by entering in the order code/product root/serial number into the spare parts finder tool under product tools at Endress.com.
-  Always keep the installation instructions together with the packaging.

1.2 Designated use

- A defective unit can only be replaced with a functioning unit of the same type.
- Use only original parts designed by Endress+Hauser.

1.3 Personnel authorized to carry out repairs

Only personnel who meet the following requirements for mounting, electrical installation, commissioning, and maintenance of the device:

- Qualified for their role and assigned tasks
- Knowledgeable about protection principles, types of protection, and equipment markings
- Understand the aspects of equipment design that affect the protection concept
- Able to interpret certificates and relevant sections of IEC 60079-14
- Familiar with inspection and maintenance requirements in IEC 60079-17
- Skilled in equipment selection and installation techniques referenced in IEC 60079-14
- Understand the importance of permit-to-work systems and safe isolation for explosion protection
- Familiar with national and local regulations (e.g., ATEX, IECEx, UKEX, cCSAus)
- Trained in lockout/tagout procedures, toxic gas monitoring, and personal protective equipment (PPE) requirements

WARNING

Do NOT substitute components.

- ▶ Substitution of components may impair intrinsic safety and alter the hazardous area rating of the assembly.
-  Whoever carries out the repairs has full responsibility to ensure that work is carried out safely and to the required quality standard and must guarantee the safety of the device following repair.

Repair authorization depends on the measuring device's approval type. The table below lists authorized personnel for each component. A qualified specialist may perform the repairs under guidance from an Endress+Hauser authorized technician.

Measurement component	Personnel authorized to perform repairs
Spectrometer replacement	Qualified customer specialist or Endress+Hauser authorized service technician
Measurement cell replacement	Endress+Hauser (return device to manufacturer)
Optical head replacement	Endress+Hauser (return device to manufacturer)
Pressure sensor replacement	Qualified customer specialist or Endress+Hauser authorized service technician
Far mirror cleaning	Qualified customer specialist or Endress+Hauser authorized service technician
Far mirror replacement	Qualified customer specialist or Endress+Hauser authorized service technician

1.4 Manufacturer address

Endress+Hauser
 11027 Arrow Route
 Rancho Cucamonga, CA 91730
 USA
www.endress.com

1.5 U.S. export compliance

The policy of Endress+Hauser is in strict compliance with U.S. export control laws as detailed on the website of the [Bureau of Industry and Security](#) at the U.S. Department of Commerce.

2 Safety instructions

Each analyzer shipped from the factory includes safety instructions and documentation to the responsible party or operator of the equipment for the purpose of installation and maintenance.

WARNING

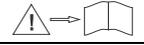
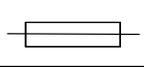
Technicians are expected to be trained and to follow all safety protocols, established by the customer in accordance with the area hazard classification, to service or operate the analyzer.

- ▶ This may include, but is not limited to, toxic and flammable gas monitoring protocols, lockout/tagout procedures, personal protective equipment (PPE) requirements, hot work permits, and other precautions that address safety concerns related to the use and operation of process equipment located in hazardous areas.

2.1 Safety symbols

Structure of Information	Meaning
 WARNING Causes (/consequences) Consequences of noncompliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.
 CAUTION Causes (/consequences) Consequences of noncompliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
NOTICE Cause/situation Consequences of noncompliance (if applicable) ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

2.1.1 Symbols on the measuring device

Symbol	Description
	The High Voltage symbol alerts people to the presence of electric potential large enough to cause injury or damage. In certain industries, high voltage refers to voltage above a certain threshold. Equipment and conductors that carry high voltage warrant special safety requirements and procedures.
	PROTECTIVE EARTH GROUND - Symbol indicates the connection point of the ground wire from the main power source.
	This symbol refers the user to the technical documentation for more information.
	The Fuse symbol is found on the Measurement Accessory Controller (MAC) printed circuit board adjacent to the fuse holder.
	The Ex mark signals to Authorities Having Jurisdiction and end-users in Europe that the product complies with the essential ATEX Directive for explosion protection.
	The UKCA Marking indicates conformity with health, safety, and environmental protection standards for products sold within the United Kingdom.
	The FCC Mark indicates that the electromagnetic radiation from the device is below the limits specified by the Federal Communications Commission and the manufacturer has followed the requirements of the Supplier's Declaration of Conformity authorization procedures.
	The CSA Certification Mark indicates that the product was tested against and met the applicable North American standards requirements.
	The CE Marking indicates conformity with health, safety, and environmental protection standards for products sold within the European Economic Area (EEA).

2.1.2 Symbols for certain types of information

Symbol	Meaning
	Permitted: Procedures, processes or actions that are permitted.
	Forbidden: Procedures, processes or actions that are forbidden.
	Tip: Indicates additional information.
	Reference to documentation.
	Reference to page.
	Reference to graphic.
	Notice or individual step to be observed.
1., 2., 3. ...	Series of steps.
	Result of a step.

2.2 Product safety

The TDLAS gas analyzer is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition that is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the specific EU Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the analyzer system.

2.2.1 General

Operating and safety conditions

- Follow all warning labels to prevent damage to the unit.
- Do not operate the device outside its specified electrical, thermal, or mechanical parameters.
- Use the device only in media compatible with the wetted materials.
- Prevent foreign matter (solid, liquid, or gas) from entering the MAC or controller enclosure during maintenance to maintain its pollution degree 2 rating.

Modification and access

- Modifications can affect explosion protection and must only be performed by Endress+Hauser-authorized personnel.
- Only open the controller or MAC cover when no explosive atmosphere is present and all technical data on the nameplate is observed.

Hazardous locations and installation

In potentially explosive atmospheres:

- Do not disconnect electrical connections while equipment is energized.
- Do not open the connection compartment cover or MAC cover when energized or in a hazardous area.
- Install controller circuit wiring according to Canadian Electrical Code (CEC) or National Electrical Code (NEC), using threaded conduit or methods per Articles 501–505 and IEC 60079-14 for international installations.
- Install the device according to manufacturer's instructions and applicable regulations.

2.2.2 Safety instructions specific to this manual

General requirements

- Verify that the spare part matches the labeling on the measuring device (see cover page).
- Use only original Endress+Hauser parts for replacement. Spare part sets and installation instructions are intended to replace a faulty unit with a functioning unit of the same type.

- Follow all national regulations for mounting, electrical installation, commissioning, maintenance, and repair.
- Do not modify the measuring device.

Personnel qualifications

Mounting, electrical installation, commissioning, maintenance, and repair must be performed by specialized technical staff who:

- Are trained in instrument safety.
- Understand the operating conditions of the device.
- For Ex-certified devices: are trained in explosion protection.

Electrical safety

- The measuring device is energized. **Risk of fatal electric shock.** Open the device only when de-energized.
- Turn off the device before removing internal covers.
- After removing the electronics compartment cover, follow proper grounding techniques to prevent electrostatic discharge.
- Work in an environment protected from electrostatic discharge.

Safety precautions

- Explosion Protection: For devices designed for hazardous locations, always follow the Ex Safety Instructions (XA03137C).
- Do not connect the service plug in explosive atmospheres.
- Before removing the device, set the process to a safe state and purge the pipe of hazardous substances.
- For safety-related applications (IEC 61508/61511): Commission the device according to operating instructions after repair and document the procedure. Refer to the *JT33 Operating Instructions* (BA02297C).
- Risk of burns from hot surfaces. Allow the system and device to cool to a touchable temperature before starting work.

Handling and assembly

- Open the housing only briefly to prevent ingress of foreign bodies, moisture, or contaminants.
- Replace defective seals only with original Endress+Hauser seals. For the spectrometer assembly, apply a light coating of HP300 grease or equivalent. For all non-spectrometer assembly seals (such as those in the optical head enclosure and controller), use a grease such as Syntheso Glep.
- If threads are damaged, repair the device. Lubricate threads (e.g., electronics compartment cover) with acid-free, non-hardening lubricant if dry lubricant is unavailable.
- If spacing or dielectric strength cannot be guaranteed after repair, perform a high-voltage test per manufacturer's instructions.

Documentation and transport

- Follow the operating instructions for the device.
- Observe transport and return instructions in the operating manual.
- For questions, contact your Endress+Hauser service organization or visit endress.com/contact for local sales channels.

 If you have any questions, please contact your Endress+Hauser service organization. Refer to our website (endress.com/contact) for the list of local sales channels in your area.

2.3 Potential risks affecting personnel

This section addresses the appropriate actions to undertake when faced with hazardous situations during or before service of the analyzer. It is not possible to list all potential hazards within this document. The user is responsible for identifying and mitigating any potential hazards present when servicing the analyzer.

NOTICE

- ▶ Technicians are expected to be trained and follow all safety protocols that have been established by the customer in accordance with the area hazard classification to service or operate the analyzer and MAC controller.
- ▶ This may include, but is not limited to, toxic and flammable gas monitoring protocols, lockout/tagout procedures, PPE requirements, hot work permits, and other precautions that address safety concerns related to the use and operation of process equipment located in hazardous areas.

2.3.1 Electrocuting hazard

⚠ WARNING

- ▶ Complete this action before performing any service that requires working near the main input power or disconnecting any wiring or other electrical components.
1. Shut off power at the main disconnect external to the analyzer.
 2. Only use tools with a safety rating for protection against accidental contact with voltage up to 1000 V (IEC 900, ASTF-F1505-04, VDE 0682/201).

2.3.2 Laser safety

The JT33 spectrometer is a Class 1 laser product, which poses no threat to equipment operators. The laser internal to the analyzer controller is classified Class 1 and could cause eye damage if the beam is viewed directly.

⚠ WARNING

- ▶ Before servicing, shut off all power to the analyzer. If any flame path is damaged while servicing, it needs to be replaced before returning power to the device.

2.3.3 Electrostatic discharge: JT33 analyzer and MAC

The powder coating and the adhesive labels are nonconducting and may generate an ignition-capable level of electrostatic discharge under certain extreme conditions. Ensure that the equipment is not installed in a location where it may be subjected to external conditions, such as high-pressure steam, which might cause a buildup of electrostatic charges on nonconducting surfaces. To clean the equipment, use only a damp cloth.

2.3.4 Chemical compatibility

Never use vinyl acetate or acetone or other organic solvents to clean the analyzer housing or labels.

2.4 IT security

Our warranty is valid only if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the device and associated data transfer, must be implemented by the operators in line with their security standards.

2.4.1 Device-specific IT security

The device offers a range of specific functions to support protective measures on the operator's side. These functions can be configured by the user and guarantee greater operational safety if used correctly. Refer to the *Operating Instructions* (BA02297C) for more information.

2.5 Turn off and purge the instrument

Purging is a critical safety step when servicing gas analyzer enclosures. It removes hazardous gases and prevents exposure to harmful substances during maintenance. The purging process depends on the enclosure design and the presence of a purge valve for the enclosure. Always verify the purge configuration before beginning any service activity.

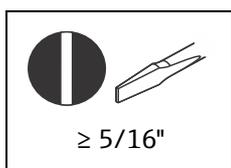
Before servicing the JT33 Sample Conditioning System (SCS), disconnect all external power from both the SCS and controller, and shut off all process gas to the analyzer. Follow the instructions below to safely prepare the SCS for service.

⚠ WARNING

- ▶ Always follow your site procedure to safely disconnect gas lines to the analyzer. Before opening the enclosure, purge the system with N₂ to ensure no poisonous gas is present.

2.5.1 Tools and materials

- 5/16" (or larger) flathead screwdriver
- Nitrogen (N₂)



2.5.2 Overview of purging a TDLAS gas analyzer

The JT33 SCS may include an enclosure purge valve. If present, purge the enclosure first. After purging the enclosure, test the enclosure for gas using a sensor. Then, open the enclosure and purge the gas lines. If no purge valve is installed, purge only the gas lines. Both steps ensure removal of residual process gas before servicing internal components.

2.5.3 Turning off power

⚠ WARNING

- ▶ Complete this procedure before working near main input power or disconnecting any wiring or electrical components.

To turn off power

1. Turn off power at the main disconnect external to the analyzer. Use tools rated for up to 1000 V (IEC 900, ASTM F1505-04, VDE 0682/201).
2. Shut off process gas to the analyzer. If the gas sample line cannot be shut off, continue with the purge.

2.5.4 Testing the enclosure for gas safety

⚠ WARNING

- ▶ Use a gas sensor based on the toxic components in the process gas stream.

To turn off and test the analyzer before purging

1. Confirm the power is off and the SCS is isolated from the process gas flow.
 2. Use the gas detector to check for H₂S at the enclosure exterior.
 3. Open the tee-fitting cap on the exhaust port on the lower right side of the enclosure and insert a sensor to determine if there is H₂S inside the enclosure.
- If **no hazardous gas is detected**, open the enclosure door using a 5/16" flathead screwdriver and proceed to *Purging the SCS gas lines* →
 - If **hazardous gas is detected**, proceed with *Purging the SCS enclosure* → .

2.5.5 Purging the SCS enclosure

The enclosure purge is performed when the sample gas contains high concentrations of H₂S.

⚠ WARNING

- ▶ Complete the following procedure before working near the main input power or disconnecting any wiring or electrical components.

To purge the enclosure

1. Connect N₂ to the enclosure purge valve.

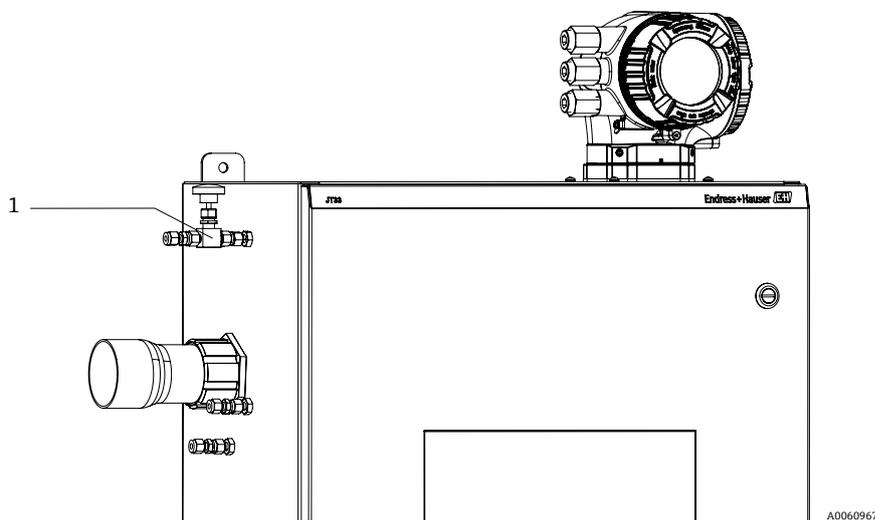


Figure 2. Enclosure purge valve (1)

2. Open the exhaust on the bottom right side of the enclosure and connect a piece of tubing that vents to a safe area.
3. Input the purge gas at 10 SLPM (0.35 scfm).
4. Operate the purge for 20 minutes.
5. After purging the enclosure, proceed to *Purging the SCS gas lines* → .

2.5.6 Purging the SCS gas lines

⚠ WARNING

- ▶ Complete this procedure before working near the main input power or disconnecting any wiring or electrical components.

To purge the gas lines

1. Open the enclosure door using a 5/16" flathead screwdriver.
2. Close the internal **Inlet Shutoff** ball valve in the filtration assembly.
3. Open the **Sample Vent** ball valve on the outlet side.

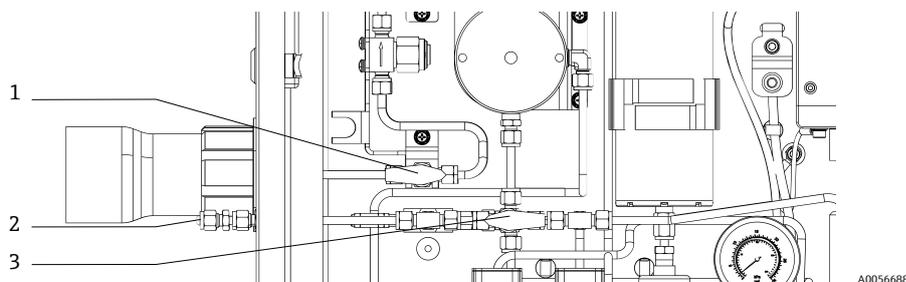


Figure 3. Inlet shutoff valve (1), sample vent line (2), and sample vent valve (3)

4. Connect N₂ to the sample vent connection on the exterior of the SCS.
5. Set the flow rate to 3 L/min and run the purge for at least 10 minutes.

3 Scope of delivery

This chapter provides a comprehensive listing of the spare part kits applicable to the repair and maintenance of Endress+Hauser JT33 spectroscopic measurement components. Each kit is designed to support specific device models and configurations, ensuring compatibility and ease of installation.

The following tables list the available kits, their components, and the corresponding part numbers required for ordering replacements. These part numbers can be used directly through Endress+Hauser’s official ordering channels or verified through the Device Viewer.

Only genuine Endress+Hauser parts should be used to maintain the integrity and warranty of your equipment. For verification and additional support, visit the Endress+Hauser Device Viewer.

3.1 Items received with a calibrated optical head replacement kit

- Calibrated optical head with pressure sensor
- Pressure sensor cable
- O-ring
- Calibration certificate

3.2 Optical head and measurement cell kit for spectrometer 1 (part number 71656062) and spectrometer 2 (part number 71656066)

i This kit currently supports the repair procedures for *Spectrometer replacement* → , *Measurement cell replacement* → , and *Optical head replacement* → . Use the same kit for either procedure as specified.

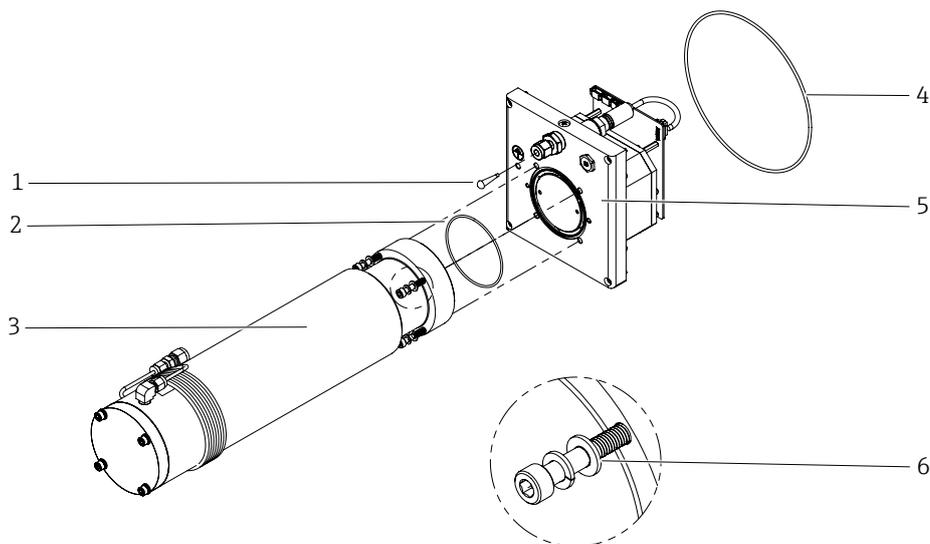


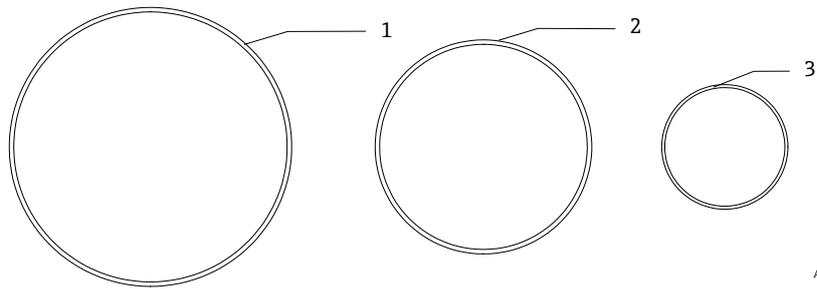
Figure 4. JT33 TDLAS Spectrometer

A0058065

#	Description
1	Tapered vinyl plug, 0.30" L END, 0.14"
2	O-ring, Viton, 2.739" × 0.07"
3	Measurement cell assembly, 28 M, JT33

#	Description
4	O-ring, Viton, #164, 6.237 × 0.103
5	Optical head assembly, 1576.3/1590 nm
6	Screw, SHCS, M5 × 35 mm, 316 SS, Screw, set, M5 × 40 mm, 316 SS Locking washer, SPR, M5 DIN 127B, 316 SS Flat washer, M5 10 × 1.0, ISO-7089, 316 SS

3.3 Spectrometer seals kit (part number 71656069)

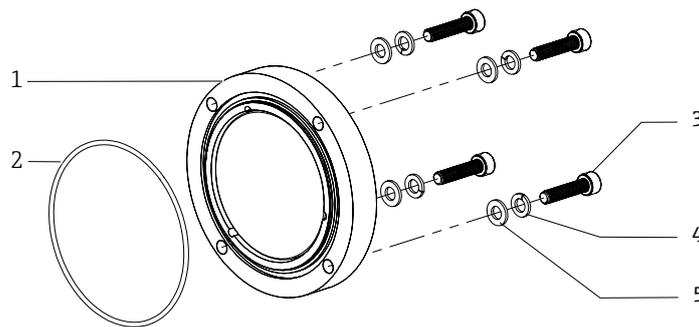


A0060071

Figure 5. Spectrometer seals

#	Description
1	Viton O-ring, #164, 6.237 × 0.103 (utilized for controller transition plate to optical head in the <i>Optical head and measurement cell</i> → )
2	Viton O-ring, #159, 4.987 × 0.103 (utilized for <i>Optical head enclosure</i> → )
3	Viton O-ring, 2.739 × 0.07 (utilized for <i>Far mirror</i> → )

3.4 Far mirror kit (part number 71656065)

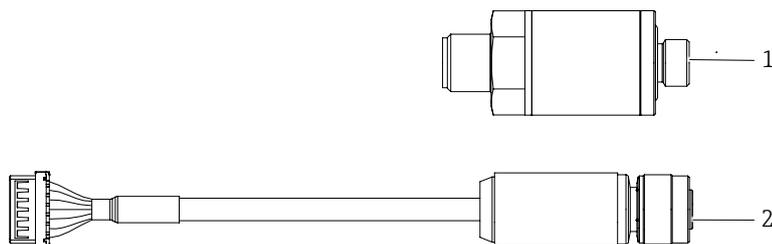


A0060072

Figure 6. Mirror Replacement Kit

#	Description
1	Far mirror assembly
2	O-ring, Viton, 2.739 × 0.07
3	Screw, SHCS, M5-0.8 × 22MM, 316 SS
4	Locking washer, SPR, M5, DIN 127B, 316 SS
5	Flat washer, M5 10 × 1.0, ISO-7089, 316 SS

3.5 Digital pressure sensor kit (part number 70188825)

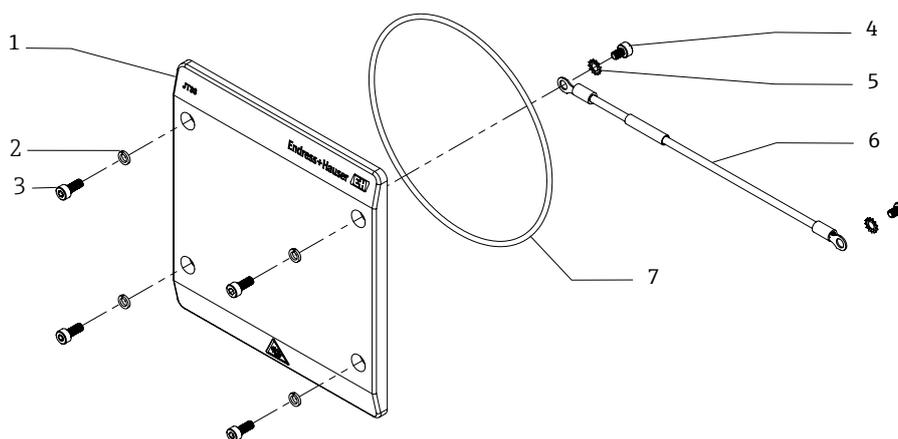


A0060073

Figure 7. Digital pressure sensor kit

#	Description
1	Digital pressure sensor
2	Digital pressure sensor cable assembly

3.6 Optical head enclosure kit (part number 71655802)



A0060074

Figure 8. JT33 Optical head enclosure

#	Description
1	Locking washer, SPR, M4, DIN 127B, 316 SS
2	Screw, SHCS, M4-0.7 × 8, ISO-4762, 316 SS
3	JT33 Optical head enclosure cover
4	Screw, SHCS, M4-0.7 × 6, ISO-4762, 316 SS
5	Ext tooth washer, M4, DIN-6797, 18-8 SS
6	Ground cable, 14 GA, GRN/YEL, 170 mm
7	Viton O-ring, #159, 4.987 × 0.103

3.7 Tools kit (part number 71656073)

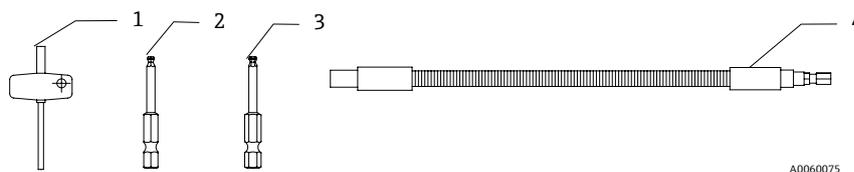


Figure 9. Service tools kit

#	Description
1	T10 Torx, 3" overall
2	¼" hex shank, 3 mm hex size
3	¼" hex shank, 4 mm hex size
4	Flex driver, 156 lbf-in max

3.8 Documentation

All documentation is available:

- On the media device supplied (not included in the delivery for all device versions)
- On the Endress+Hauser mobile app: www.endress.com/supporting-tools
- In the Downloads area of the Endress+Hauser website: www.endress.com/downloads

This document is an integral part of the document package, which includes:

Part Number	Document Type	Description
GP01198C	Description of Device Parameters	Reference for parameters, providing a detailed explanation of each individual parameter of the operating menu
BA02297C	Operating Instructions	A complete overview of the operations required to install, commission, and maintain the device
KA01655C	Brief Operating Instructions	Short instructions for standard installation and commissioning of the device
SD02912C	Special Documentation Heartbeat Technology	Reference for using the Heartbeat Technology function integrated in the measuring device
SD03032C	Special Documentation Web server	Reference for using the web server integrated in the measuring device
SD03286C	Validation of TDLAS gas analyzers	Reference for proper procedures for validation of TDLAS gas analyzers
EA01521C	Installation Instructions	Validation and scrubber valve replacement installation instructions.
EA01426C	Installation Instructions	Firmware Upgrade installation instructions
TI01722C	Technical Information	Technical data for the device with an overview of associated models available
XA03137C	Safety Instructions	Requirements for installing or operating the analyzer as it relates to personnel or equipment safety
EX310000056	Control Drawing	Drawings and requirements for JT33 field interface connections

4 Spectrometer replacement

This chapter provides step-by-step instructions for safely removing and replacing the complete JT33 spectrometer as described in the combined *Optical head and measurement cell kit* → . Refer to the kit description section for details. The JT33 spectrometer includes the optical head and measurement cell with mirror.

Replacement of the spectrometer is only recommended for customers or service personnel that have completed advanced TDLAS service training. Contact Endress+Hauser service for more information. NACE and MTR reports are available upon request.

WARNING

The measuring device is energized! Risk of fatal injury from electric shock.

- ▶ Open the measuring device only when the device is de-energized.

CAUTION

Hot surfaces! Risk of injury!

- ▶ Before commencing work: allow the system and measuring device to cool down to a touchable temperature.
- ▶ Before removing the device: set the process to a safe state and purge the pipe of dangerous process substances.
- ▶ After removing the electronics compartment cover: risk of electrical shock due to missing touch protection!

NOTICE

Risk of damaging the electronic components!

- ▶ Work in an environment protected from electrostatic discharge.
- ▶ Handle optical components carefully to avoid mirror damage.

4.1 Remove the spectrometer

The JT33 spectrometer may be mounted to the enclosure wall using a rear bracket or side bracket. Refer to the instructions that apply to your configuration.

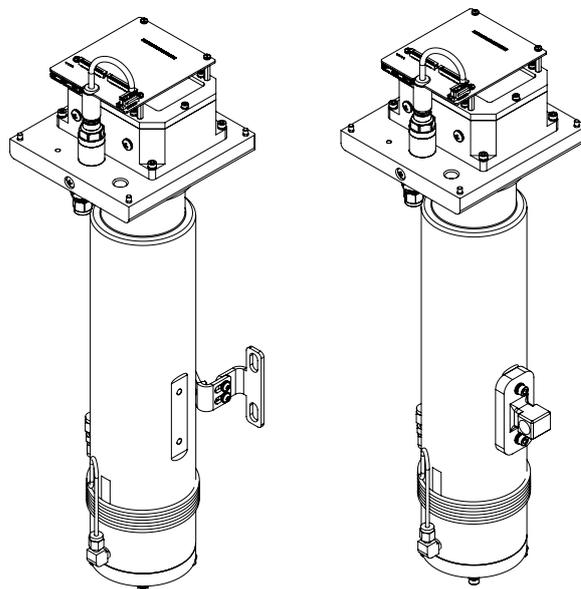
WARNING

INVISIBLE LASER RADIATION - The sample cell assembly contains a low power, 10 mW maximum, CW Class 3B invisible laser with a wavelength between 750 and 3000 nm.

- ▶ Never open the sample cell flanges or the optical assembly unless the power is turned off.

Process samples may contain hazardous material in potentially flammable and/or toxic concentrations.

- ▶ Personnel must have a thorough knowledge and understanding of the physical properties and safety precautions for the sample contents before operating the SCS.
- ▶ Operate all valves, regulators, and switches in accordance with site lockout/tagout procedures.

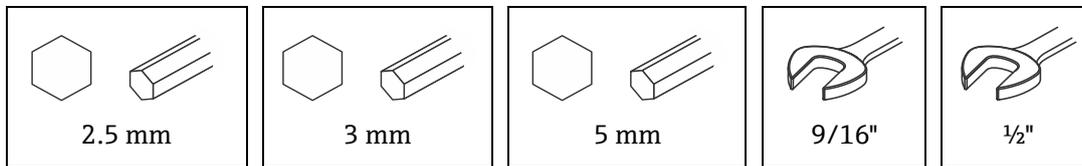


A0060076

Figure 10: Measurement cell with back mounting bracket (left) or side mounting bracket (right)

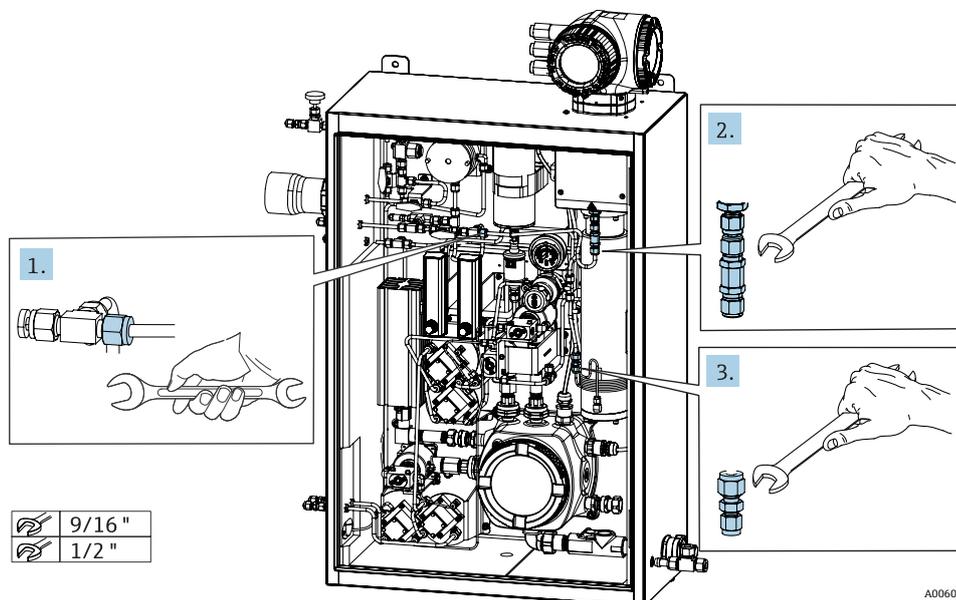
Tools and materials

- 2.5 mm, 3 mm, and 5 mm hex keys
- 1/2" and 9/16" wrenches
- Digital multimeter



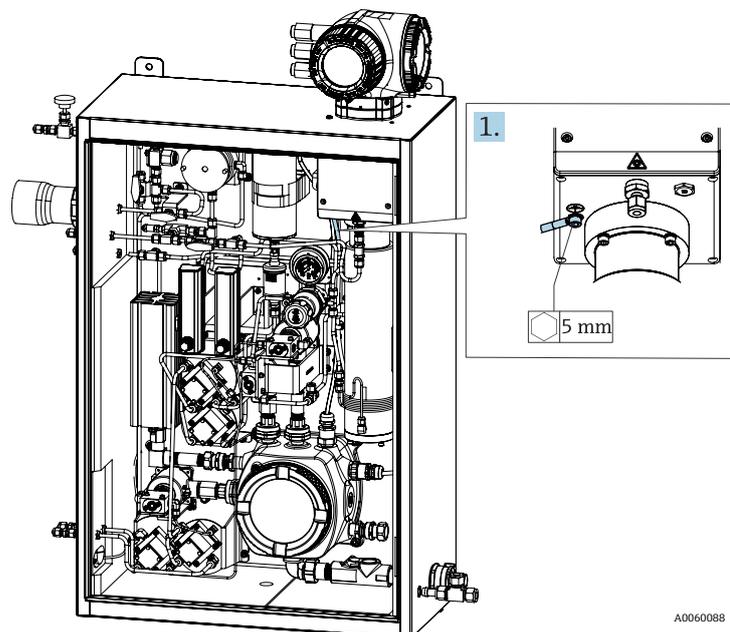
To remove the spectrometer

1. Turn off the analyzer and purge the sample cell. Refer to the instructions in *Turning off and purging the instrument* → .
2. Disconnect tubing from the spectrometer inlet and outlet. Additional tubing may need to be removed to access the spectrometer.



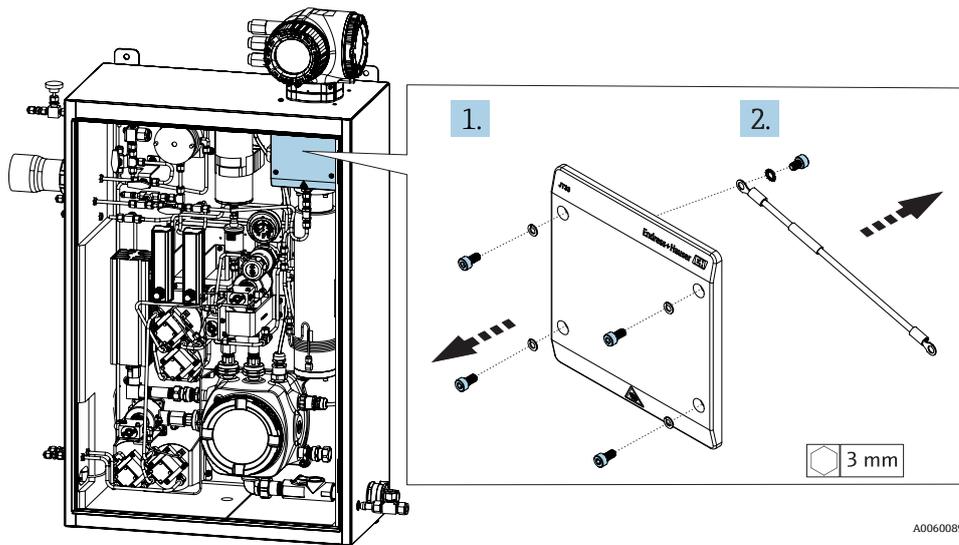
A0060077

3. Remove the ground cable from the optical head and push it aside.

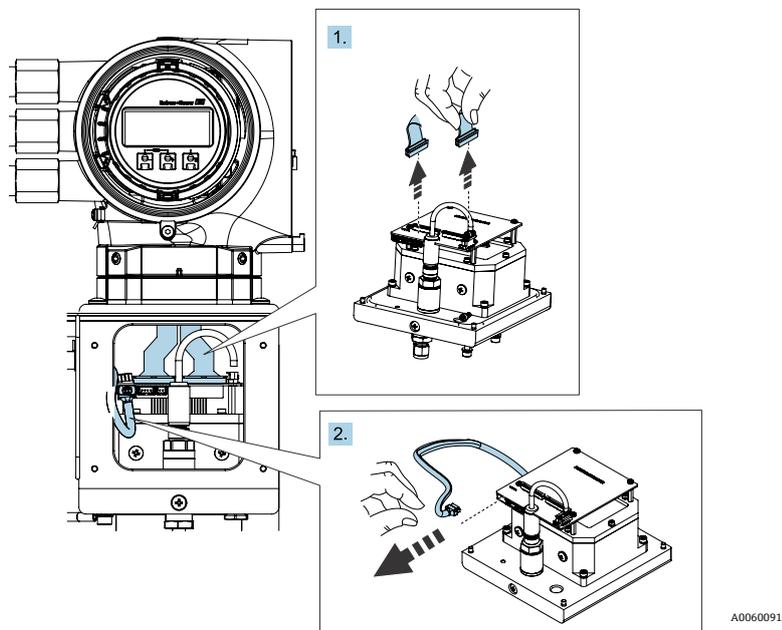


A0060088

4. Remove the optical head cover and disconnect the interior ground cable.

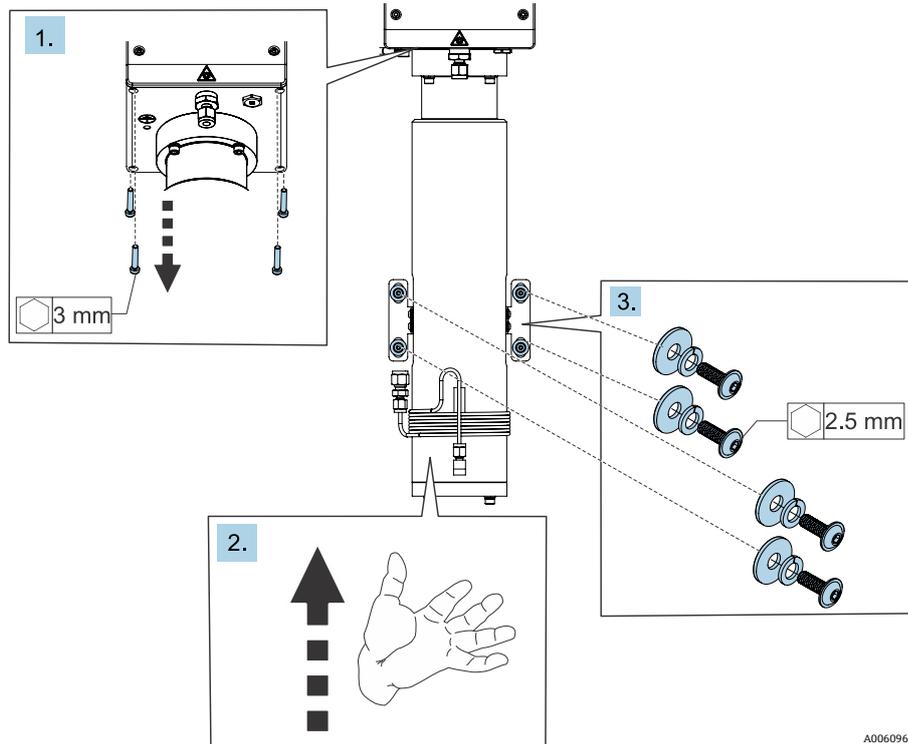


5. Disconnect flex cables and RS485 cable from the optical head electronics.



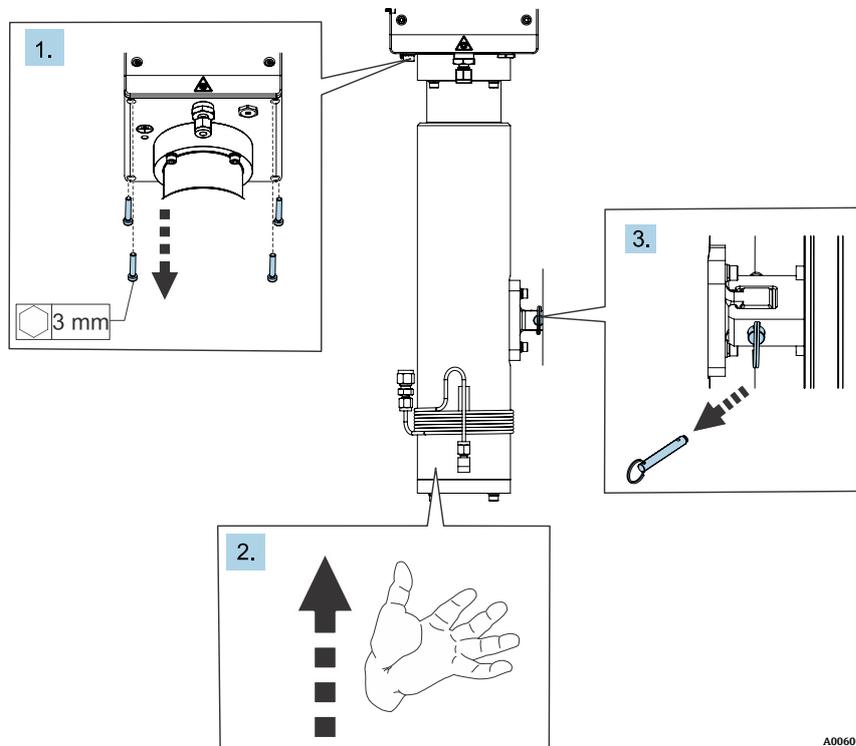
6. Remove mounting hardware securing the optical head and measurement cell to the enclosure:

- **Rear-mounted bracket:** Remove four screws securing the optical head to the enclosure, then remove four flange screws securing the bracket to the panel.



A0060965

- **Side-mounted bracket:** Remove four captive screws securing the optical head, then pull the connecting pin to separate bracket components.

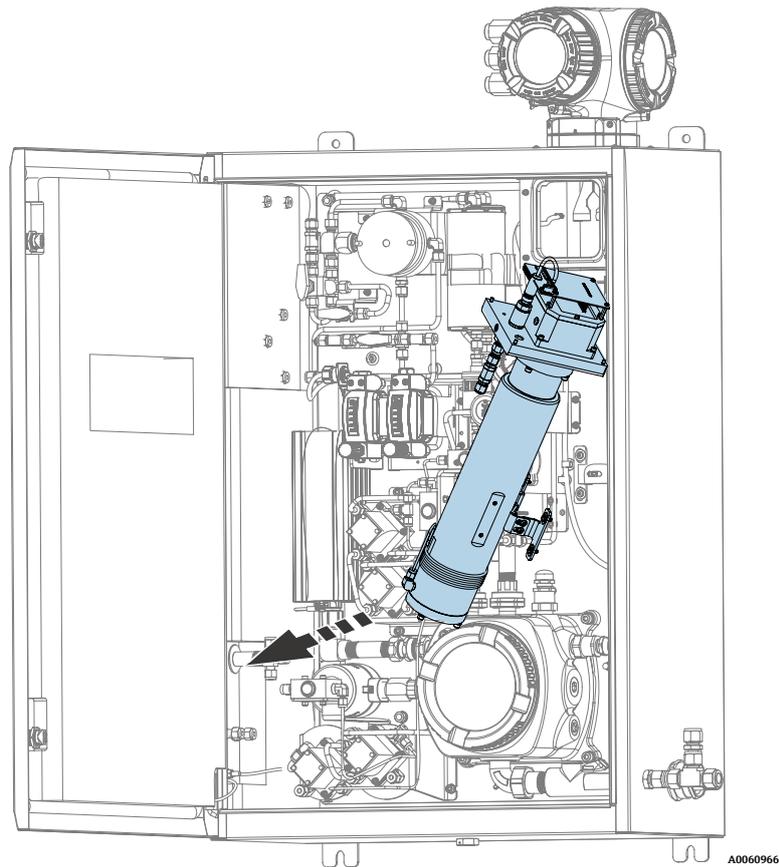


A0060080

NOTICE

- ▶ Support the measurement cell while removing the rear flange screws. The cell is heavy and may fall if not properly supported.

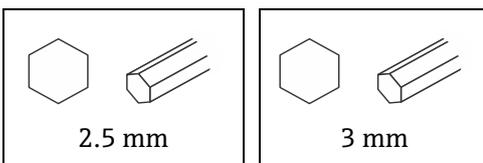
7. Tilt the spectrometer assembly to remove. Avoid contact with other assemblies inside the enclosure.



4.2 Install the new spectrometer assembly

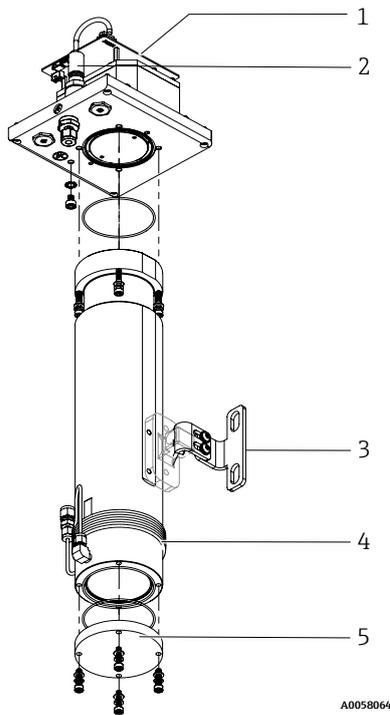
Tools and materials

- 2.5 mm and 3 mm hex keys
- Optical head and measurement cell kit (part number 71656062 or 71656066)
- Grease (e.g., Syntheso Glep PN: 1600002139)



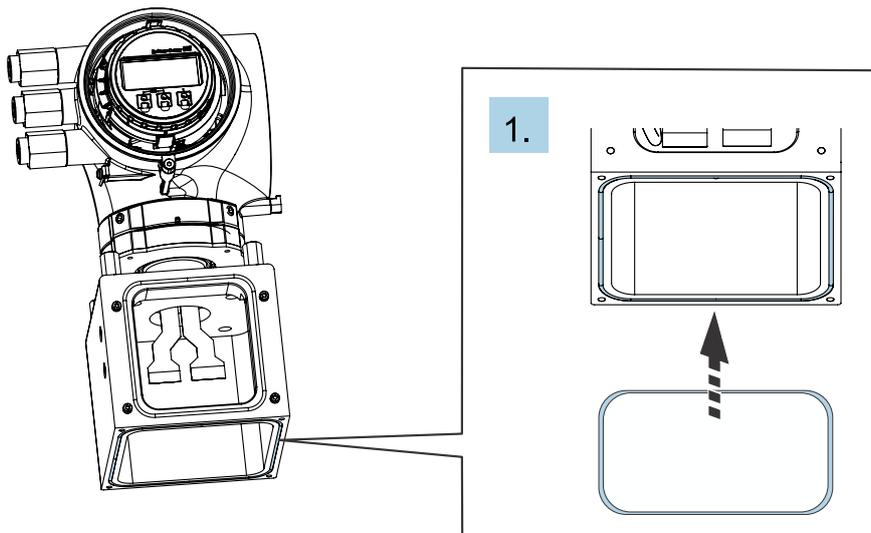
To install the spectrometer assembly

1. Verify the new spectrometer assembly includes:
 - Optical head electronics (OHE) PCBA installed (1).
 - Pressure cable connected (2).
 - Bracket installed (3).
 - Gas fitting and coil installed (4).
 - Mirror cap installed (5).



A0058064

2. Ensure the O-ring is seated in the optical head enclosure groove and lubricated with grease.
 - Replace if removed or missing. To order a replacement kit, refer to kit number 70188826.

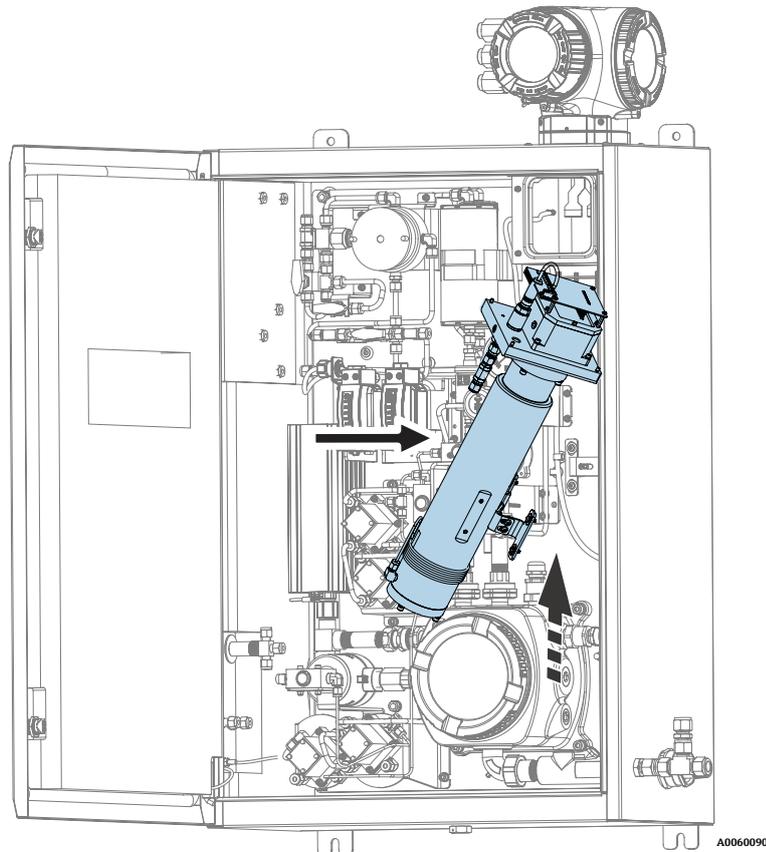


A0060093

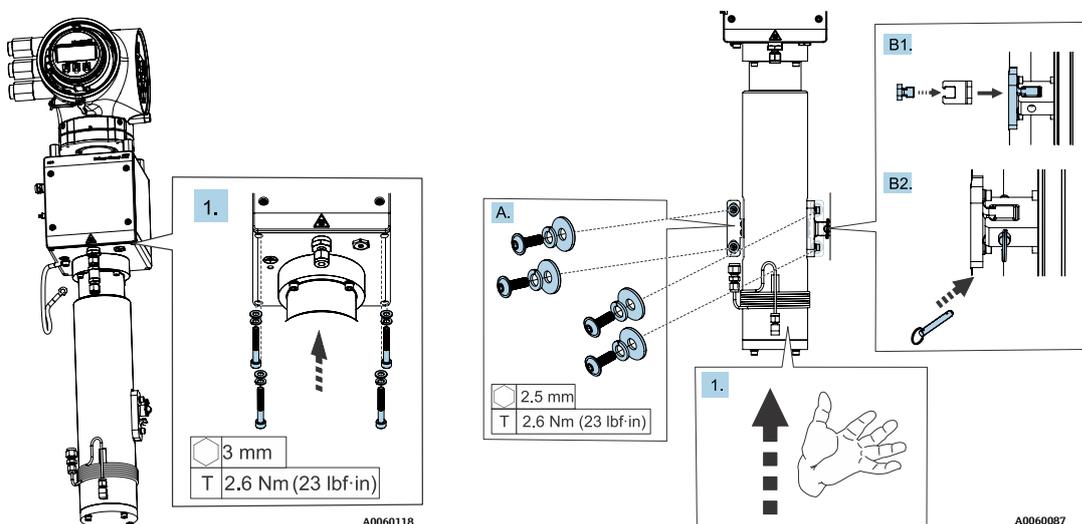
3. Carefully guide the measurement cell and optical head assembly into position, avoiding contact with the optical head enclosure circuit board (PCBA).

NOTICE

- Position the measurement cell so the gas connections face outward.



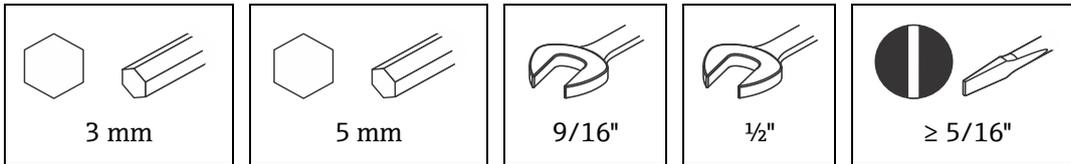
4. Install the four M4 screws with a flat washer and split ring washer.
5. Secure the spectrometer assembly based on bracket type:
 - **Rear-mounted bracket**
 - a. Install the four M4 screws connecting the T-plate to the optical enclosure with a flat washer and split ring washer.
 - b. Align and secure the bracket to the back of the enclosure (A).
 - **Side-mounted bracket**
 - c. Insert the connecting pin fully, ensuring the bracket is fully engaged and secured (B1, B2).
 - d. Install the four M4 screws connecting the T-plate to the optical enclosure with a flat washer and split ring washer.



4.3 Reconnect cables and fittings

Tools and materials

- 3 mm and 5 mm hex keys
- 1/2" and 9/16" wrenches
- 5/16" flathead screwdriver
- Grease (e.g., Syntheso Glep PN: 1600002139)

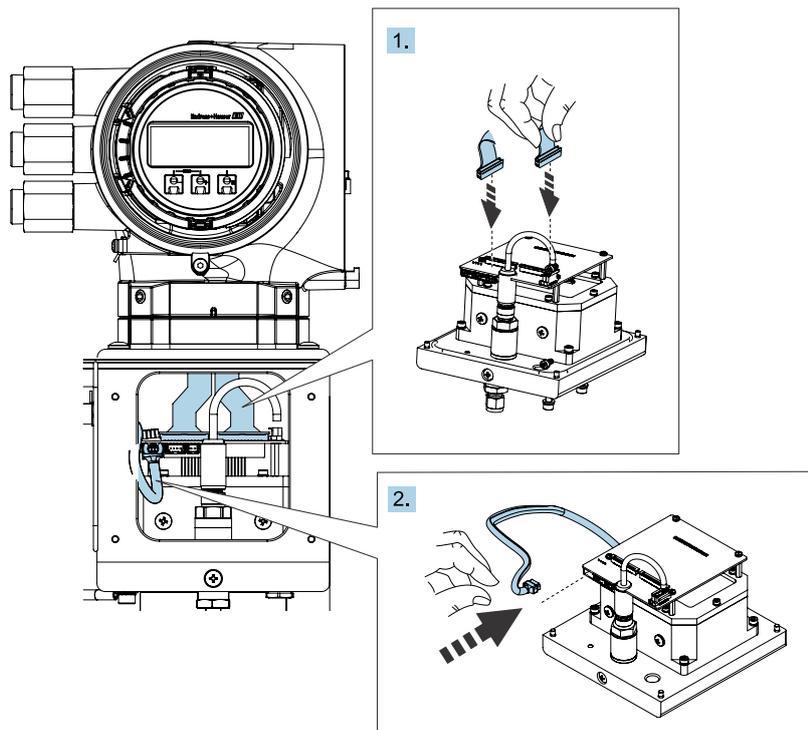


To finish the optical head replacement, reconnect the cables and fittings:

1. Reconnect flex cables and RS485 cable.

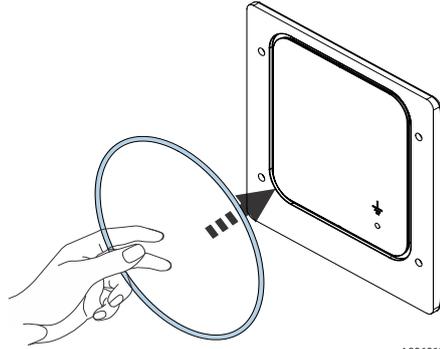
NOTICE

- ▶ Secure the flex cables carefully, as they are fragile and may break if forced.



2. Verify O-ring in optical head cover is present; replace if necessary.

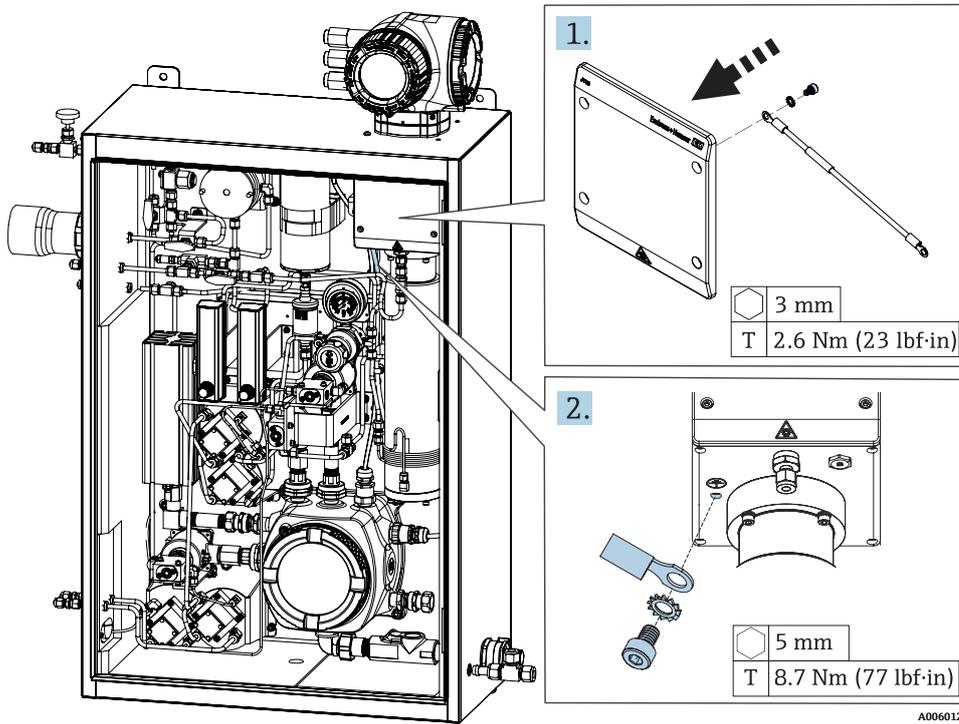
- i** If missing, replace it using kit number 70188826. To replace the O-ring, apply a generous amount of grease to Viton O-ring #159 and press it into the groove.



A0060123

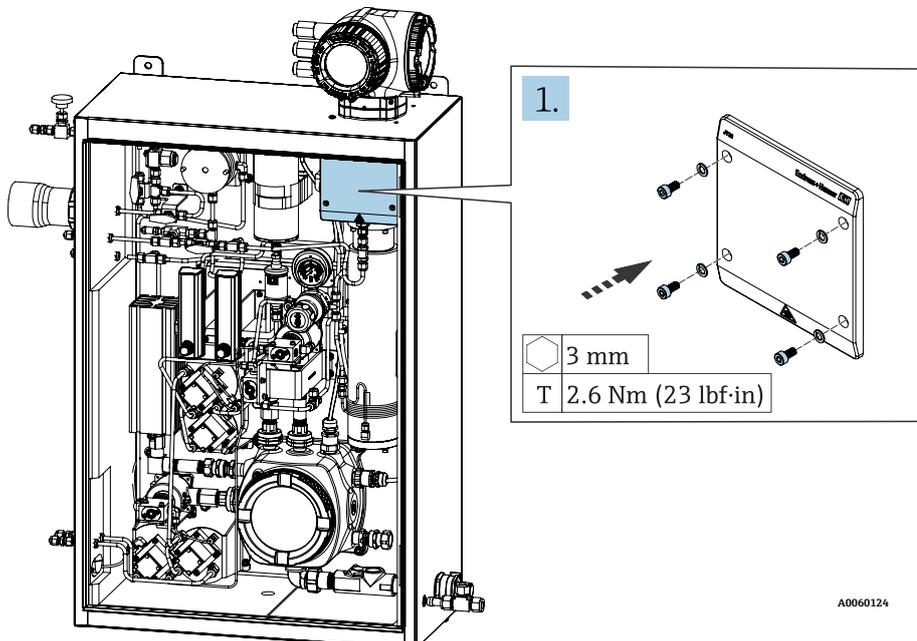
i O-ring #159 is circular in shape but installs into a square groove. Groove shape is square for proper sealing.

3. Reinstall the transition plate and optical head cover grounding cables.



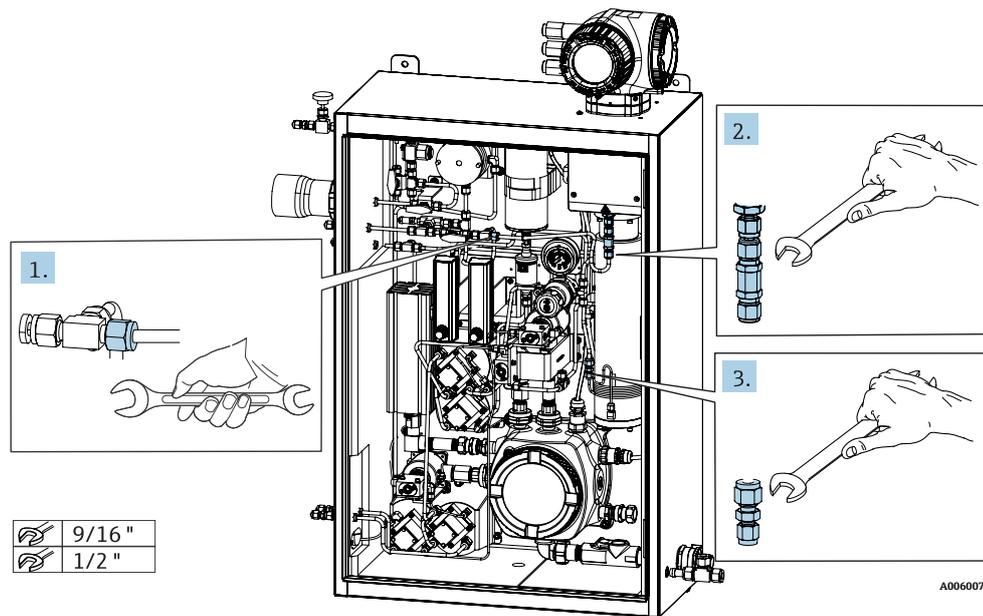
A0060121

4. Reinstall the optical head cover.



A0060124

5. Reconnect the gas piping to the inlet and outlet to hand-tight plus $\frac{1}{4}$ turn.



6. Power on the unit and monitor system alarms.

i The temperature, restart, and pressure alarms are expected upon turning on the system. If there are other alarms or if any alarms persist, check the Operating Instructions (BA02297C) or contact Service.

7. Conduct a leak test.
8. Close the enclosure using a 5/16" flathead screwdriver.
9. Allow the system to reach its set point temperature; this process may take up to 8 hours.
10. Validate the analyzer following the procedures in *Validation of TDLAS gas analyzers (SD03286C)*.

5 Measurement cell replacement

This chapter provides step-by-step instructions for safely removing and replacing the JT33 measurement cell to ensure proper maintenance and continued system performance.

Replacement of the measurement cell is only recommended for customers or service personnel that have completed advanced TDLAS service training. Contact Endress+Hauser service for more information.

- i** This procedure references parts from the combined *Optical head and measurement cell kit* → . Refer to the kit description section for details.

WARNING

The measuring device is energized! Risk of fatal injury from electric shock.

- ▶ Open the measuring device only when the device is de-energized.

CAUTION

Hot surfaces! Risk of injury!

- ▶ Before commencing work: allow the system and measuring device to cool down to a touchable temperature.
- ▶ Before removing the device: set the process to a safe state and purge the pipe of dangerous process substances.
- ▶ After removing the electronics compartment cover: risk of electrical shock due to missing touch protection!

NOTICE

Risk of damaging the electronic components!

- ▶ Ensure you have a working environment protected from electrostatic discharge.

5.1 Remove the measurement cell

The JT33 measurement cell may be mounted to the enclosure wall using a rear bracket or side bracket. Refer to the instructions that apply to your configuration.

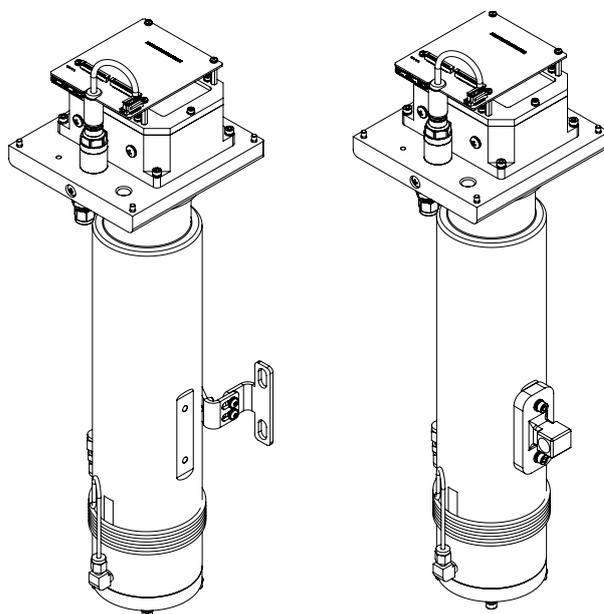
WARNING

INVISIBLE LASER RADIATION - The sample cell assembly contains a low power, 10 mW maximum, CW Class 3B invisible laser with a wavelength between 750 to 3000 nm.

- ▶ Never open the sample cell flanges or the optical assembly unless the power is turned off.

Process samples may contain hazardous material in potentially flammable and/or toxic concentrations.

- ▶ Personnel must have a thorough knowledge and understanding of the physical properties and safety precautions for the sample contents before operating the SCS.
- ▶ Operate all valves, regulators, and switches in accordance with site lockout/tagout procedures.

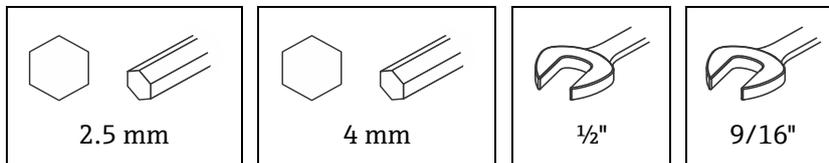


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Figure 11: Measurement cell with back mounting bracket (left) or side mounting bracket (right)

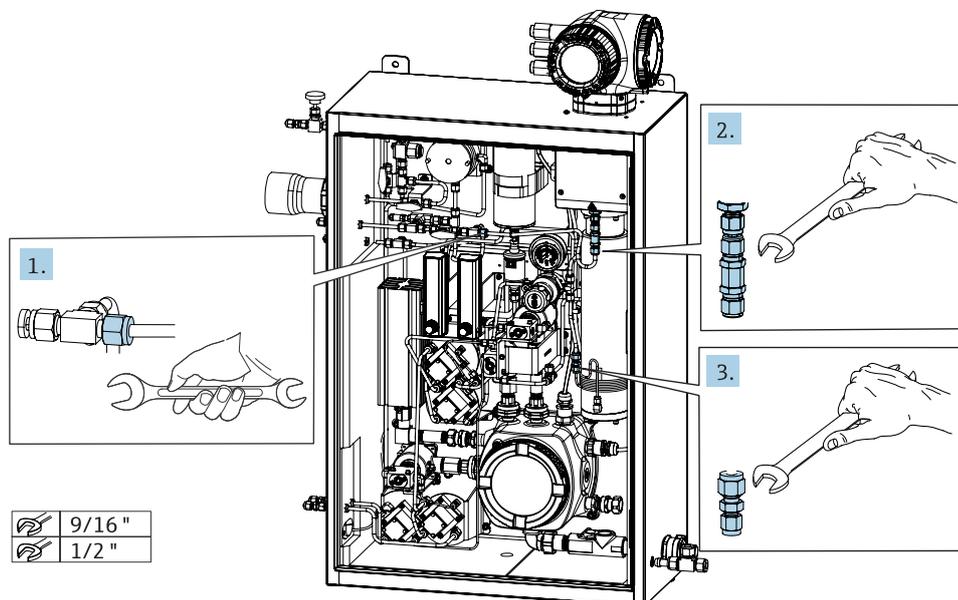
Tools and materials

- 2.5 mm and 4 mm hex drivers
- 1/2" and 9/16" wrenches
- M5 × 0.8 × 40 mm set screws (2)



To remove the measurement cell:

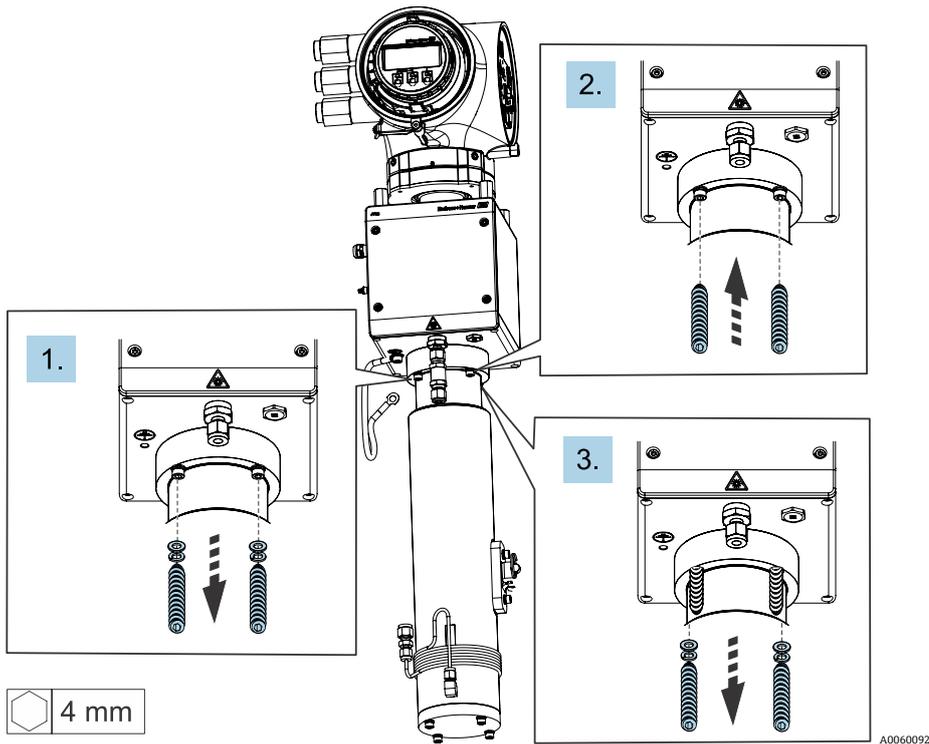
1. Turn off the analyzer and purge the sample cell. Refer to the instructions in *Turning off and purging the instrument* → .
2. Disconnect tubing from the spectrometer inlet and outlet. Additional tubing may need to be removed to access the spectrometer.



3. Remove the measurement cell from the optical head:
 - a. Remove two screws connecting the measurement cell to the optical head transition plate.
 - b. Install two M5 × 40 mm set screws as guides to prevent mirror damage during removal.
 - c. Remove remaining two screws and separate the measurement cell from the optical head.

NOTICE

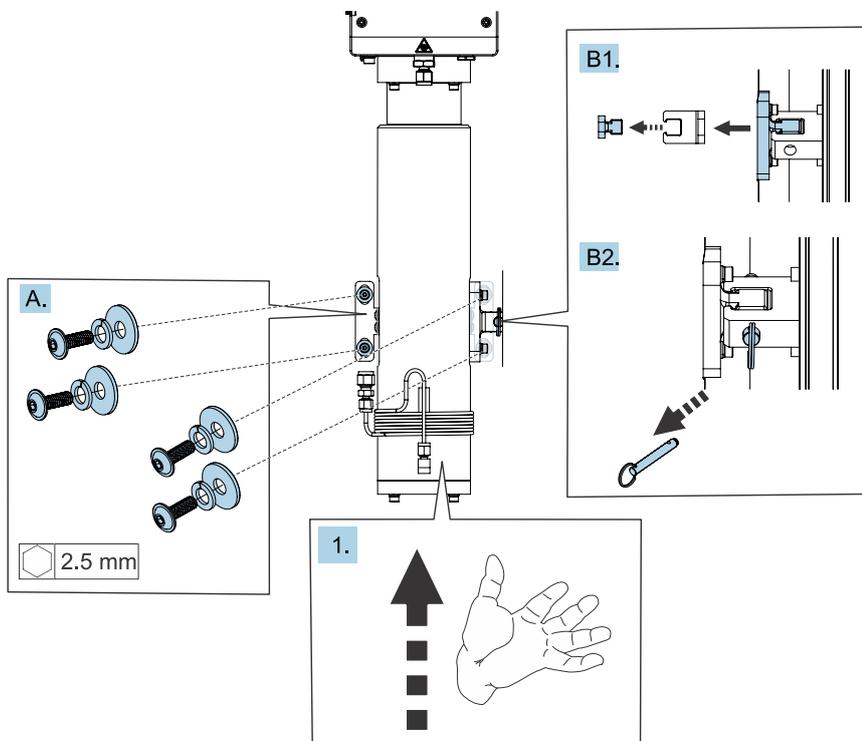
- ▶ Handle the measurement cell with care. The near mirror is located on the bottom of the optical head. Avoid impact and do not touch the mirror surface. Proceed with caution during installation.



4. Remove the measurement cell from the enclosure:

NOTICE

- ▶ Due to the weight of the assembly, the measurement cell must be supported when removing the screws (1).
- **Back-mounted bracket:** Remove the four flange screws securing the bracket to the panel (A).
- **Side-mounted bracket:** Pull the connecting pin to separate the 2 bracket components (B1, B2).



5. Carefully remove the measurement cell. Support the tube during removal and ensure it does not contact other assemblies inside the enclosure.

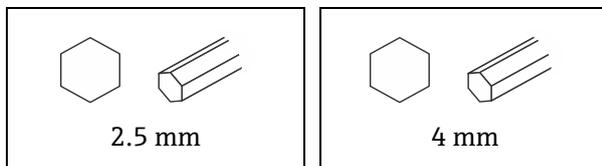
5.2 Install the enclosure bracket onto the new measurement cell

The JT33 measurement cell may be mounted to the enclosure wall using a rear bracket or side bracket. Refer to the instructions that apply to your configuration. Refer to Figure 10.

5.2.1 Installing a back-mounted bracket

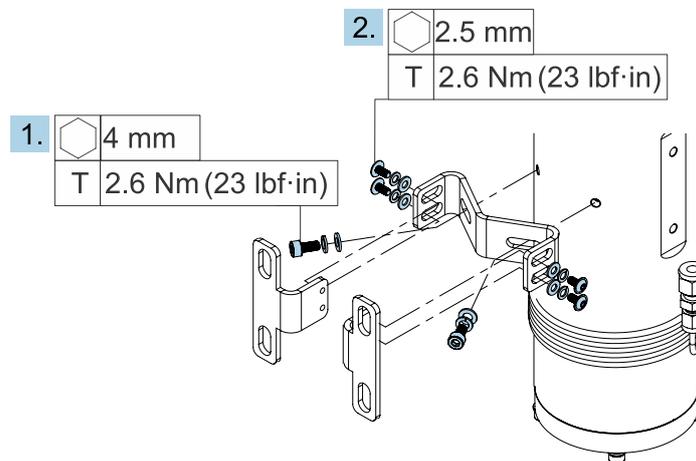
Tools and materials

- Measurement cell from the *Optical head and measurement cell kit* (part number 71656062 or 71656066)
 -  To remove the measurement cell from the optical head, refer to Disconnect the measurement cell → .
- Spectrometer rear support bracket and legs
- M5 × 0.8 × 10 mm screws (2) with locking and flat washers
- M4 × 0.7 × 8 mm flange back screws (2) with locking and flat washers
- 2.5 mm and 4 mm hex drivers



To install the back bracket onto the replacement cell

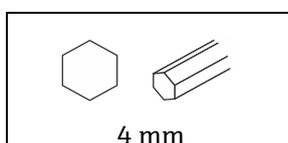
1. Ensure the following components are installed:
 - The mirror cap. Refer to *Far mirror kit* (part number 71656065) → .
 - Gas fittings and coil. Ensure the assembly is properly prepared for connection.
2. Install the spectrometer rear support bracket using two M5 × 10 mm screws.
3. Attach legs to each side of the support bracket with two M4 × 8 mm screws.



5.2.2 Installing a side-mounted bracket

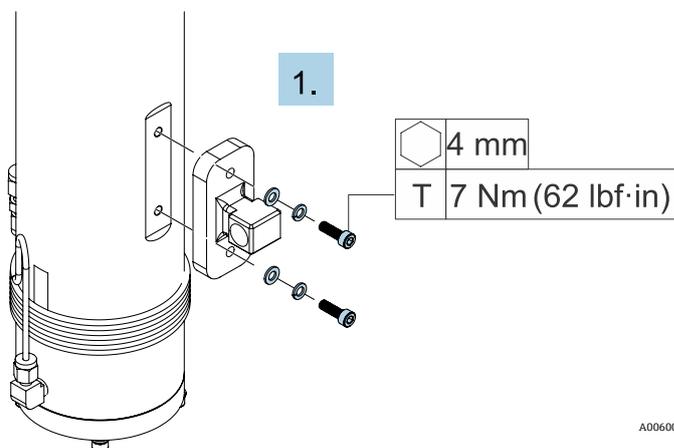
Tools and materials

- Spectrometer side support bracket and legs
- M5 × 10 mm screws (2) with flat washers (2) and lock washers (2)
- 4 mm hex driver



To install the side bracket on the replacement cell

1. Ensure the following components are installed:
 - The mirror cap. Refer to *Far mirror kit* (part number 71656065) → .
 - Gas fittings and coil. Ensure the assembly is properly prepared for connection.
2. Install the analyzer support bracket using two M5 × 10 mm screws and washers.

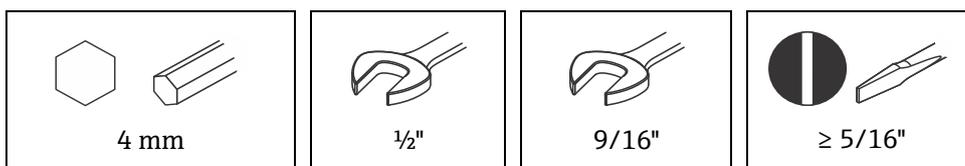


5.3 Replace the measurement cell

The JT33 measurement cell may be mounted to the enclosure wall using a rear bracket or side bracket. Refer to the instructions that apply to your configuration. Refer to Figure 10.

Tools and materials

- Viton O-ring, #036
- M5 × 0.8 × 35 mm screws (4) with flat and split ring washers
- M4 × 0.7 × 12 mm screws (4) with flat and split ring washers (for rear spectrometer bracket only)
- 4 mm hex driver
- ½" and 9/16" wrenches
- 5/16" flathead screwdriver
- Non-outgassing grease (e.g., HP300 (PN:1600002114))

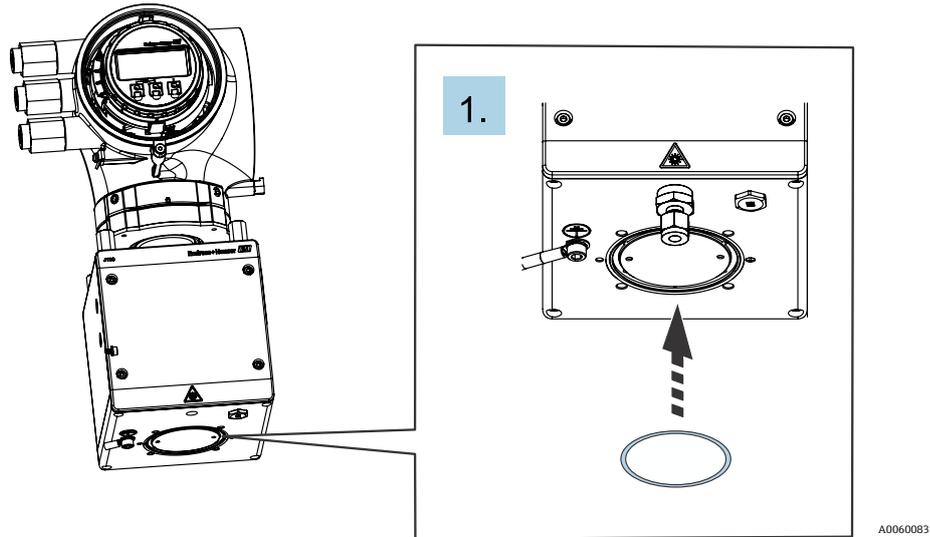


To replace the measurement cell

1. Ensure that the O-ring seated at the bottom of the optical head transition plate is present. If it is missing, replace it.
 - i** To replace the O-ring, apply a generous amount of non-outgassing grease to the O-ring (Viton, #036). Carefully place the O-ring in the O-ring groove of the optical head transition plate. The grease keeps it in place.

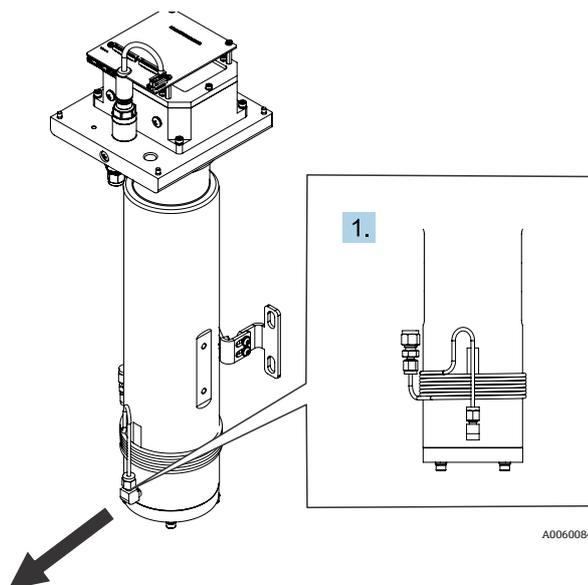
NOTICE

- ▶ The near mirror is located on the bottom of the optical head. Avoid impact and do not touch the mirror surface. Proceed with caution during installation.



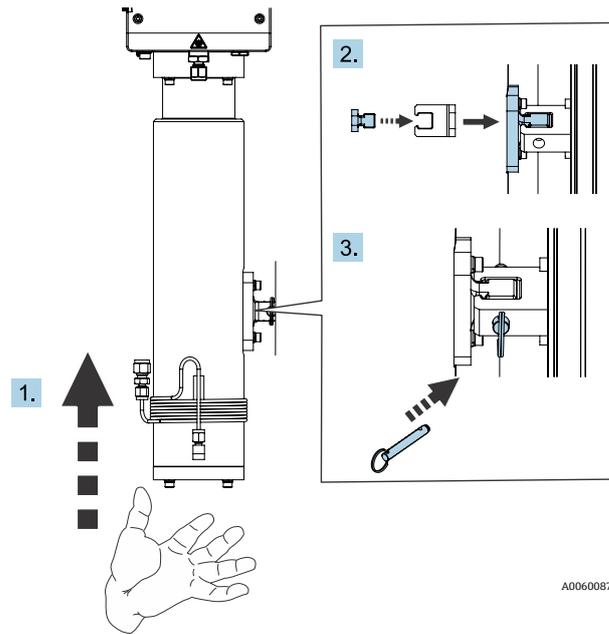
2. Position the measurement cell assembly:

- a. Verify that the set screws from Step 4 of *Remove the measurement cell* are still installed. If not, reinstall them to assist with alignment during installation.
- b. Guide the assembly into place, ensuring the front gas connections face outward.



3. Secure the spectrometer assembly based on bracket type:

- **Side-mounted bracket**
 - a. Insert the connecting pin fully.
 - b. Verify full bracket engagement and secure the bracket (B1, B2).
This bracket must be secured before installing the measurement cell.
- **Rear-mounted bracket**
Do not install the rear bracket yet. Proceed to Step 4 to install the measurement cell first.



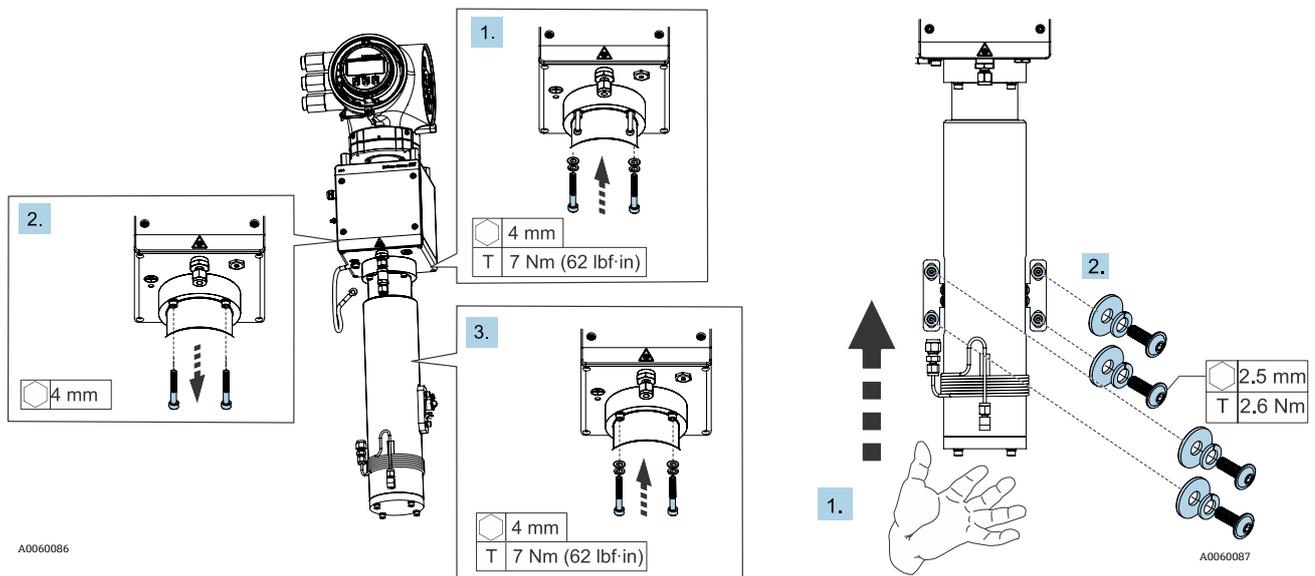
4. Secure the measurement cell to the transition plate:
 - a. Install two M5 × 35 mm screws with washers.
 - b. Remove the guide screws and install the remaining two M5 × 35 mm screws.

NOTICE

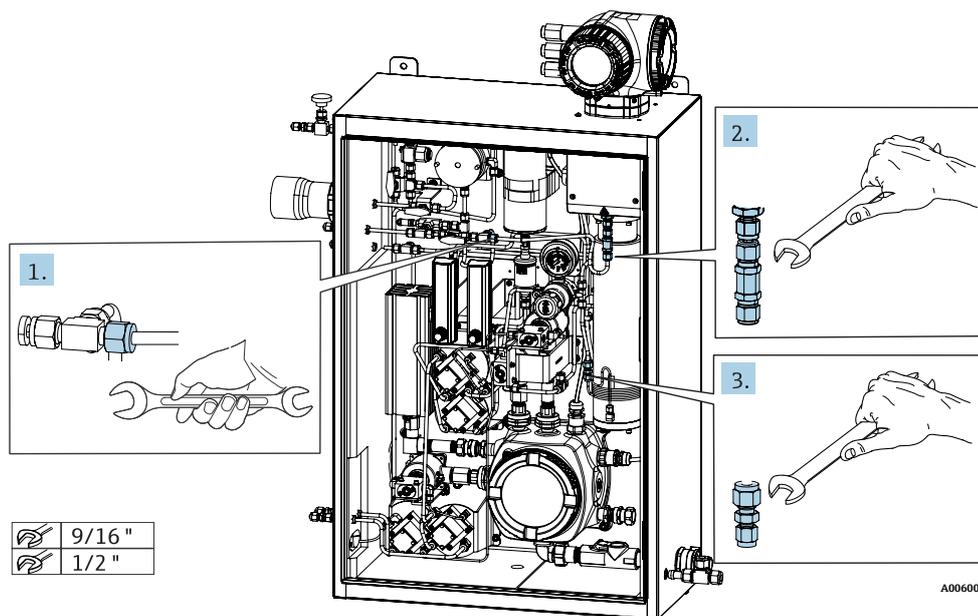
► Avoid impact and do not touch the near mirror surface. Proceed with caution during installation.

c. If using a rear mounted bracket:

Align the bracket with the enclosure wall and secure it with four M4 screws.



5. Reconnect the gas piping to the inlet and outlet to hand-tight plus $\frac{1}{4}$ turn.



6. Power on the unit and monitor system alarms.

i The temperature, restart, and pressure alarms are expected upon turning on the system. If there are other alarms or if any alarms persist, check the Operating Instructions (BA02297C) or contact Service.

7. Conduct a leak test.
8. Close the enclosure using a 5/16" flathead screwdriver.
9. Allow the system to reach its set point temperature; this process may take up to 8 hours.
10. Validate the analyzer following the procedures in *Validation of TDLAS gas analyzers (SD03286C)*.

6 Pressure sensor replacement

This procedure describes how to remove and replace the pressure sensor.

⚠ WARNING

INVISIBLE LASER RADIATION: The measurement cell assembly contains a low-power, Class 1 CW (≤ 35 mW, 750-3000 nm).

- ▶ **Power off the analyzer** before opening measurement cell flanges or optical assemblies.
- ▶ Only use tools with a safety rating for protection against accidental contact with voltage up to 1000 V (IEC 900, ASTF-F1505-04, VDE 0682/201).

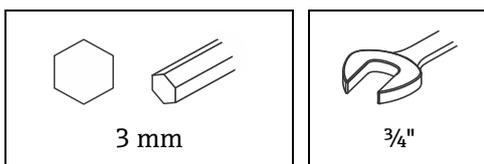
Hazardous process samples

Samples may contain flammable or toxic materials.

- ▶ Personnel must understand the physical properties and safety precautions of the sample.
- ▶ Operate all valves, regulators, and switches in accordance with site lockout/tagout procedures.

6.1 Tools and materials

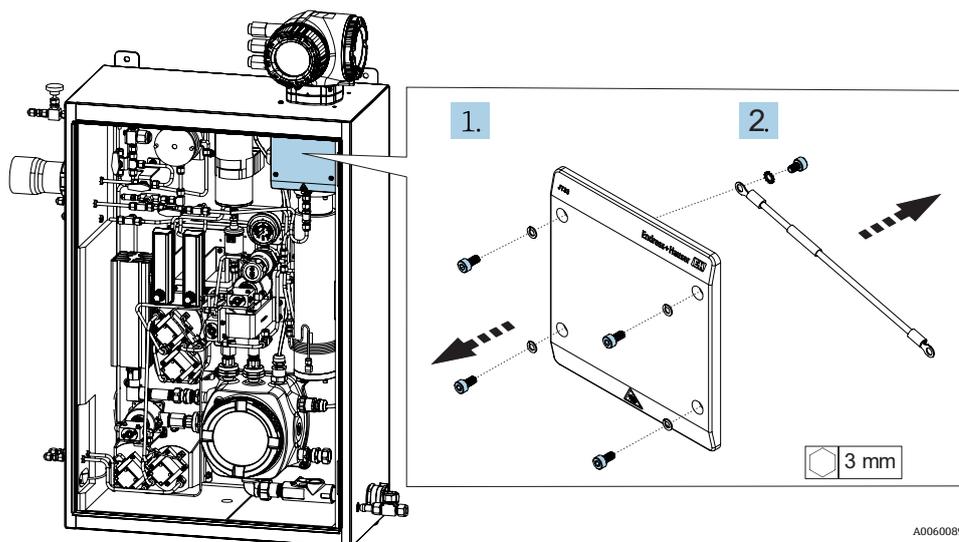
- 3 mm hex key
- $\frac{3}{4}$ " wrench
- Non-outgassing grease (e.g., HP300 (PN:1600002114))



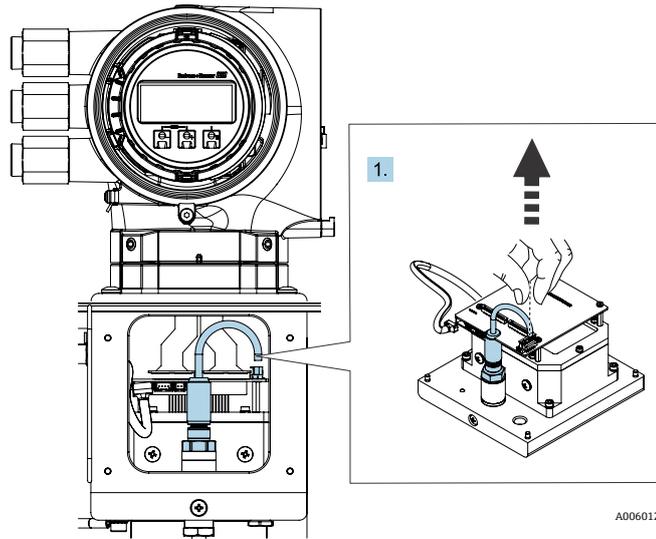
6.2 Remove the pressure sensor

To remove the pressure sensor

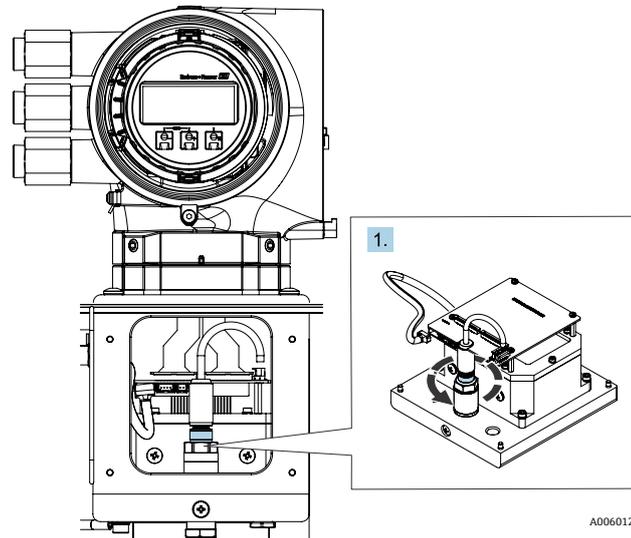
1. Turn off the analyzer and purge the sample cell. Refer to *Turning off and purging the instrument* → .
2. Remove the optical head cover and disconnect the interior grounding cable.



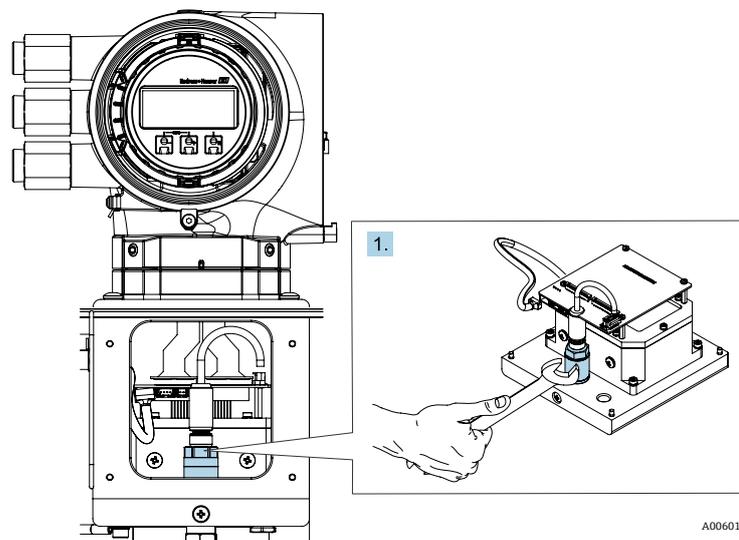
3. Disconnect the pressure sensor cable from the optical head electronic (OHE) board.



4. Unscrew the M12 cable from the pressure sensor, then carefully disconnect the cable.



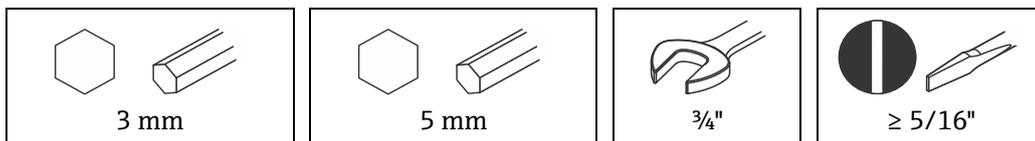
5. Remove the pressure sensor from the transition plate using a 3/4" wrench.



6.3 Install the new pressure sensor

6.3.1 Tools and materials

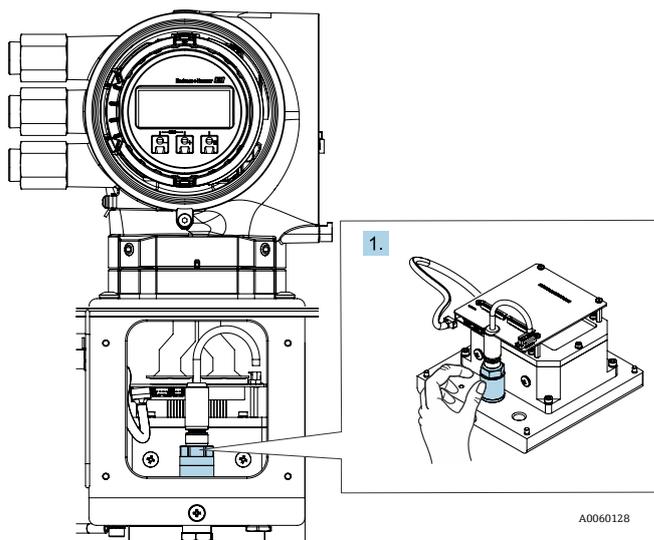
- 3 mm and 5 mm hex keys
- 3/4" wrench
- 5/16" flathead screwdriver
- Grease (e.g., Syntheso Glep PN: 1600002139)



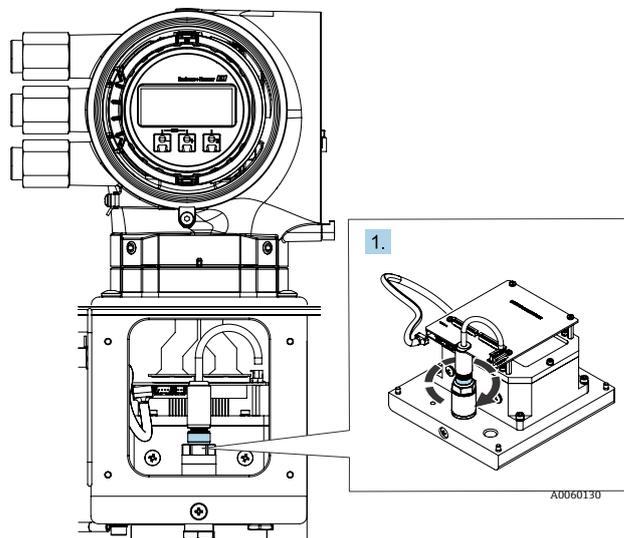
6.3.2 Installing a new pressure sensor

To install a new pressure sensor

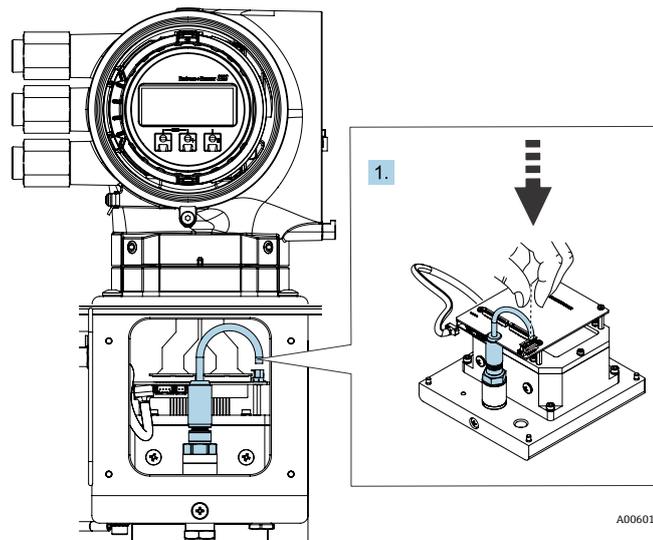
1. Locate the O-ring between the transition plate and pressure sensor. Ensure it is lubricated with non-outgassing grease.
2. Lubricate the threads of the pressure sensor with a small amount of non-outgassing grease.
3. Finger-tighten the pressure sensor and cable plus 1/4 turn to approximately 2 Nm (18 lbf·in).



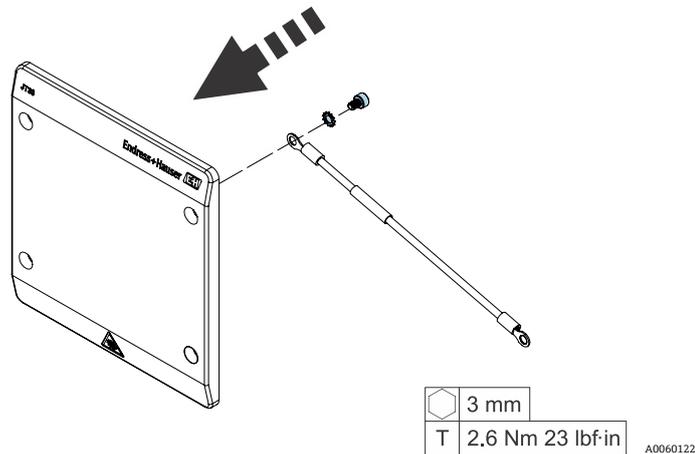
4. Connect the M12 cable to the pressure sensor.



- Connect the M12 cable to the optical head electronic (OHE) board.

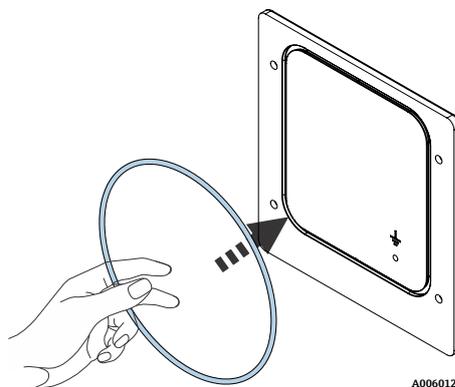


- Reinstall the ground cable onto the optical head cover.



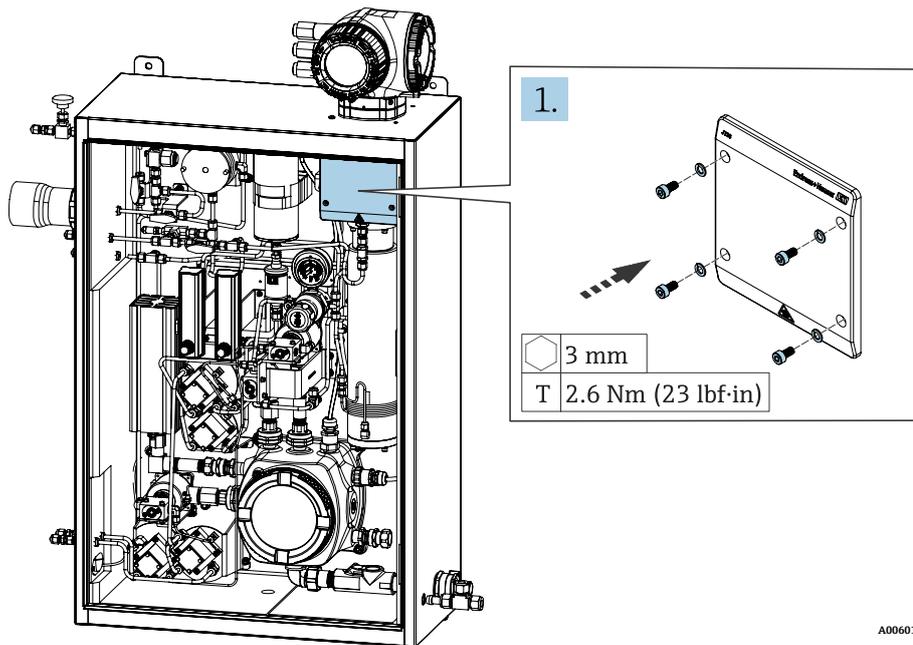
- Verify O-ring in optical head cover is present; replace if necessary.

i If missing, replace it using kit number 70188826. To replace the O-ring, apply a generous amount of grease to Viton O-ring #159 and press it into the groove.



i O-ring #159 is circular in shape but installs into a square groove. Groove shape is square for proper sealing.

- Reinstall the optical head cover.



9. Power on the unit and monitor system alarms.

i The temperature, restart, and pressure alarms are expected upon turning on the system. If there are other alarms or if any alarms persist, check the Operating Instructions (BA02297C) or contact Service.

10. Close the enclosure using a 5/16" flathead screwdriver.

11. Allow the system to reach its set point temperature; this process may take up to 8 hours.

12. Validate the analyzer following the procedures in *Validation of TDLAS gas analyzers (SD03286C)*.

7 Mirror cleaning and replacement

Contamination on internal optics can trigger a Detector Reference Level Range Exceeded fault. Review the following notices and warnings before performing this procedure.

NOTICE

- ▶ Do not clean the top mirror. If the top mirror is visibly contaminated or scratched in the clean area (see *Required clean area on mirror* → ) , contact *Service* → .
- ▶ Clean the measurement cell mirror only if contamination is minimal. Otherwise, contact *Service* → .
- ▶ Mark the mirror orientation before removal to ensure proper reassembly and system performance.
- ▶ Handle the optical assembly only by the mount edges. Do not touch coated mirror surfaces.
- ▶ Do not use pressurized gas dusters; propellants may leave residue on optics.
- ▶ Never rub optical surfaces, especially with dry tissues, to avoid damage.
- ▶ This procedure is not part of routine maintenance and should be performed only when necessary.

WARNING

INVISIBLE LASER RADIATION: The measurement cell assembly contains a low-power, Class 1 CW (≤ 35 mW, 750-3000 nm).

- ▶ Power off the analyzer before opening measurement cell flanges or optical assemblies.

WARNING

Hazardous process samples

Samples may contain flammable or toxic materials.

- ▶ Personnel must understand the physical properties and safety precautions of the sample.
- ▶ Operate all valves, regulators, and switches in accordance with site lockout/tagout procedures.

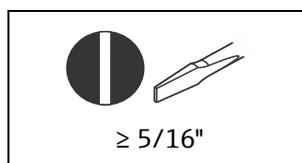
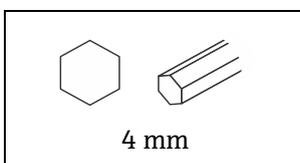
7.1 Clean the mirror

Follow the steps below to properly clean the cell assembly mirror and ensure optimal optical performance. The procedure for cleaning the measurement cell mirror includes:

- Purging the SCS and removing the mirror assembly
- Cleaning the cell assembly mirror
- Replacing the mirror assembly and components

7.1.1 Tools and materials

- Lens cleaning cloth (e.g., Cole-Parmer® EW-33677-00 or equivalent)
- Reagent-grade isopropyl alcohol (e.g., Cole-Parmer® EW-88361-80)
- Small drop dispenser bottle (e.g., Nalgene® 2414 FEP)
- Acetone-resistant gloves (e.g., North NOR CE412W)
- Hemostats (e.g., Fisherbrand™ 13-812-24)
- Bulb blower or dry compressed air/nitrogen
- Permanent ink marker
- Non-outgassing grease (e.g., HP300 (PN:1600002114))
- 4 mm hex key
- 5/16" flathead screwdriver
- Flashlight

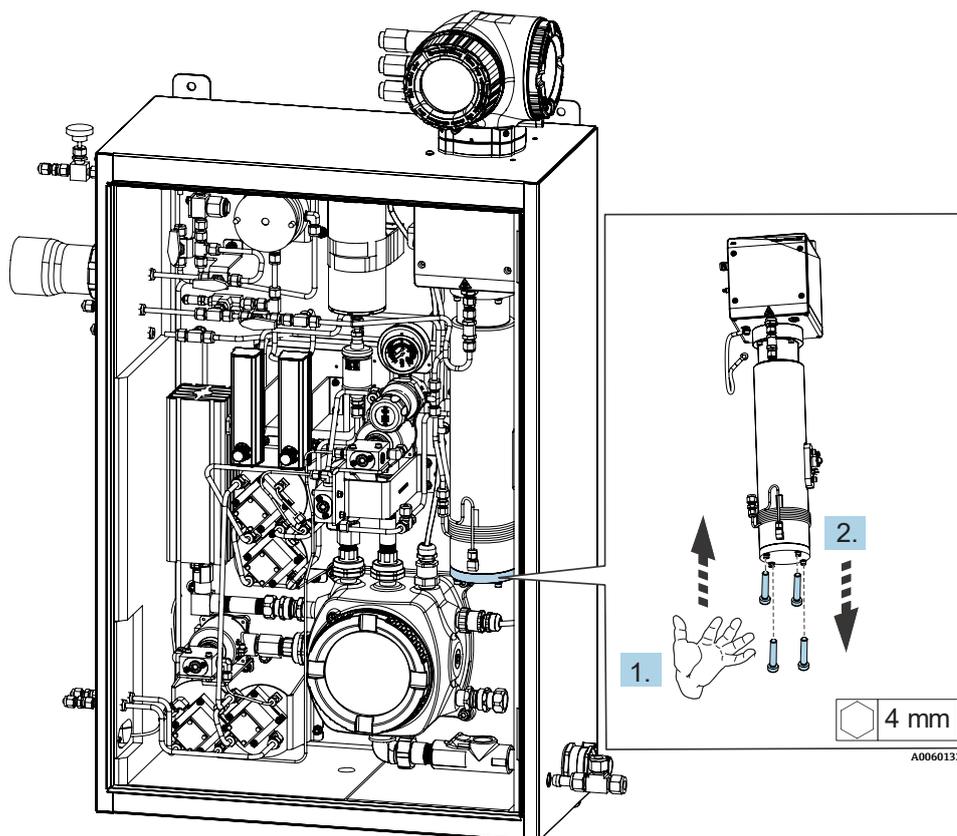


7.1.2 Cleaning the far mirror

For this procedure, wear clean, acetone-impenetrable gloves.

To clean the cell assembly mirror

1. Turn off the analyzer and purge the sample cell. Refer to *Turning off and purging the instrument* → 6.
2. Remove the far mirror assembly:
 - a. Mark the orientation of the mirror assembly on the cell body.
 - b. Use a 4 mm hex driver to remove the four M5 screws.
 - c. Support the bottom of the mirror cap assembly during removal.



3. Place the mirror assembly on a clean, stable surface.
 4. Use a bulb blower or dry compressed air/nitrogen to remove dust and debris.
 5. Clean the mirror:
 - a. Fold a lens cloth in half twice. Using hemostats or fingers, clamp near the fold to form a “brush.”
 - b. Apply a few drops of isopropyl alcohol to the mirror. Rotate the mirror to evenly distribute the liquid.
 - c. Wipe once in a single direction with gentle pressure. Discard the cloth.
- NOTICE**
- Use only **very** light pressure. The gold coating can be easily scratched.
- d. Repeat with a clean cloth to remove streaks.
6. Repeat Step 5 as needed until the required clean area is free of contamination. If the mirror remains dirty or scratched, replace the assembly.

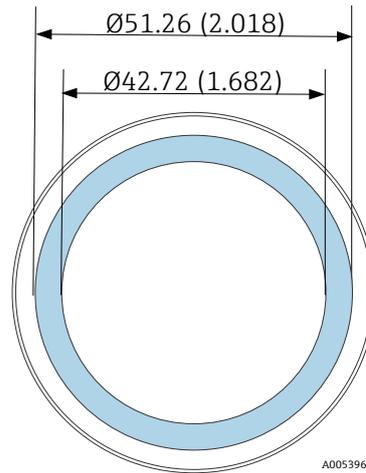
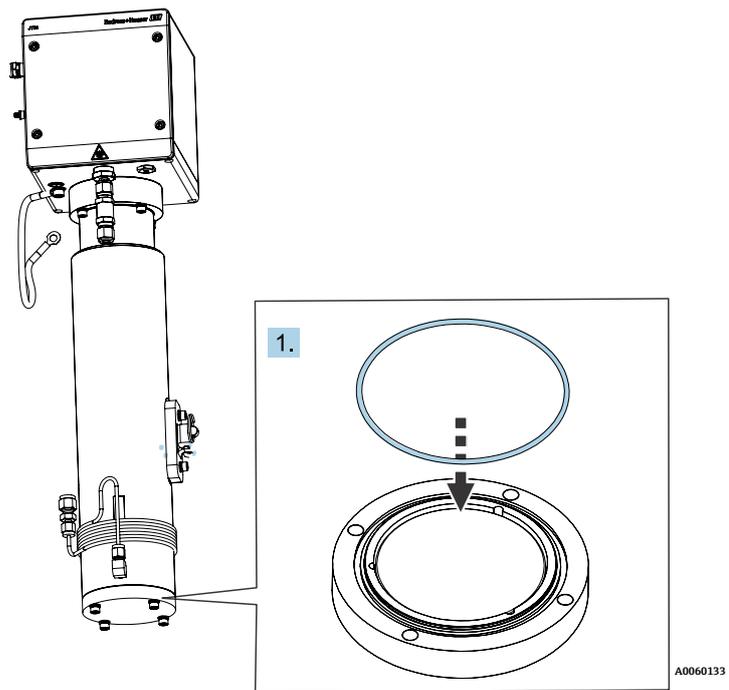


Figure 12. Required clean area on mirror shown in blue. Dimensions: mm (in)

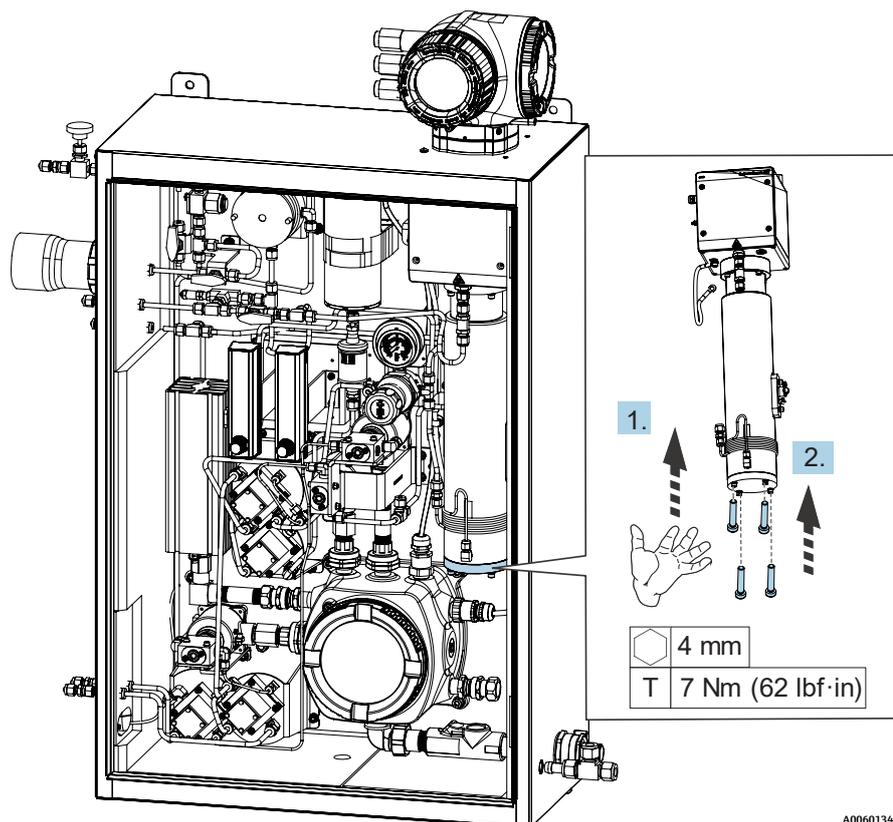
7. Reinstall the mirror assembly:
 - a. Align the mirror assembly with the previously marked orientation.
 - b. Apply a thin layer of non-outgassing grease to the O-ring.
 - c. Seat the O-ring properly in the groove.



NOTICE

- ▶ Do not touch the mirror surface.

- d. Install four M5 screws.



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8. Turn on the unit and monitor system alarms.

i The temperature, restart, and pressure alarms are expected upon turning on the system. If there are other alarms or if any alarms persist, check the *JT33 Operating Instructions (BA02297C)* or contact Service.

9. Close the enclosure using a 5/16" flathead screwdriver.

10. Allow the system to reach its set point temperature; this process may take up to 8 hours.

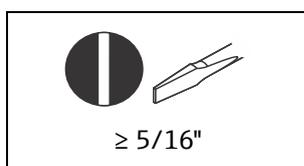
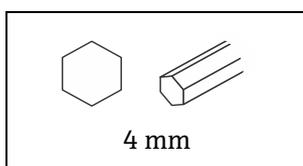
11. Validate the analyzer following the procedures in *Validation of TDLAS gas analyzers (SD03286C)*.

7.2 Replace the far mirror assembly

This section provides step-by-step instructions and required materials for replacing the far mirror assembly, including safety precautions and validation procedures to ensure optimal analyzer performance. NACE and MTR reports are available upon request.

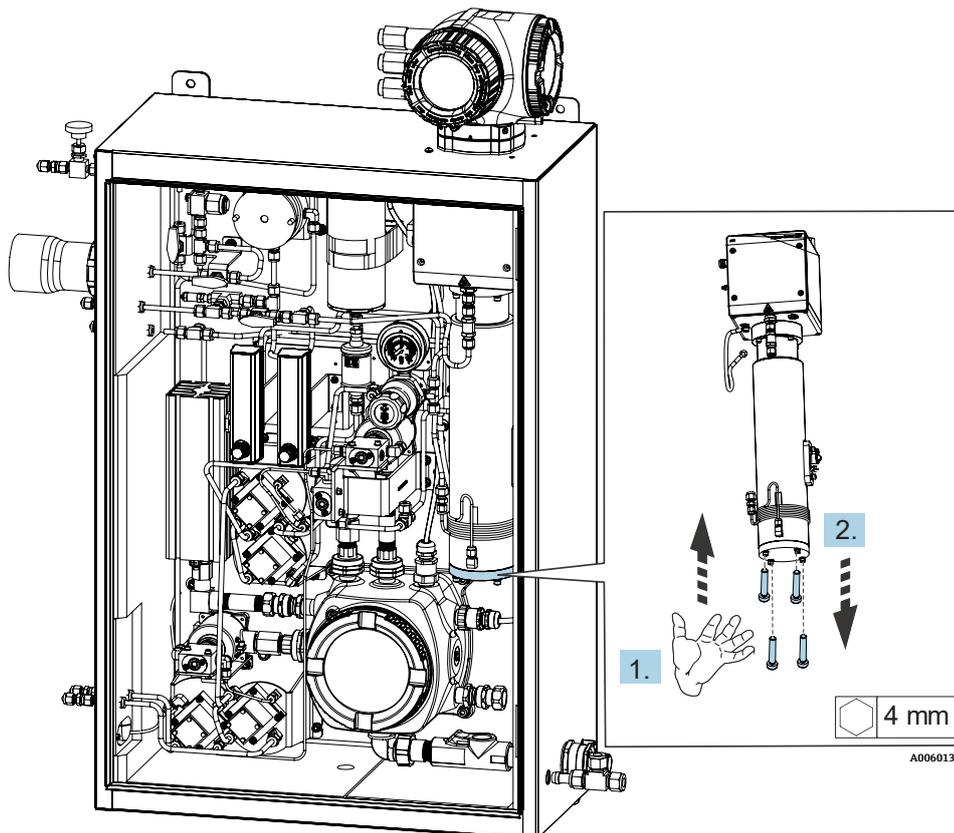
Tools and materials

- Far mirror assembly (part number 71656065)
- Flat washer (4)
- Lock washer (4)
- Viton O-ring lubricated with non-outgassing grease (e.g., HP300 (PN:1600002114))
- 4 mm hex key
- 5/16" flathead screwdriver
- Flashlight

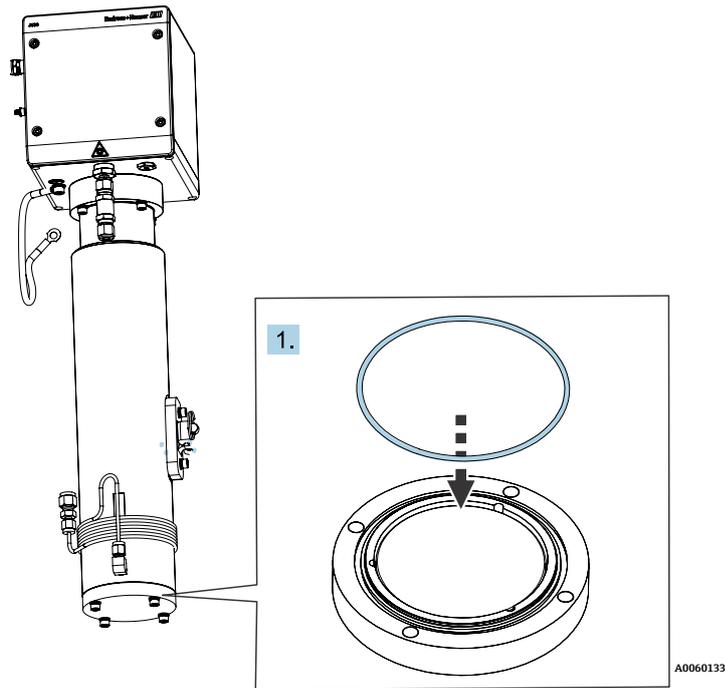


To replace the far mirror assembly

1. Turn off the analyzer and purge the sample cell. Refer to *Turning off and purging the instrument* → .
2. Access the measurement cell:
 - For analyzers in an enclosure, open the enclosure door.
 - For panel-mounted analyzers, access the optical head directly on the panel.
3. Remove the existing far mirror assembly:
 - a. Use a 4 mm hex driver to remove the four M5 screws.
 - b. Support the bottom of the mirror cap assembly during removal.



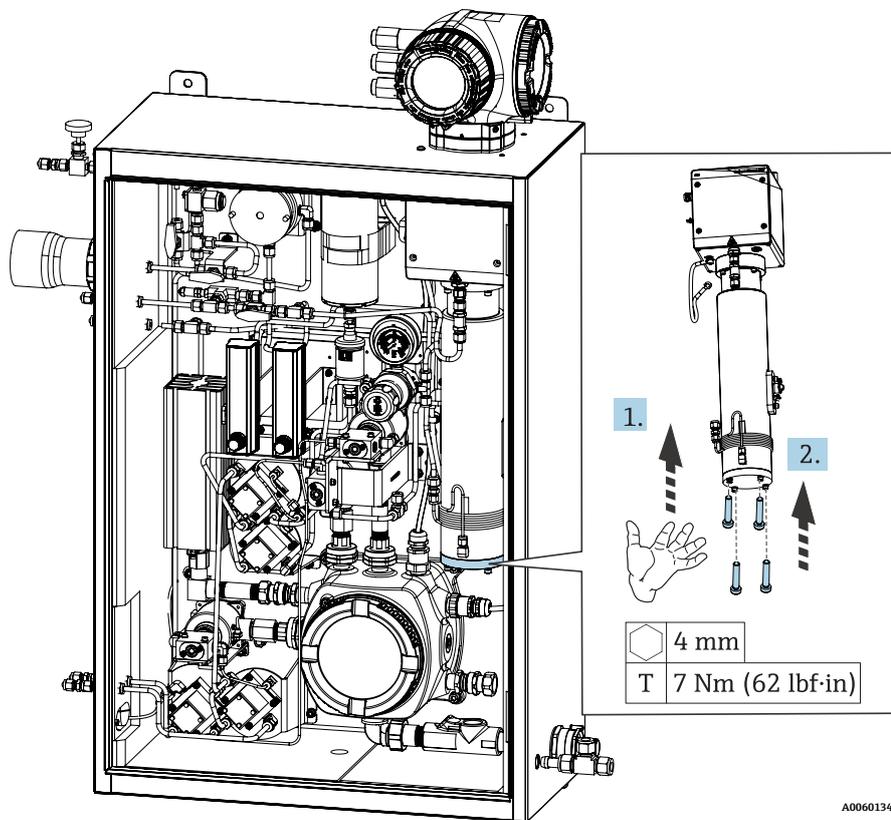
4. Discard the old mirror cap assembly.
5. Prepare the new mirror cap assembly:
 - Ensure the mirror surface is clean. Refer to *Cleaning the far mirror* →  if cleaning is needed.
 - Verify the O-ring is installed. If missing, apply non-outgassing grease and seat it into the groove.



NOTICE

► Do not touch the mirror surface.

6. Install the new assembly:
 - a. Align the mirror cap assembly with the bottom of the measurement cell. Support it until secured.
 - b. Install the four M5 screws using a 4 mm hex driver.



7. Power on the unit and monitor system alarms.

i The temperature, restart, and pressure alarms are expected upon turning on the system. If there are other alarms or if any alarms persist, check the *JT33 Operating Instructions (BA02297C)* or contact Service.

8. Close the enclosure using a 5/16" flathead screwdriver.
9. Allow the system to reach its set point temperature; this process may take up to 8 hours.
10. Validate the analyzer following the procedures in *Validation of TDLAS gas analyzers (SD03286C)*.

8 Disposal



If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, send them to separate collection facilities for recovery and recycling.

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