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Installation Instructions

TDLAS cell assembly mirror cleaning

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Table of Contents

1 Symbols 4

1.1 Safety symbols 4

1.2 Symbols for certain types of information 4

2 Intended use 5

3 Cell assembly mirror cleaning 6

3.1 Determining the type of cell mirror 6

3.2 Tools and supplies 7

3.3 Cleaning the mirror 7

1 Symbols

1.1 Safety symbols

Symbol	Description
	The High Voltage symbol that 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.
	Failure to follow all directions may result in analyzer damage/malfunction or injury to personnel.
	PROTECTIVE EARTH GROUND - Symbol indicates the connection point of the ground wire from the main power source.
	A sign that alerts people to the presence of visible and invisible radiation. They should avoid direct exposure to the beam and not disconnect the system while active.
	A sign that alerts people to the presence of containers or equipment with poisonous substances.

1.2 Symbols for certain types of information

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 Intended use

This is a general guideline intended for the SS500, SS500e, SS2000, SS2000e, SS3000, SS3000e, SS2100, SS2100a, and SS2100i series of gas analyzers and includes information on replacing the optics and mirror as part of the cell assembly.

3 Cell assembly mirror cleaning

A fault occurs if contamination makes its way into the cell and accumulates on the internal optics. Consult the firmware manual for the actual alarm message.
Use the following procedure to clean the mirrors if contamination is suspected.

This procedure should be used only when necessary and is not part of routine maintenance. To avoid compromising the system warranty, refer to Service → 🖹 before cleaning mirrors.

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.

3.1 Determining the type of cell mirror

Measurement cells will come equipped with either a glass or stainless steel mirror. Before determining whether to clean or replace the mirror, identify the type of measurement cell being used in the analyzer. There are four types of measurement cells; 0.1 m, 0.8 m, 8 m, and 28 m. Refer to the figure below.

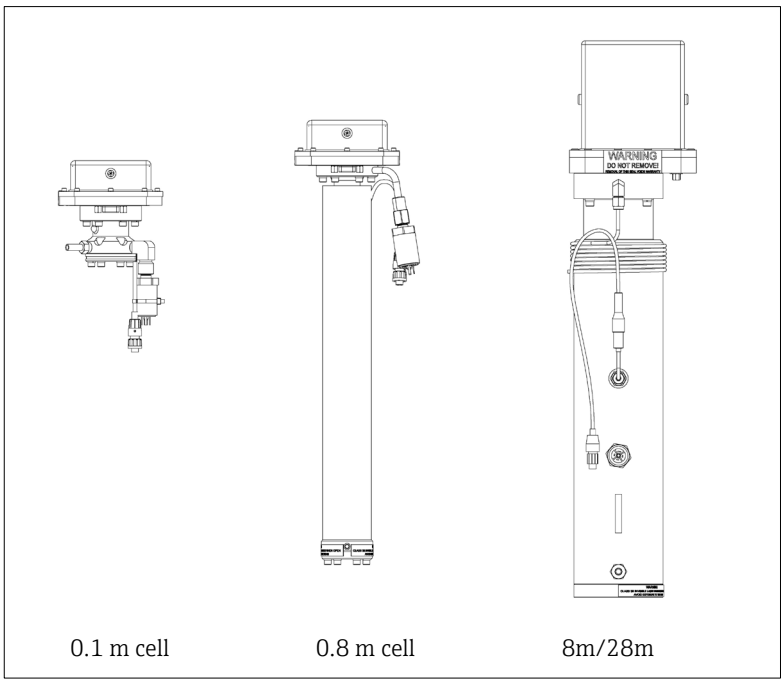

Figure 1. Measurement cell types

Stainless steel mirrors are used with 0.1 m and 0.8 m measurement cells only. They have been identified with either an “X” engraved on the outside bottom of the mirror or a groove around the rim of the mirror. Glass mirrors can be used on any size cell.

To determine the type of mirror being used for the system cell, feel at the bottom of the cell for the engraved “X” marking or the side of the mirror for a groove, as in the images below.

- If the bottom surface is smooth, a glass mirror is being used.
- If the bottom surface is rough or engraved, or a groove on the side of the mirror is detected, a stainless steel mirror is being used.

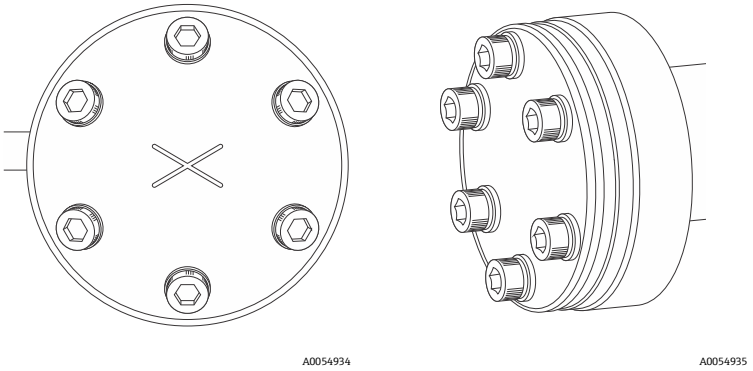

Figure 2. Stainless steel mirror marking: mirror with engraved X (left), mirror with grooved rim (right)

NOTICE

▶ Do not attempt to replace a glass mirror with a stainless steel mirror. System calibration may be adversely affected.

To clean the mirror, refer to the following instructions. To replace a stainless steel mirror, refer to *Replacing a mirror* →.

3.2 Tools and supplies

- Lens cleaning cloth (Cole Parmer® EW-33677-00 TEXWIPE® Alphawipe® Low-Particulate clean room wipes or equivalent)
- Reagent-grade isopropyl (ColeParmer® EW-88361-80 or equivalent)
- Small drop dispenser bottle (Nalgene® 2414 FEP drop dispenser bottle or equivalent)
- Acetone-impenetrable gloves (North NOR CE412W Nitrile Chemsoft™ CE Cleanroom Gloves or equivalent)
- Hemostat (Fisherbrand™ 13-812-24 Rochester-Pean Serrated Forceps or equivalent)
- Bulb blower or dry compressed air/nitrogen
- Torque wrench
- Permanent marker
- Non-outgassing grease
- Flashlight

3.3 Cleaning the mirror

3.3.1 To remove the mirror assembly

1. Power down the analyzer following the instructions in the applicable firmware manual.
2. Disconnect the sample supply and return tubes from the analyzer.

All valves, regulators, switches should be operated in accordance with site lockout/tagout procedures.

3. Purge the measurement cell with nitrogen for 10 minutes, if possible.

Process samples may contain hazardous material in potentially flammable or toxic concentrations. Personnel should have a thorough knowledge and understanding of the physical properties and safety precautions for the sample contents before operating the sample conditioning system (SCS).

4. Carefully mark the orientation of the mirror assembly on the cell body.

Careful marking of the mirror orientation is critical to restoring system performance upon reassembly after cleaning.

5. Gently remove the mirror assembly from the cell by removing the cell socket-head cap screws and set the mirror assembly on a clean, stable and flat surface.

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.

Always handle the optical assembly by the edge of the mount. Never touch the optical surfaces of the mirror.

3.3.2 To clean the mirror

1. Look inside the sample cell at the top mirror using a flashlight to ensure that there is no contamination on the top mirror or window.

Do not clean the top mirror. If the top mirror is visibly contaminated, refer to Service → 🖹.

2. Remove dust and other large particles of debris from the lower mirror using a bulb blower or dry compressed air/nitrogen. Do not use pressurized gas duster products because the propellant may deposit liquid droplets onto the optic surface.
3. Put on clean acetone-resistant gloves.
4. Double fold a clean sheet of lens cleaning cloth. Using hemostats or your fingers, clamp near and along the fold to form a "brush."
5. Place a drop or two of isopropyl alcohol onto the mirror and rotate the mirror to spread the liquid evenly across the mirror surface.
6. With gentle, uniform pressure, wipe the mirror from one edge to the other with the cleaning cloth only once, and only in one direction, to remove the contamination. Discard the cloth.

NOTICE

Never rub an optical surface, especially with dry tissues.

▶ This can mar or scratch the coated surface.

7. Repeat with a clean sheet of lens cleaning cloth to remove the streak left by the first wipe. Repeat, if necessary, until there is no visible contamination on the mirror.

To replace the O-ring and mirror assembly

1. Check the O-ring.

   a. If replacement is needed, apply grease on fingertips and then to the new O-ring.

   b. Place the newly greased O-ring into the groove around the outside of the mirror, taking care not to touch the cleaned mirror.

2. Carefully replace the mirror assembly onto the cell in the same orientation as previously marked, making sure the O-ring is properly seated.
3. Tighten the socket-head cap screws evenly with a torque wrench to 13 in-lbf.


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