XA02744C/66/EN/01.21

Safety Instruction
TDLAS Gas Analyzer
SS500, SS2000, and SS3000
SS500e, SS2000e, and SS3000e
SS500XP and SS2000XP

Endress+Hauser
People for Process Automation

Revision History

Revision	Engineering Order	Date
01.21	EO18996	February 25, 2022

Table of Contents

1 Introduction

Endress+Hauser's TDLAS Gas Analyzer products are high-speed, diode laser-based extractive analyzers designed for extremely reliable monitoring of standard concentrations of specific components in various background gases.

This manual applies to the following analyzers:
- SS500, SS2000, SS3000
- SS500e, SS2000e, SS3000e
- SS500XP, SS2000XP

To operate the analyzer safely, it is important to closely review all information contained in the manuals related to system installation, operation and maintenance, as referenced in Associated Documents below. Each chapter in this manual includes product-specific safety instructions in the following topics:
- General Safety Instructions
- Equipment Installation
- Equipment Operation

Common procedures for equipment maintenance and service follow the product-specific sections.

Who Should Read This Manual

This manual should be read and referenced by anyone installing, operating or having direct contact with the analyzer. Endress+Hauser highly recommends that the responsible party and/or operator of the equipment be qualified to handle this equipment.

How to Use This Manual

Read the **Table of Contents** for an overview of the most common safety issues regarding the installation and operation of the TDLAS gas analyzers referenced in this manual. Additional information on the installation, operation and maintenance is in the Operating Instruction. Please note that only qualified users should perform these tasks.

Images, tables and charts are included to provide a comprehensive understanding of the analyzer and its functions. Carefully read the section on special symbols which provide key information on the system's configuration and/or operation.

Conventions used in this manual

In addition to the symbols and instructional information, use "hot links" to quickly navigate between different sections. These links include table, figure and section references and are identified by a pointing finger cursor when rolling over the text. Click on the link to navigate to the reference.

Associated Documentation

Enclosed in your analyzer system order is the product Safety Instruction for your reference. Please review all necessary safety instructions before installing or operating your analyzer.

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

Part Number	Document Type	Description
SS500		
BA02182C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.
TI01642C	Technical Information	Provides technical data on the device with an overview of associated models available.
SS2000		
BA02182C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.
TI01644C	Technical Information	Provides technical data on the device with an overview of associated models available.
SS3000		
BA02185C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.
TI01653C	Technical Information	Provides technical data on the device with an overview of associated models available.
SS500XP		
BA02183C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.

Part Number	Document Type	Description
TI01642C	Technical Information	Provides technical data on the device with an overview of associated models available.
SS2000XP		
BA02183C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.
TI01644C	Technical Information	Provides technical data on the device with an overview of associated models available.
SS500e		
BA02164C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.
TI01657C	Technical Information	Provides technical data on the device with an overview of associated models available.
SS2000e		
BA02164C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.
TI01658C	Technical Information	Provides technical data on the device with an overview of associated models available.

Part Number	Document Type	Description
SS3000e		
BA02164C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.
TI01659C	Technical Information	Provides technical data on the device with an overview of associated models available.
Device Parameters		
GP01181C	Description of Device Parameters HC12 v2.51	Provides the user with an overview of the HC12 v2.51 firmware functionality.

For additional instruction manuals, please refer to the following:

- For custom orders:
  - Refer to the Endress+Hauser website for the list of local sales channels who can provide the requested order-specific documentation[1]: https://www.endress.com/contact
- For standard orders:
  - Refer to the Endress+Hauser website to download the published operating instructions: www.endress.com

Manufacturer Address

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

1. Order-specific documentation is located by analyzer serial number (SN).

2 General Safety Information

This chapter reviews the general safety instruction for the TDLAS Gas Analyzer.

Intended Equipment Use

The natural gas analyzers are intended for use as explained in the documentation provided. Endress+Hauser recommends that the qualified technician read and reference the documentation when installing, operating or having direct contact with the TDLAS Gas Analyzer. Any use of the equipment in a manner not specified by Endress+Hauser could lead to physical injury and damage to the equipment.

The safety of the analyzer is the responsibility of the installer and the organization represented.

Warning Labels

Equipment labels are adhered to the TDLAS Gas Analyzer to alert the user of potential hazards. Instructional symbols are also used in the equipment manuals to indicate potential hazards, important information and valuable tips, and are not labeled on the analyzer. Following are the equipment labels and instructional symbols with associated warning and caution types to observe when servicing the analyzer.

Safety label

A warning label is affixed to the front side of all analyzer enclosures that contain sample gas. An example of the warning label is shown below.

Hazards may vary by stream composition. One or more of the following conditions may apply.

Flammable. *Gases used in the processing of this analyzer may be extremely flammable. Any work in a hazardous area must be carefully controlled to avoid creating any possible ignition sources (e.g., heat, arcing, sparking, etc.).*

Toxins. *Endress+Hauser analyzers measure a variety of gases, including high-level H_2S. Follow all safety protocols governing toxic gases and potential leaks.*

Inhalation. *Inhaling toxic gases or fumes may cause physical damage or death.*

Technicians are expected to follow all safety protocols established by the customer that are necessary for servicing or operating the analyzer. This may include, but is not limited to, lockout/tag-out procedures, toxic gas monitoring protocols, personal protective equipment (PPE) requirements, hot work permits and other precautions that address safety concerns related to performing service or operation on process equipment located in hazardous areas.

Equipment labels

*Warning statement for **hazardous voltage**. Contact may cause electric shock or burn. Turn off and lock out the system before servicing.*

Failure to follow all directions may result in damage to or the malfunction of the analyzer.

Maximum voltage and current specifications for fuses.

PROTECTIVE EARTH GROUND *– Symbol indicates the connection point of the ground wire from the main power source.*

INVISIBLE LASER RADIATION *– Avoid exposure to beam. Class 3b Radiation Product. Refer servicing to the manufacturer-qualified personnel.*

CLASS 1 LASER PRODUCT *– Invisible laser radiation when open. Avoid direct exposure to the beam.*

FUNCTIONAL EARTH GROUND *– Symbol indicates grounding points intended primarily for troubleshooting.*

Removing label from measurement cell optical head will void analyzer warranty.

Instructional symbols

General notes and important information concerning the installation and operation of the analyzer.

Failure to follow all directions may result in damage or the malfunction of the analyzer.

Failure to follow all directions or substitution of components may result in explosion.

Failure to follow all directions may result in fire.

Maximum voltage and current specifications for fuses.

Potential Risks Affecting Personnel

This section addresses what to do when hazardous situations occur during or before servicing the analyzer. Not all potential hazards are listed in this document. The user is responsible for identifying and mitigating any potential hazards present when servicing the analyzer.

Technicians are expected to follow all safety protocols established by the customer that are necessary for servicing the analyzer. This may include, but is not limited to, lockout/ tagout procedures, toxic gas monitoring protocols, PPE requirements, hot work permits and other precautions that address safety concerns related to performing service on process equipment located in hazardous areas.

Personnel Responsibility

The safety of the analyzer is the responsibility of the installer and the organization he/she represents.

Mitigating risks

Refer to the instructions for each situation listed below to mitigate risks.

Electrocution hazard

1. Shut off power at the main disconnect external to the analyzer.

Complete this action before performing any service that requires working near the main input power or disconnecting any wiring or other electrical components.

2. Open enclosure door.
3. If service must be performed with power engaged, do the following:
   a. Note any live electrical components and avoid all contact with them.
   b. Only use tools with a safety rating for protection against accidental contact with voltage up to 1000V (IEC 900, ASTF-F1505-04, VDE 0682/201).

Explosion/fire hazard

Any work in a hazardous area must be carefully controlled to avoid creating any possible ignition sources (e.g., heat, arcing, sparking, etc.). All tools must be appropriate for the area and hazards present. Electrical connections must not be made or broken with power on (to avoid arcing).

3 SS500, SS2000, and SS3000 TDLAS Gas Analyzer

The information in this chapter includes technical specifications as well as safety warnings and considerations for equipment installation and equipment operation for the SS500, SS2000, and SS3000 TDLAS Gas Analyzers. For complete instructions refer to the Operating Instruction → 🖹 1.

Analyzer Technical Specifications

Technical specifications are provided in the following tables that outline recommended equipment settings, ratings, and physical specifications.

Peripheral devices

For systems equipped with peripheral devices, e.g., probe assemblies, only devices that meet with Endress+Hauser' specifications may be used. Refer to documentation provided by the manufacturer for instruction on installation, operation, etc.

Equipment rating

The following equipment rating information is provided by model type for each TDLAS Gas Analyzer in the Operating Instruction.

Table 3–1 SS500 analyzer specifications

Measurement data	
Target components	H_2O in natural gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	0.25 to 20, 0.25 to 50, 0.25 to 100 lbs/MMscf 5 to 422, 5 to 1055, 5 to 2110 ppmv
Repeatability	±1 ppmv or ±1% of reading (whichever is greater)
Accuracy	±10 ppmv or ±2% of reading (whichever is greater)
Application Data	
Ambient temperature range	-20 °C to 50 °C (-4 °F to 122 °F)

Sample cell pressure range	700 to 1400 mbara
Sample cell temperature range	-20 ˚C to 50 ˚C (-4 ˚F to 122 ˚F)
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 L/min (1 to 2 scfh)
Bypass flow rate	1 L/min (2 scfh)
Electrical and communication	
Input Voltage (Electronics)	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6 A Maximum 12 VDC, 3.2 A Maximum
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2 A at 12 VDC
Communication	Analog: One or two 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RS232C Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	2, general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics
Physical	**Class I, Division 2**
Electronics enclosure type	Type 3R - 304 stainless steel

Electronics with sample cell dimensions	444 mm H x 376 mm W x 135 mm D (17.5 x 14.8 x 5.8 inches)
Weight approximately	11.5 kg (25 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Number of sample cells	1
Area Classification	
Certification	cCSAus Class I, Division 2, Groups A, B, C, D, T3C cCSAus Class I, Zone 2 IIC T3C

Table 3–2 SS2000 analyzer specifications

Measurement data	
Target components	H_2O or CO_2 in natural gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	H_2O: 0 to 20, 0 to 50, 0 to 100, 0 to 250 lbs/MMscf 0 to 422, 0 to 1055, 0 to 2110, 0 to 5275 ppmv CO_2: 0 to 5%, 0 to 10%, 0 to 20%
Repeatability	H_2O: ±1 ppmv or ±1% of reading (whichever is greater) CO_2: ±400 ppmv or ±2% of reading (whichever is greater)
Accuracy	H_2O: ±2 ppmv plus 2% of reading

Application data	
Ambient temperature range	-20° C to 50 °C (-4° F to 122 °F)
Sample cell pressure range	700 to 1400 mbara
Sample cell temperature range	-20 °C to 50 °C (-4 °F to 122 °F)
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 L/min (1 to 2 scfh)
Bypass flow rate	1 L/min (2 scfh)
Electrical and communication	
Input Voltage Electronics	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6 A Max 12 VDC, 3.2 A Max
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2 A at 12 VDC
Communication	Analog: One or two 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RS232C Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	2, general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics

Physical	Class I, Div 2
Electronics enclosure type	Type 3R - 304 stainless steel*
Electronics with sample cell dimensions	444 mm H x 376 mm W x 135 mm D (17.5 x 14.8 x 5.8 inches)
Weight approximate	11.5 kg (25 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Number of Sample Cells	1
Area classification	
Certification	cCSAus Class I, Div 2, Groups A, B, C, D, T3C cCSAus Class I, Zone 2 IIC T3C

Table 3–3 SS3000 analyzer specifications

Measurement data	
Target components	H_2O and/or CO_2 in natural gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	H_2O: 0 to 20, 0 to 50, 0 to 100, 0 to 250 lbs/ MMscf 0 to 422, 0 to 1055, 0 to 2110, 0 to 5275 ppmv CO_2: 0 to 5%, 0 to 10%, 0 to 20%
Repeatability	H_2O: ±1 ppmv or ±1% of reading (whichever is greater) CO_2: ±400 ppmv or ±2% of reading (whichever is greater)

Accuracy	H_2O: ±2 ppmv plus 2% of reading
Application data	
Ambient temperature range	-20 ˚C to 50 ˚C (-4 ˚F to 122 ˚F)
Sample cell pressure range	700 to 1400 mbara
Sample cell temperature range	-20 ˚C to 50 ˚C (-4 ˚F to 122 ˚F)
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 L/min (1 to 2 scfh)
Bypass flow rate	1 L/min (2 scfh)
Electrical and communication	
Input Voltage Electronics	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6 A Max 12 VDC, 3.2 A Max
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2A at 12 VDC
Communication	Analog: One or two 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RSlcC Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	Four general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics

Physical	Class I, Div 2
Electronics enclosure type	Type 3R - 304 stainless steel*
Electronics with sample cell Dimensions	444 mm H x 376 mm W x 135 mm D (17.5 x 14.8 x 5.8 inches)
Weight approximately	11.5 kg (25 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Sample cell construction	316L series polished stainless steel
Number of Sample Cells	2
Area classification	
Certification	cCSAus Class I, Division 2, Groups A, B, C, D, T3C cCSAus Class I, Zone 2 IIC T3C

Equipment Installation

The information in this section is related to safety considerations for equipment installation.

Endress+Hauser Class I Division 2 analyzers use a non-incendive protection method, and as such all portions of the local installation codes apply. The maximum allowed inductance to resistance ratio (L/R ratio) for the field wiring interface must be less than 25 µH/Ω. The maximum total loop capacitance shall be 0.27 microfarads.

The safety of the analyzer is the responsibility of the installer and the organization he/she represents.

Configurations requiring optional accessories, e.g., probe assemblies, with specific characteristics must meet manufacturer specifications.

Endress+Hauser analyzers are designed for operation within the specified ambient temperature range of -20 °C to 50 °C (-4 °F to 122 °F). Intense sun exposure in some areas may cause the analyzer temperature to exceed the maximum.

Lifting/carrying the analyzer

The SS500, SS2000, and SS3000 analyzers can be easily lifted from the packaging and moved to the installation location. Take care not to lift or carry the analyzer by the measurement cells or the cables connected at the top of the analyzer, or damage may occur. For analyzers configured inside enclosures and weighing more than 18 kg (approximately 40 lbs), lift the unit by the mounting brackets using at least two individuals and distribute the weight among personnel to avoid injury.

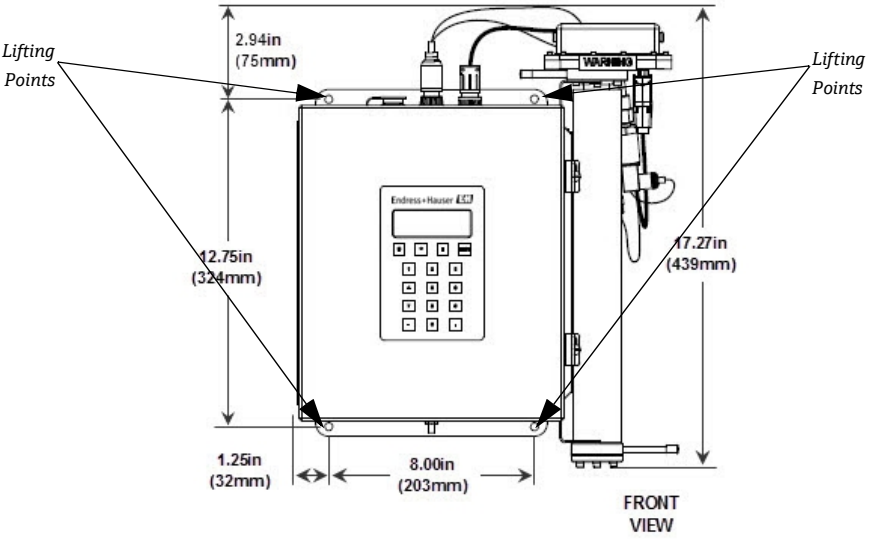

Figure 3–1 Lifting and carrying the SS500 and SS2000 TDLAS Gas Analyzers

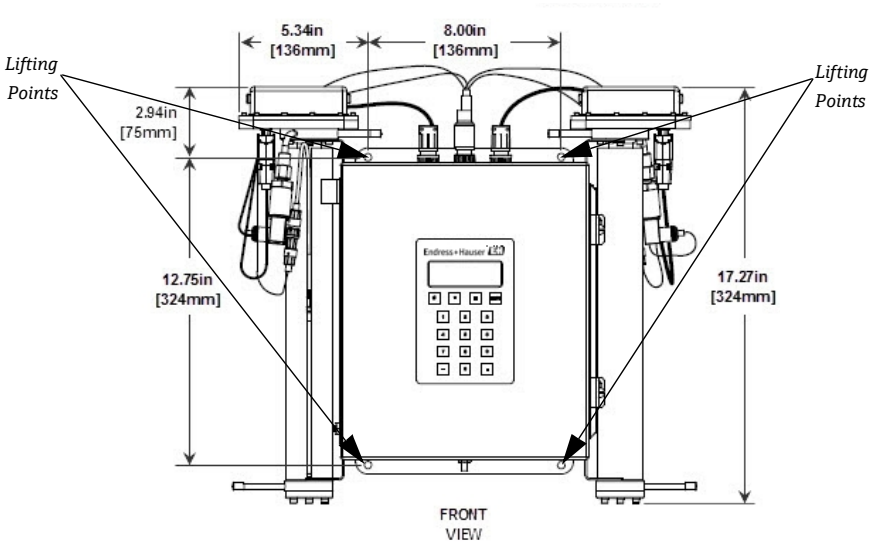

Figure 3–2 Lifting and carrying the SS3000 TDLAS Gas Analyzers

Mounting the Analyzer

The SS500, SS2000, and SS3000 analyzers are manufactured for wall or Unistrut® (or equivalent) metal framing installations. Depending on your application and configuration, the analyzer may come pre-mounted on a SCS panel to be mounted on a wall or Unistrut framing, or without a panel requiring mounting via the standard electronics enclosure tabs. Refer to the layout diagrams in the Operating Instructions or as-built system drawings for detailed mounting dimension and “Lifting/carrying the analyzer” below for recommendations for safely moving the equipment.

When mounting the analyzer, be sure to position the instrument so that it is not difficult to operate adjacent devices.

It is critical to mount the analyzer so that the inlet and outlet lines reach the inlet and outlet connections on the chassis while still maintaining flexibility so that the sample lines are not under excessive stress.

*Bolts or screws used for wall-mounting must be able to support four times the weight of the instrument. For weight specifications → 🖹 **9**.*

Opening/Closing the Analyzer Enclosure

Hazardous voltage and risk of electric shock. Failure to properly ground the analyzer may create a high-voltage shock hazard.

Protective Chassis and Ground Connections

To protect personnel and equipment, connect the protective and chassis grounds first before connecting any electrical signal or power. Requirements for the protective and chassis grounds are listed below:

- The protective and chassis grounds and heater wire must be a minimum of 1.5 mm^2 (14 awg), equal or greater size than any other current-carrying conductors located in the sample conditioning system (SCS).
- The protective and chassis grounds must remain connected until all other wiring is removed.
- If the protective and chassis ground is insulated, it must use the green/yellow color.

Electrical Wiring Requirements

Interconnection of the analyzer enclosure and cell enclosure shall be performed using wiring methods approved for Class I, Division 2 or Zone 2 hazardous locations per the Canadian Electrical Code (CEC) Appendix B or J and Article 18. Zone 2 is -150 and the National Electric Code (NEC) Article 501 or 505. The installer is responsible for complying with all local installation codes.

External Circuit Breaker Requirements

An approved switch or circuit breaker rated for 15 amp should be used and clearly marked as a disconnecting device for the analyzer. The switch or circuit beaker shall not interrupt a protective earth conductor.

Because the breaker in the customer-provided power distribution panel or switch will be the primary means of disconnecting the power from the analyzer, Endress+Hauser recommends that the power distribution panel be located in close proximity to the equipment and within easy reach of the operator.

Thread lubricant must be applied on all conduit hub threaded connections. Endress+Hauser recommends using STL8 lubricant on all conduit screw thread and its taped openings.

Connections to the Supply

Use the following procedure to connect the sample supply line.

To connect the sample supply line

1. Confirm that the sample probe is correctly installed at the process supply tap and that the sample probe valve is closed.

Consult sample probe manufacturer instructions for proper installation procedures.

The process sample at the sample tap may be at a high pressure. Use extreme caution when operating the sample probe valve and the field pressure reducing regulator.

All valves, regulators, switches, etc. shall be operated in accordance with site lock-out/tag-out procedures.

2. Confirm that the field pressure reducing station is installed properly at the sample probe and that the pressure regulator at the field pressure reducing station is closed (adjustment knob turned fully counter-clockwise).
3. Determine appropriate tubing route from the field pressure reducing station to the sample conditioning system.
4. If configured with this analyzer, install the heat trace bundle in the heat trace sample inlet.
   a. Remove the white foam supplied with the SCS.
   b. Run the entire heat trace bundle into the enclosure.
   c. Once installed, seal the rubber tube around the heat trace by applying heat until the tube shrinks down around the heat trace bundle.

***Hazardous voltage and risk of electric shock**. Follow your plant safety guidelines or refer to your safety engineer before attempting to heat the rubber tube.*

5. If configured with this analyzer, install the heat trace terminal box external to the SCS enclosure; ensure that the power source for the heat trace is provided with a GFI breaker.
   a Run the heat trace power back out of the enclosure and into the heat trace terminal box.
6. Run stainless steel tubing from the field pressure reducing station (set for the specified inlet pressure) to the sample supply port of the SCS. Bend tubing using industrial grade benders, check tubing fit to ensure proper seating between the tubing and fittings. Fully ream all tubing ends. Blow out the lines for 10 to 15 seconds with clean, dry nitrogen or air prior to making the connection.
7. Connect the inlet tube to the SCS using the 1/4 in. stainless steel compression-type fitting provided.
8. Tighten all new fittings 1-1/4 turns with a wrench from finger tight. For connections with previously swaged ferrules, thread the nut to the

previously pulled up position, then tighten slightly with a wrench. Secure tubing to appropriate structural supports as required.

9. Check all connections for gas leaks. Using a liquid leak detector is recommended.

Do not exceed 70 kPaG (10 PSIG) (0.7 barg) in sample cell. Damage to cell may result.

Ventilation Requirements

Flammable gases or vapors shall not be vented to an area in which the existing area classification will be impacted. Flammable gases or vapors shall be vented to a safe location or to the flare header. For information related to mitigating risks associated with electrocution, etc → 🖹 7.

Equipment Operation

This section provides an overview of safety operational instructions for SS500, SS2000, and SS3000 TDLAS Gas Analyzers.

Operating Controls

Refer to the appropriate manual for the purchased analyzer to review the operational controls for the equipment → 🖹 1.

Firmware Version

Each SS500, SS2000, and SS3000 TDLAS gas analyzer operates based on its own firmware version which is listed in the system calibration report and displays when the analyzer starts up. Detailed operation instructions are provided in the Description of Device Parameters available for download by model type on the Endress+Hauser website (www.endress.com).

Intermittent Operation

The warnings outlined in this section apply to both the full-featured and simplified sample systems.

Process samples may contain hazardous material in potentially flammable and/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 SCS.

The process sample at the sample tap is at a high pressure. A pressure reducing regulator is located at the sample tap to reduce the sample pressure and enable operation of the SCS at a low pressure. Use extreme caution when operating the sample probe valve and field pressure reducing regulator.

4 SS500XP and SS2000XP TDLAS Gas Analyzer

The information in this chapter includes technical specifications as well as safety warnings and considerations for equipment installation and equipment operation for the SS500XP and SS2000XP TDLAS Gas Analyzers. For complete instructions refer to the Operating Instruction → 🖹 1.

Analyzer Technical Specifications

All TDLAS Gas Analyzer models come with a set of technical specifications that outline recommended equipment settings and ratings. This information is included in the Operating Instruction.

Peripheral devices

For systems equipped with peripheral devices, e.g., probe assemblies, only devices that meet with Endress+Hauser' specifications may be used. Refer to documentation provided by the manufacturer for instruction on installation, operation, etc.

Equipment rating

The following equipment rating information is provided by model type for each TDLAS Gas Analyzer in the Operating Instruction.

Table 4–1 SS500XP analyzer specifications

Measurement data	
Target components	H_2O in natural gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	0.25 to 20, 0.25 to 50, 0.25 to 100 lbs/MMscf 5 to 422, 5 to 1055, 5 to 2110 ppmv
Repeatability	±1 ppmv or ±1% of reading (whichever is greater)
Accuracy	±10 ppmv or ±2% of reading (whichever is greater)
Application Data	
Ambient temperature range	-20 °C to 50 °C (-4 °F to 122 °F)

Sample cell pressure range	700 to 1400 mbara
Sample cell temperature range	-20 °C to 50 °C (-4 °F to 122 °F)
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 L/min (1 to 2 scfh)
Bypass flow rate	1 L/min (2 scfh)
Electrical and communication	
Input Voltage (Electronics)	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6 A Maximum 12 VDC, 3.2 A Maximum
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2 A at 12 VDC
Communication	Analog: One or two 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RS232C Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	2, general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics
Physical	**Class I, Division 1**
Electronics enclosure type	Type 4, 7, 9 - cast aluminum

Electronics with sample cell dimensions	565 mm H x 413 mm W x 222 mm D (22.25 x 16.25 x 8.75 inches)
Weight approximately	46.8 kg (103 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Number of sample cells	1
Area Classification	
Certification	cCSAus Class I, Division 1, Groups B, C, D, T4

Table 4–2 SS2000XP analyzer specifications

Measurement data	
Target components	H_2O or CO_2 in natural gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	H_2O: 0 to 20, 0 to 50, 0 to 100, 0 to 250 lbs/ MMscf 0 to 422, 0 to 1055, 0 to 2110, 0 to 5275 ppmv CO_2: 0 to 5%, 0 to 10%, 0 to 20%
Repeatability	H_2O: ±1 ppmv or ±1% of reading (whichever is greater) CO_2: ±400 ppmv or ±2% of reading (whichever is greater)
Accuracy	H_2O: ±2 ppmv plus 2% of reading
Application data	
Ambient temperature range	-20° C to 50 °C (-4° F to 122 °F)

Sample cell pressure range	700 to 1400 mbara
Sample cell temperature range	-20 °C to 50 °C (-4 °F to 122 °F)
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 L/min (1 to 2 scfh)
Bypass flow rate	1 L/min (2 scfh)
Electrical and communication	
Input Voltage (Electronics)	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6 A Maximum 12 VDC, 3.2 A Maximum
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2 A at 12 VDC
Communication	Analog: One or two 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RS232C Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	2, general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics
Physical	**Class I, Div 1**
Electronics enclosure type	Type 4, 7, 9 - cast aluminum

Electronics with sample cell dimensions	565 mm H x 413 mm W x 222 mm D (22.25 x 16.25 x 8.75 inches)
Weight approximate	46.8 kg (103 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Number of Sample Cells	1
Area classification	
Certification	cCSAus Class I, Div 1, Groups B, C, D, T4

Equipment Installation

The information in this section is related to safety considerations for equipment installation.

Endress+Hauser Class I Division 2 analyzers use a non-incendive protection method, and as such all portions of the local installation codes apply. The maximum allowed inductance to resistance ratio (L/R ratio) for the field wiring interface must be less than 25 µH/Ω. The maximum total loop capacitance shall be 0.27 microfarads.

The safety of the analyzer is the responsibility of the installer and the organization he/she represents.

Configurations requiring optional accessories, e.g., probe assemblies, with specific characteristics must meet manufacturer specifications.

Endress+Hauser analyzers are designed for operation within the specified ambient temperature range of -20 °C to 50 °C (-4 °F to 122 °F). Intense sun exposure in some areas may cause the analyzer temperature to exceed the maximum.

Lifting/carrying the analyzer

Due to the analyzer's size and weight (48.6 Kg., or 103 lbs.), Endress+Hauser recommends the use of a forklift, pallet jack, etc. to lift and/or move the analyzer. Before removing the analyzer from the crate, move the crate as close as possible to the final location.

If the analyzer is to be lifted by hand, designate multiple individuals to lift by the mounting brackets, and distribute the weight among personnel to avoid injury.

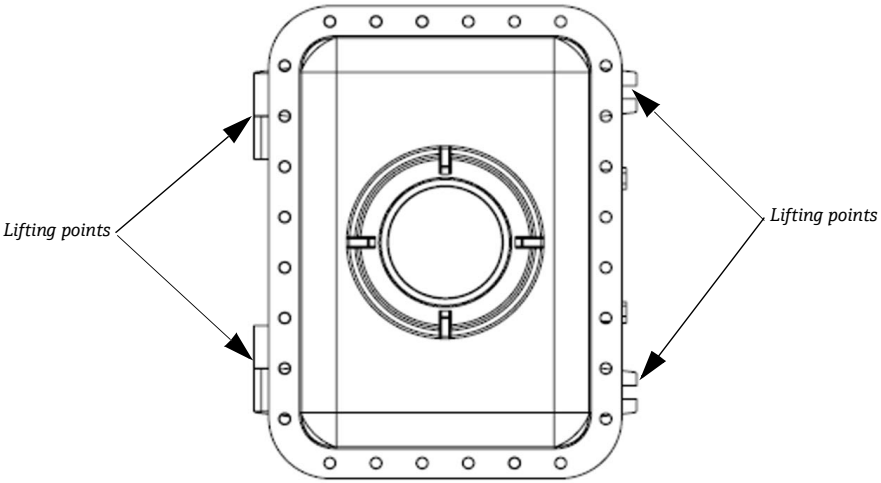

Figure 4–1 SS500XP and SS2000XP lifting points

Mounting the Analyzer

The TDLAS Gas Analyzer analyzer is manufactured for wall or Unistrut® (or equivalent) metal framing installations.

When mounting the analyzer, be sure to position the instrument so that it is not difficult to operate adjacent devices.

It is critical to mount the analyzer so that the inlet and outlet lines reach the inlet and outlet connections on the chassis while still maintaining flexibility so that the sample lines are not under excessive stress.

Endress+Hauser analyzers are designed for operation within the specified ambient temperature range of -20 °C to 50 °C (-4 °F to 122 °F). Intense sun exposure in some areas may cause the analyzer temperature to exceed the maximum.

Opening/Closing the Analyzer Enclosure

Hazardous voltage and risk of electric shock. Failure to properly ground the analyzer may create a high-voltage shock hazard.

Protective Chassis and Ground Connections

To protect personnel and equipment, connect the protective and chassis grounds first before connecting any electrical signal or power. Requirements for the protective and chassis grounds are listed below:

- The protective and chassis grounds and heater wire must be a minimum of 1.5 mm^2 (14 awg), equal or greater size than any other current-carrying conductors located in the sample conditioning system (SCS).
- The protective and chassis grounds must remain connected until all other wiring is removed.
- If the protective and chassis ground is insulated, it must use the green/yellow color.

Electrical Wiring Requirements

Interconnection of the analyzer enclosure and cell enclosure shall be performed using wiring methods approved for Class I, Division 2 or Zone 2 hazardous locations per the Canadian Electrical Code (CEC) Appendix B or J and Article 18. Zone 2 is -150 and the National Electric Code (NEC) Article 501 or 505. The installer is responsible for complying with all local installation codes.

External Circuit Breaker Requirements

An approved switch or circuit breaker rated for 15 amp should be used and clearly marked as a disconnecting device for the analyzer. The switch or circuit beaker shall not interrupt a protective earth conductor.

Because the breaker in the customer-provided power distribution panel or switch will be the primary means of disconnecting the power from the analyzer, Endress+Hauser recommends that the power distribution panel be located in close proximity to the equipment and within easy reach of the operator.

Thread lubricant must be applied on all conduit hub threaded connections. Endress+Hauser recommends using STL8 lubricant on all conduit screw thread and its taped openings.

Connections to the Gas Supply

Consult the Sample Conditioning System (SCS) manual for guidance. All work must be performed by technicians qualified in instrument tubing.

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

Ventilation Requirements

Flammable gases or vapors shall not be vented to an area in which the existing area classification will be impacted. Flammable gases or vapors shall be vented to a safe location or to the flare header. For information related to mitigating risks associated with electrocution, etc → 🖹 7.

Equipment Operation

This chapter provides an overview of safety operational instructions for the SS500XP and SS2000XP TDLAS Gas Analyzers.

Operating Controls

Refer to the appropriate manual for the purchased analyzer to review the operational controls for the equipment → 🖹 1.

Firmware Version

Each SS500XP and SS2000XP TDLAS gas analyzer operates based on its own firmware version which is listed in the system calibration report and displays when the analyzer starts up. Detailed operation instructions are provided in the Description of Device Parameters available for download by model type on the Endress+Hauser website (www.endress.com).

Preparing the analyzer for shipment or storage

If the equipment is to be shipped or stored for any length of time, it should be packed in the original packaging when shipped when shipped from the factory. If analyzer has been installed and or operated (even for purposes of a demonstration), the system should first be decontaminated (purged with an inert gas) before powering down the analyzer.

Process samples may contain hazardous material in potentially flammable and/or toxic concentrations. Personnel should have a thorough knowledge and understanding of the physical properties of the sample and prescribed safety precautions before installing, operating or maintaining the analyzer.

Storage

The packaged analyzer should be stored in a sheltered environment that is temperature controlled between -20 °C (-4 °F) and 50 °C (122 °F), and should not be exposed to direct sun, rain, snow, condensing humidity or corrosive environments.

5 SS500e, SS2000e, and SS3000e TDLAS Gas Analyzer

The information in this chapter includes technical specifications as well as safety warnings and considerations for equipment installation and equipment operation for the SS500e, SS2000e, and SS3000e TDLAS Gas Analyzers. For complete instructions refer to the Operating Instruction → 🖹 1.

Analyzer Technical Specifications

All ModelNumber models come with a set of technical specifications that outline recommended equipment settings and ratings. This information is included in the Operating Instruction.

Peripheral devices

For systems equipped with peripheral devices, e.g., probe assemblies, only devices that meet with Endress+Hauser' specifications may be used. Refer to documentation provided by the manufacturer for instruction on installation, operation, etc.

Equipment rating

The following equipment rating information is provided by model type for all TDLAS Gas Analyzers in the Operating Instruction.

Table 5–1 SS500e analyzer specifications

Measurement data	
Target components	H_2O in natural gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	0.25 to 20, 0.25 to 50, 0.25 to 100 lbs/MMscf 5 to 422, 5 to 1055, 5 to 2110 ppmv
Repeatability	±1 ppmv or ±1% of reading (whichever is greater)
Accuracy	±10 ppmv or ±2% of reading (whichever is greater)
Application data	
Ambient temperature range	-20 °C to 50 °C (-4 °F to 122 °F) -10 °C to 60 °C (14 °F to 140 °F) — *optional*

Sample cell pressure range	700 to 1400 mbara 700 to 1700 mbara — *optional*
Sample cell temperature range	-20 °C to 50 °C (-4 °F to 122 °F) -10 °C to 60 °C (14 °F to 140 °F) — *optional*
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 slpm (1 to 2 scfh)
Bypass flow rate	1 slpm (2 scfh)
Electrical and communication	
Input Voltage (Electronics)	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6A Maximum 12 VDC, 3.2 A Maximum
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current (Unheated)	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2 A at 12 VDC
Max current (heated)	2 A maximum at 120 VAC
Communication	Analog: 2 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RS232C — *standard*, RS485 and Ethernet — *optional* Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	2, general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics
Physical	
Enclosure type	Type 4X - 304 stainless steel

Dimensions	973 mm H x 406 mm W x 229 mm D (38.3 x 16 x 9 inches)
Weight approximately	34 kg (75 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Number of sample cells	1
Area classification	
Certification	C US

Table 5–2 SS2000e analyzer specifications

Measurement Data	
Target Components	H_2O or CO_2 in Natural Gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	H_2O: 0 to 20, 0 to 50, 0 to 100 lbs/MMscf 0 to 422, 0 to 1055, 0 to 2110 ppmv CO_2: 0 to 5%, 0 to 10%, 0 to 20%
Repeatability	H_2O: ±1 ppmv or ±1% of reading (whichever is greater) CO_2: ±400 ppmv or ±2% of reading (whichever is greater)
Accuracy	H_2O: ±2 ppmv or ±2% of reading (whichever is greater)
Application data	
Ambient temperature range	-20 °C to 50 °C (-4 °F to 122 °F) -10 °C to 60 °C (14 °F to 140 °F) — *optional*

Sample cell pressure range	700-1400 mbara 700-1700 mbara — *optional*
Sample cell temperature range	-20 °C to 50 °C (-4 °F to 122 °F) -10 °C to 60 °C (14 °F to 140 °F) — *optional*
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 slpm (1 to 2 scfh)
Bypass flow rate	1 slpm (2 scfh)
Electrical and communication	
Input Voltage (Electronics)	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6A Maximum 12 VDC, 3.2 A Maximum
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current (Unheated)	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2 A at 12 VDC
Max current (heated)	2 A maximum at 120 VAC
Communication	Analog: 2 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RS232C — *standard*, RS485 and Ethernet — *optional* Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	2, general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics
Physical	
Enclosure type	Type 4X - 304 stainless steel

Dimensions	973 mm H x 406 mm W x 229 mm D (38.3 x 16 x 9 inches)
Weight approximately	34 kg (75 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Number of sample cells	1
Area classification	
Certification	C SA US

Table 5–3 SS3000e analyzer specifications

Measurement data	
Target components	H_2O and/or CO_2 in natural gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	H_2O: 0 to 20, 0 to 50, 0 to 100, 0 to 250 lbs/MMscf 0 to 422, 0 to 1055, 0 to 2110, 0 to 5275 ppmv CO_2: 0 to 5%, 0 to 10%, 0 to 20%
Repeatability	H_2O: ±1 ppmv or ±1% of reading (whichever is greater) CO_2: ±400 ppmv or ±2% of reading (whichever is greater)
Accuracy	H_2O: ±2 ppmv plus 2% of reading

Application data	
Ambient temperature range	-20 °C to 50 °C (-4 °F to 122 °F) — *standard* -10 °C to 60 °C (15 °F to 140 °F) — *optional*
Sample cell pressure range	700 to 1400 mbara
Sample cell temperature range	-20 °C to 50 °C (-4 °F to 122 °F)
Maximum cell pressure	70 kPag (10 psig)
Sample flow rate	0.5 to 1.0 slpm (1 to 2 scfh)
Bypass flow rate	1 slpm (2 scfh)
Electrical and communication	
Input Voltage (Electronics)	120 - 240 VAC ±10%, 50 to 60 Hz, 20W Max 24 VDC, 1.6A Maximum 12 VDC, 3.2 A Maximum
Input Voltage SCS Heater (Optional)	120 VAC or 240 VAC +/-10%, 50 to 60 Hz single phase, 200 W
Max current	0.8 A maximum at 120 VAC 1.6 A at 24 VDC, 3.2 A at 12 VDC
Communication	Analog: 1 or 2 4-20mA isolated, 1200 ohms at 24 VDC max load Serial: RS232C Protocol: Modbus Gould RTU or Daniel RTU or ASCII
Alarms	Four general fault and concentration alarms via Modbus and analog output(s)
LCD display	Concentration, cell pressure and temperature, diagnostics

Physical	Class I, Div 2
Enclosure type	Type 4X stainless steel enclosures
Dimensions	1074 mm H x 508 mm W x 279 mm D (42.3 x 20 x 11 inches)
Weight approximately	45 kg (100 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)
Sample cell construction	316L series polished stainless steel
Number of sample cells	2
Area classification	
Certification	C SP US

Equipment Installation

The information in this chapter is related to safety considerations for equipment installation.

Endress+Hauser Class I Division 2 analyzers use a non-incendive protection method, and as such all portions of the local installation codes apply. The maximum allowed inductance to resistance ratio (L/R ratio) for the field wiring interface must be less than 25 µH/Ω. The maximum total loop capacitance shall be 0.27 microfarads.

The safety of the analyzer is the responsibility of the installer and the organization he/she represents.

Configurations requiring optional accessories, e.g., probe assemblies, with specific characteristics must meet manufacturer specifications.

Lifting/carrying the gas analyzer

Before removing the crate, move the gas analyzer crate as close as possible to the final location.

Lift the gas analyzer by the mounting brackets using at least two individuals and distribute the weight among personnel to avoid injury. Never lift the gas analyzer by the electronics enclosure. Always carry the load, 34 kg (75 lbs.) to 45 Kg (100 lbs.), using one of the following points/methods (refer to <Xref>Figure 5–1).

- Mounting point brackets
- Support beneath (best used when employing a forklift)

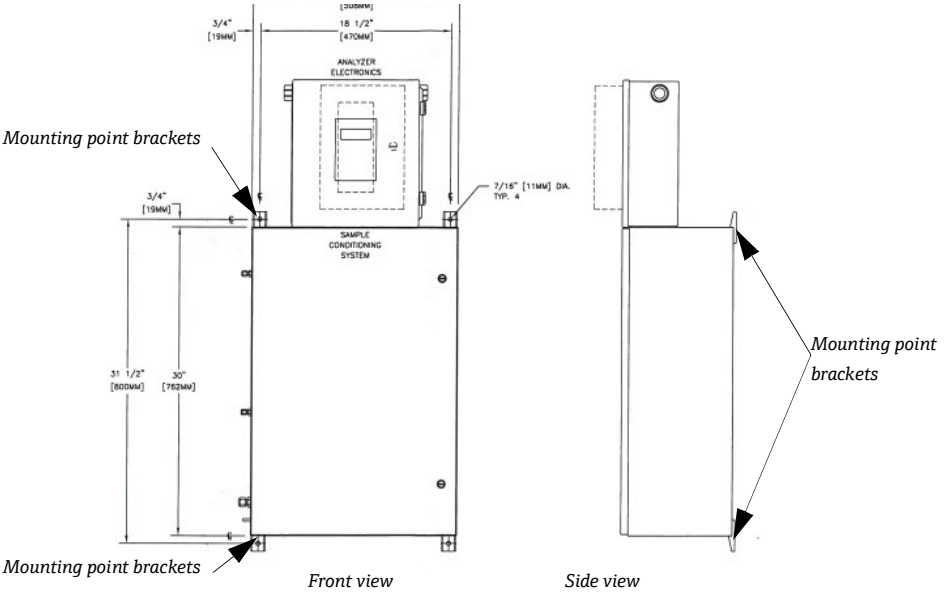

Figure 5–1 Gas analyzer carrying points/methods

Mounting the Analyzer

The SS500e, SS2000e, and SS3000e TDLAS gas analyzer is manufactured for wall or Unistrut® (or equivalent) metal framing installations. Refer to the layout diagrams in the Operating Instruction for detailed mounting dimensions → 🖹 1.

When mounting the analyzer, be sure to position the instrument so that it is not difficult to operate adjacent devices.

It is critical to mount the analyzer so that the inlet and outlet lines reach the inlet and outlet connections on the chassis while still maintaining flexibility so that the sample lines are not under excessive stress.

Endress+Hauser gas analyzers are designed for operation within the specified ambient temperature range of -20 °C to 50 °C (-4 °F to 122 °F). Intense sun exposure in some areas may cause the gas analyzer temperature to exceed the maximum.

Opening/Closing the Analyzer Enclosure

Hazardous voltage and risk of electric shock. Failure to properly ground the analyzer may create a high-voltage shock hazard.

Protective Chassis and Ground Connections

To protect personnel and equipment, connect the protective and chassis grounds first before connecting any electrical signal or power. Requirements for the protective and chassis grounds are listed below:

- The protective and chassis grounds and heater wire must be a minimum of 1.5 mm^2 (14 awg), equal or greater size than any other current-carrying conductors located in the sample conditioning system (SCS).
- The protective and chassis grounds must remain connected until all other wiring is removed.
- If the protective and chassis ground is insulated, it must use the green/yellow color.

Electrical Wiring Requirements

Interconnection of the analyzer enclosure and cell enclosure shall be performed using wiring methods approved for Class I, Division 2 or Zone 2 hazardous locations per the Canadian Electrical Code (CEC) Appendix B or J and Article 18. Zone 2 is -150 and the National Electric Code (NEC) Article 501 or 505. The installer is responsible for complying with all local installation codes.

External Circuit Breaker Requirements

An approved switch or circuit breaker rated for 15 amp should be used and clearly marked as a disconnecting device for the analyzer. The switch or circuit beaker shall not interrupt a protective earth conductor.

Because the breaker in the customer-provided power distribution panel or switch will be the primary means of disconnecting the power from the analyzer, Endress+Hauser recommends that the power distribution panel be located in close proximity to the equipment.

Thread lubricant must be applied on all conduit hub threaded connections. Endress+Hauser recommends using STL8 lubricant on all conduit screw thread and its taped openings.

Connections to the Gas Supply

Use the following procedure to connect the sample supply line. All work must be performed by technicians qualified in instrument tubing.

To connect the sample supply line

1. First, confirm that the sample probe is correctly installed at the process supply tap and that the sample probe isolation valve is closed.

The process sample at the sample tap may be at a high pressure. Use extreme caution when operating the sample probe isolation valve and field pressure reducing regulator.

All valves, regulators, switches, etc. should be operated in accordance with site lock-out/tag-out procedures.

2. Also confirm that the field pressure reducing station is installed properly at the sample probe and that the pressure regulator at the field pressure reducing station is closed (adjustment knob turned fully counter-clockwise).
3. Check that the relief valve vent line is properly installed from the field pressure reducing station to the low pressure flare or atmospheric vent connection.
4. Determine appropriate tubing route from the field pressure reducing station to the SCS.
5. Run stainless steel tubing from the field pressure reducing station to the sample supply port of the SCS. Bend tubing using industrial grade benders, check tubing fit to ensure proper seating between the tubing and fittings. Fully ream all tubing ends. Blow out the lines for 10 to 15 seconds with clean, dry nitrogen or air prior to making the connection.
6. Connect the inlet tube to the SCS using the 1/4 in. stainless steel compression-type fitting provided.
7. Tighten all new fittings 1-1/4 turns with a wrench from finger tight. For connections with previously swaged ferrules, thread the nut to the previously pulled up position, then tighten slightly with a wrench. Secure tubing to appropriate structural supports as required.

8. Check all connections for gas leaks. Using a liquid leak detector is recommended.

Do not exceed 0.7 barg or 1700 mbar (10 psig) in sample cell. Damage to cell may result.

Ventilation Requirements

Flammable gases or vapors shall not be vented to an area in which the existing area classification will be impacted. Flammable gases or vapors shall be vented to a safe location or to the flare header. For information related to mitigating risks associated with electrocution, etc → 🖹 7.

Equipment Operation

This section provides an overview of safety operational instructions for the SS500e, SS2000e, and SS3000e TDLAS gas analyzers.

Operating Controls

Refer to the appropriate manual for the purchased analyzer to review the operational controls for the equipment → 🖹 1.

Firmware Version

Each SS500e, SS2000e, and SS3000e TDLAS gas analyzer operates based on its own firmware version which is listed in the system calibration report and displays when the analyzer starts up. Detailed operation instructions are provided in the Description of Device Parameters available for download by model type on the Endress+Hauser website (www.endress.com).

Intermittent Operation

The warnings in this section apply to the SS500e, SS2000e, and SS3000e TDLAS gas analyzers.

Process samples may contain hazardous material in potentially flammable and/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 SCS.

The process sample at the sample tap is at a high pressure. A pressure reducing regulator is located at the sample tap to reduce the sample pressure and enable operation of the SCS at a low pressure. Use extreme caution when operating the sample probe valve and field pressure reducing regulator.

All valves, regulators, switches, etc. should be operated in accordance with site lock-out/tag-out procedures.

6 Maintenance and Service

This chapter provides safety information for the maintenance and service of the TDLAS Gas Analyzer. For complete instructions refer to the Operating Instruction → 1.

Cleaning and Decontamination

To clean the TDLAS gas analyzer exterior

The housing should be cleaned only with a damp cloth to avoid electrostatic discharge.

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

Fuse Ratings and Characteristics

Inside the SS500/SS2000 analyzer electronics enclosure is the electronics assembly. Fuses are located on the electronics control board → 6–1 and → 6–2.

If you need to replace a fuse, use only the same type and rating of fuse as the original. Refer also to specifications listed below.

Table 6–1 Fuse specifications

Drawing Reference	Voltage	Description	Rating
→ 6–1 F1	120 VAC	Miniature Fuse, 5 x 20 mm, Time Delay	250VAC/0.8A
	240 VAC	Miniature Fuse, 5 x 20 mm, Time Delay	250VAC/0.5 A
→ 6–2 F2	12 VDC	Miniature Fuse, 5 x 20 mm, Time Delay	250VAC/ 3.15A
	24 VDC	Miniature Fuse, 5 x 20 mm, Time Delay	250VAC/1.6A

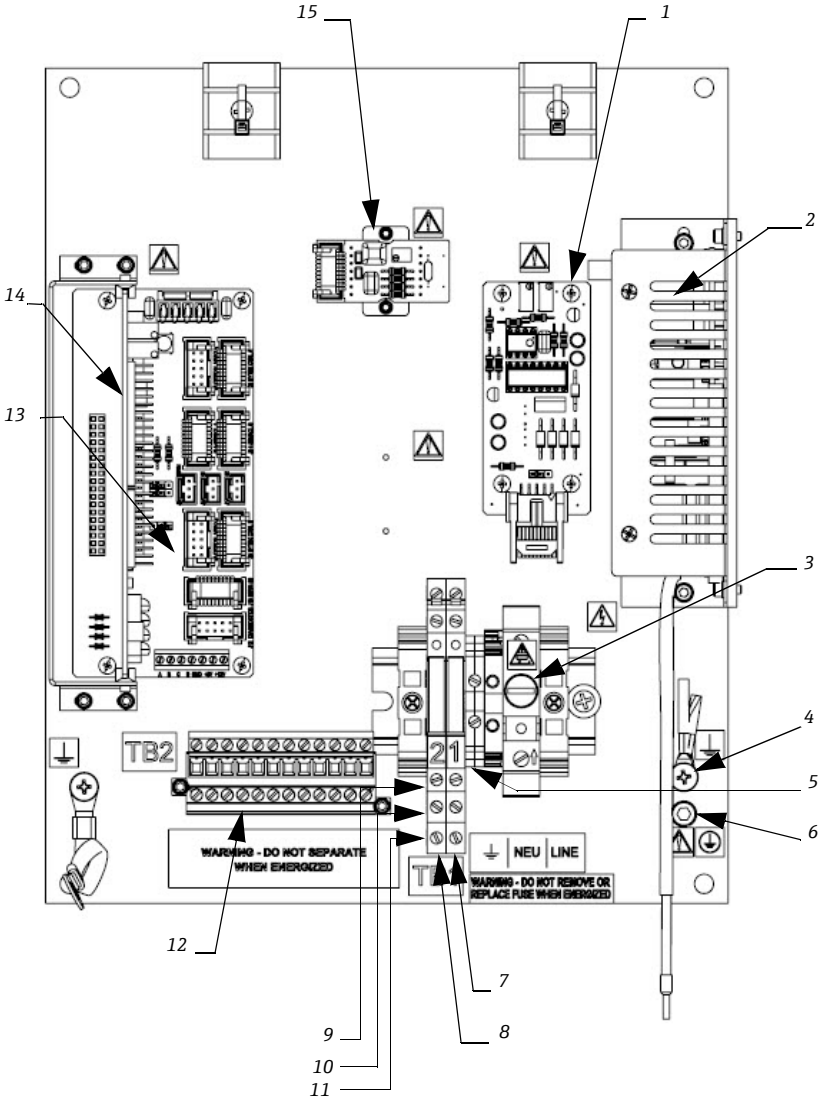

Figure 6-1 Electronics control board (AC) for single-channel systems

1 *4-20 mA Current Loop Board (stacked)*
2 *Power Supply*
3 *Fuse (F1)*
4 *Functional/Component Ground*
5 *Customer Ground*
6 *Protective Ground*
7 *Assignable Alarm Relay*
8 *General Fault Alarm Relay*
9 *NO (normally open)*
10 *Common*
11 *NC (normally closed)*
12 *4-20 mA & Serial Signal Connections*
13 *Backplane*
14 *Laser Driver Board*
15 *Temperature Control Board*

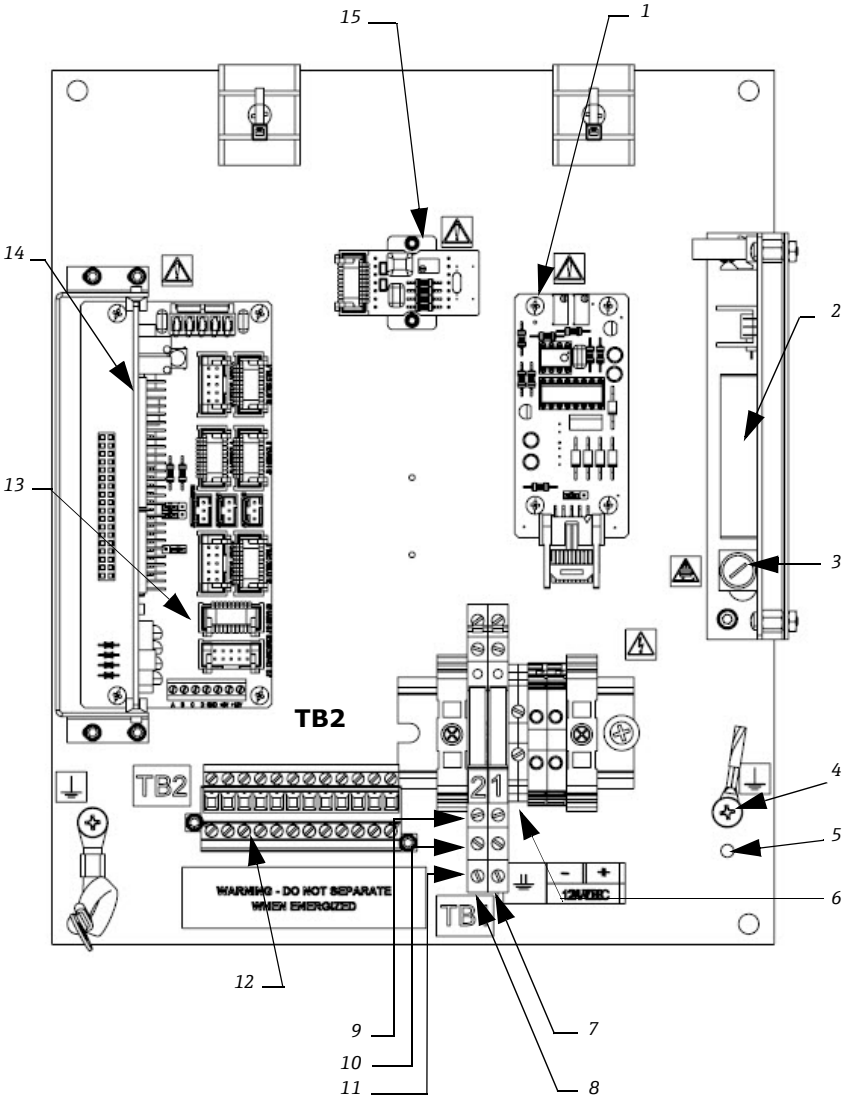

Figure 6–2 Electronics control board (DC) for single-channel systems

1 *4-20 mA Current Loop Board (stacked)*
2 *Power Supply*
3 *Fuse (F2)*
4 *Functional/Component Ground*
5 *Protective Ground*
6 *Customer Ground*
7 *Assignable Alarm Relay*
8 *General Fault Alarm Relay*
9 *NO (normally open)*
10 *Common*
11 *NC (normally closed)*
12 *4-20 mA & Serial Signal Connections*
13 *Backplane*
14 *Laser Driver Board*
15 *Temperature Control Board*

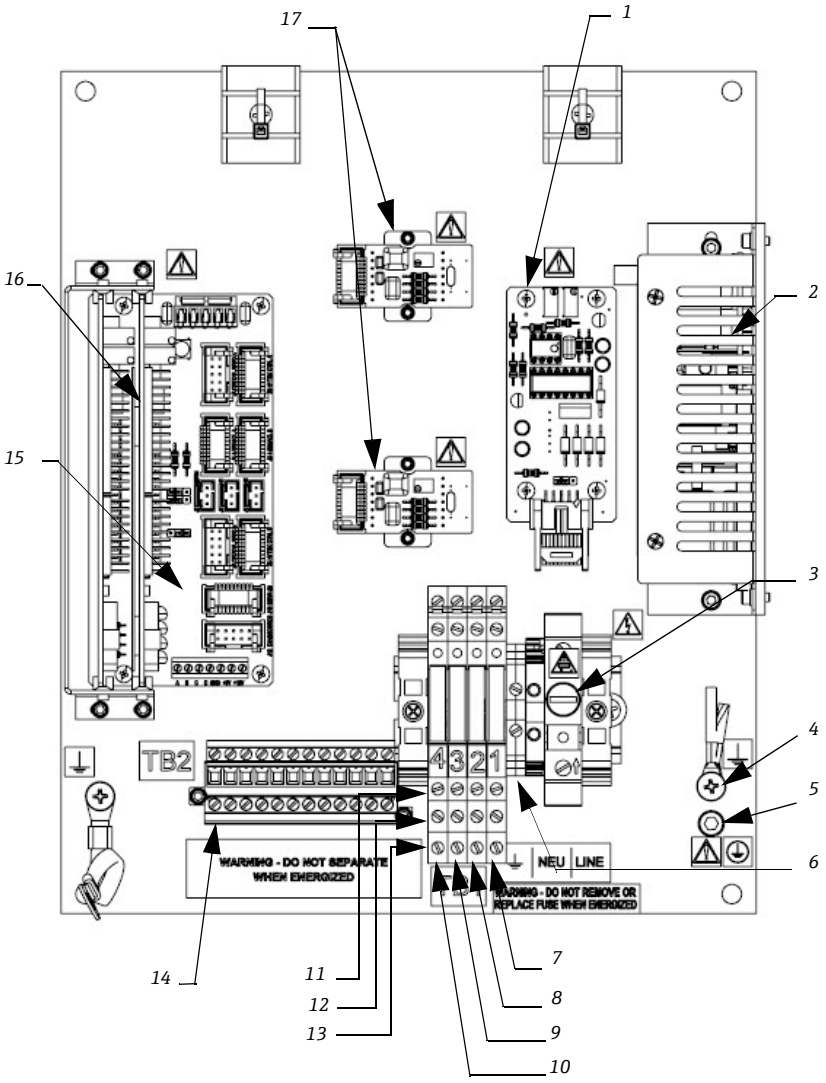

Figure 6–3 Electronics control board (AC) for dual-channel systems

1 *4-20 mA Current Loop Board (stacked)*
2 *Power Supply*
3 *Fuse (F1)*
4 *Functional/Component Ground*
5 *Protective Ground*
6 *Customer Ground*
7 *Assignable Alarm Relay (CH A)*
8 *General Fault Alarm Relay (CH A)*
9 *Assignable Alarm Relay (CH B)*
10 *General Fault Alarm Relay (CH B)*
11 *NO (normally open)*
12 *Common*
13 *NC (normally closed)*
14 *4-20 mA & Serial Signal Connections*
15 *Backplane*
16 *Laser Driver Board*
17 *Temperature Control Board*

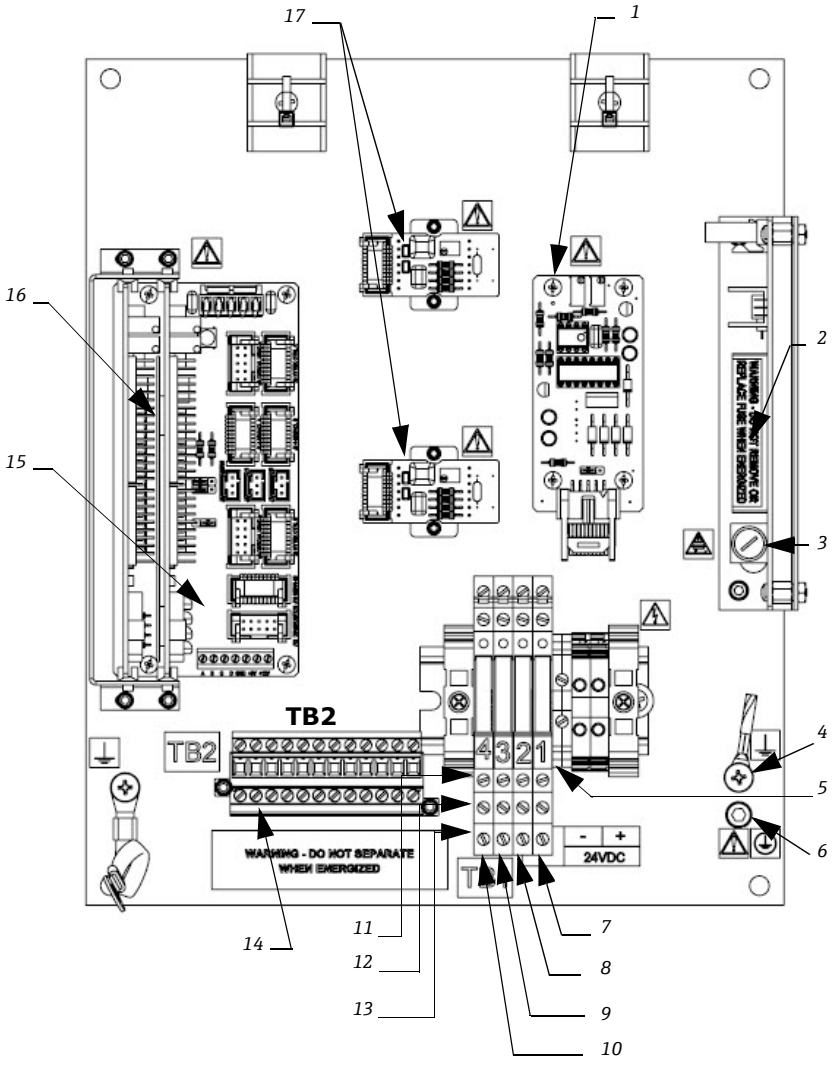

Figure 6–4 Electronics control board (DC) for dual-channel systems

1 *4-20 mA Current Loop Board (stacked)*
2 *Power Supply*
3 *Fuse (F2)*
4 *Functional/Component Ground*
5 *Customer Ground*
6 *Protective Ground*
7 *Assignable Alarm Relay (CH A)*
8 *General Fault Alarm Relay (CH A)*
9 *Assignable Alarm Relay (CH B)*
10 *General Fault Alarm Relay (CH B)*
11 *NO (normally open)*
12 *Common*
13 *NC (normally closed)*
14 *4-20 mA & Serial Signal Connections*
15 *Backplane*
16 *Laser Driver Board*
17 *Temperature Control Board*

Troubleshooting and Repair

Any repairs carried out by the customer or on behalf of the customer must be recorded in a site dossier and kept available for inspectors.

Replacement Parts

All parts required for operation of the natural gas analyzers must be supplied by Endress+Hauser or an authorized agent. Refer to Service for contact information to determine or order specific parts listing for the purchased model → 47.

Replacing a fuse

1. Power off the system and close the sample supply valve.
2. Open the electronics enclosure. For fuse location in single channel systems → 6–1 (AC) or → 6–2 (DC). For fuse locations in dual channel systems → 6–3 (AC) or → 6–4 (DC).
3. Using a flat-head screwdriver, remove the fuse screw turning counterclockwise.
4. Remove the fuse cover.
5. Remove the fuse from the cover and replace with a new fuse. Refer to Table 6–1 for fuse specifications.
6. Insert the new fuse into the screw cover and replace into the fuse opening.
7. Use the screwdriver to turn the fuse cover clockwise until tight. Do not over-tighten.

Repeat steps for each fuse to be replaced.

8. Close enclosure door and apply power to the analyzer.

Replacing a relay

1. Power off the system and close the sample supply valve.
2. Open the electronics enclosure. For relay location in single channel systems → 6–1 (AC) or → 6–2 (DC). For relay locations in dual channel systems → 6–3 (AC) or → 6–4 (DC).

Note or take a photo of the placement of wiring connections to the relays.

3. Using a small flat-head screwdriver, remove all wires connected to the bottom of the relay.
4. Using a small flat-head screwdriver, pull down the black latch behind the relay.

If more working space is needed, you can use a small flathead screwdriver to loosen and move the gray relay placer.

5. Remove the relay.

6. Insert the new relay into the relay mounting bracket and press to latch.
7. Reconnect the wires to the bottom of the relay using the reference notes or photo taken.

Repeat steps for each relay to be replaced.

8. Close enclosure door and apply power to the analyzer.

Replacing the membrane separator

1. Turn off the flow from the customer-installed shut-off valve at the sample tap.
2. Unscrew the cap from the membrane separator using a channel lock wrench.

For SS500e, SS2000e, and SS3000e analyzers, remove four screws with a 5/23 in. screwdriver at the base of the filter and remove the top O-Ring.

3. Inspect the filter.

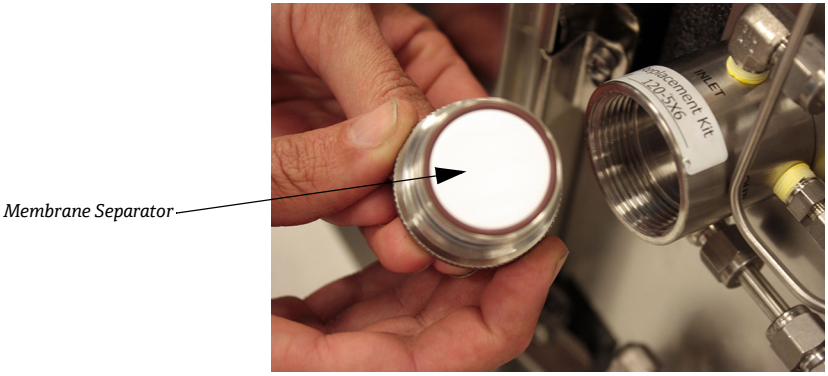

Figure 6–5 Inspecting the membrane separator filter

If the membrane filter is dry:

1. Check if there are any contaminants or discoloring of the white membrane. If yes, the filter should be replaced.
   a. Remove the O-Ring and replace the membrane filter.
   b Replace the O-Ring on top of the membrane filter.
   c Place the cap back onto the membrane separator and tighten.
2. Check upstream of the membrane for liquid contamination and clean and dry out before re-opening the shut-off valve at the sample tap.

OR

If the membrane filter is wet (liquid or contaminants are detected on the filter):

1. Drain any liquids and clean with isopropyl alcohol.
2. Clean any liquids or contaminants from the base of the membrane separator.
3. Replace the filter and the O-Ring.
4. Place the cap onto the membrane separator and tighten with a channel lock wrench.

For the SS500e, SS2000e, and SS3000e analyzers, replace the four screws and tighten the base.

5. Check upstream of the membrane for liquid contamination and clean and dry out before opening the shut-off valve at the sample tap.

Service

For Service in your location, please refer to our website (https://www.endress.com/contact) for the list of local sales channels.

XA02744C/66/EN/01.21

www.endress.com

Endress+Hauser

People for Process Automation