

Technical Information

SS500/SS500XP

TDLAS Gas Analyzer



Single channel TDLAS Gas Analyzer for H₂O that is exceptionally reliable and tailored for the natural gas industry. Available with panel-mounted sample conditioning systems.

Application

- H₂O in natural gas
- H₂O measurement ranges up to 2110 ppmv (100 lbs/MMSCF)

Key Features

- Virtually maintenance free
- No interference from glycol, methanol or amine
- Accurate, real-time measurements
- No wet-up or dry-down delays
- Reliable in harsh environments
- Short term payback; no consumables
- NIST-traceable calibration
- Analog and serial outputs for remote monitoring

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1 Introduction

Product overview

The Endress+Hauser **SS500** single channel analyzer is extremely reliable and tailored for the needs of the natural gas industry. The sensor measures gas using a patented Tunable Diode Laser (TDL) to determine the concentration of the gas without coming into physical contact with the stream.

Rapid response time: The SS500 analyzer takes four measurements per second with a laser and detector and immediately averages the results. Because there is no contact with the gas, real-time measurements are not hampered by wet-up or dry-down times as with surfaced-based sensors.

Reliable: Trustworthy measurements are vital to natural gas pipeline and processing companies. Independent studies have proven that SS500 results are highly correlated with those of chilled mirrors. However, chilled mirrors require skilled experts to operate and the results are highly scattered (large standard deviation).

Uncertain measurements can be extremely costly. Additional processing of dehydration costs, upset conditions, shut-ins and inconsistent results may be caused by sensors that do not perform properly. The SS500 is the first to offer truly reliable measurement and simple operation.

Long life: The TDLAS Gas Analyzer sensor does not come into contact with the sample gas stream. The result is a sensor which does not suffer from contamination or drift due to vapor impurities such as glycol, methanol or amines.

Low cost of ownership: Operating costs are significantly reduced by eliminating the cost of consumables, extra sensor heads, labor and overhead associated with excessive maintenance.

The SS500 dramatically reduces intangible but real costs associated with unreliable gas measurements by eliminating added processing steps, detecting poor gas quality, and reducing the possibility of costly damage to equipment that can result from sensors that produce incorrect data.

Measuring system: The SS500 is offered as a stand-alone analyzer or accompanied by a sample conditioning system on a panel.

Standard documentation

All documentation is available on the:

- Endress+Hauser website: www.endress.com

Each analyzer shipped from the factory is packaged with documents specific to the model that was purchased. This Technical Information document is an integral part of the complete document package, which also includes:

Part Number	Document Type	Description
BA02182CEN	Operating Instruction	This manual contains a comprehensive overview of the analyzer and step-by-step installation instructions (SS500).
BA02183CEN	Operating Instruction	This manual contains a comprehensive overview of the analyzer and step-by-step installation instructions (SS500XP).
GP01181CEN	Description of Device Parameters, HC12	This document provides the user with an overview of the HC12 firmware functionality.
BA02184CEN	Operating Instruction, Sample Conditioning System Remote Panel	This manual provides an overview of the Sample Conditioning System (SCS) Remote Panel along with instructions for installation and operation (SS500XP only).

Registered trademarks

Modbus®

Registered trademark of SCHNEIDER AUTOMATION, INC.

Manufacturer address

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

2 System design

Measuring system

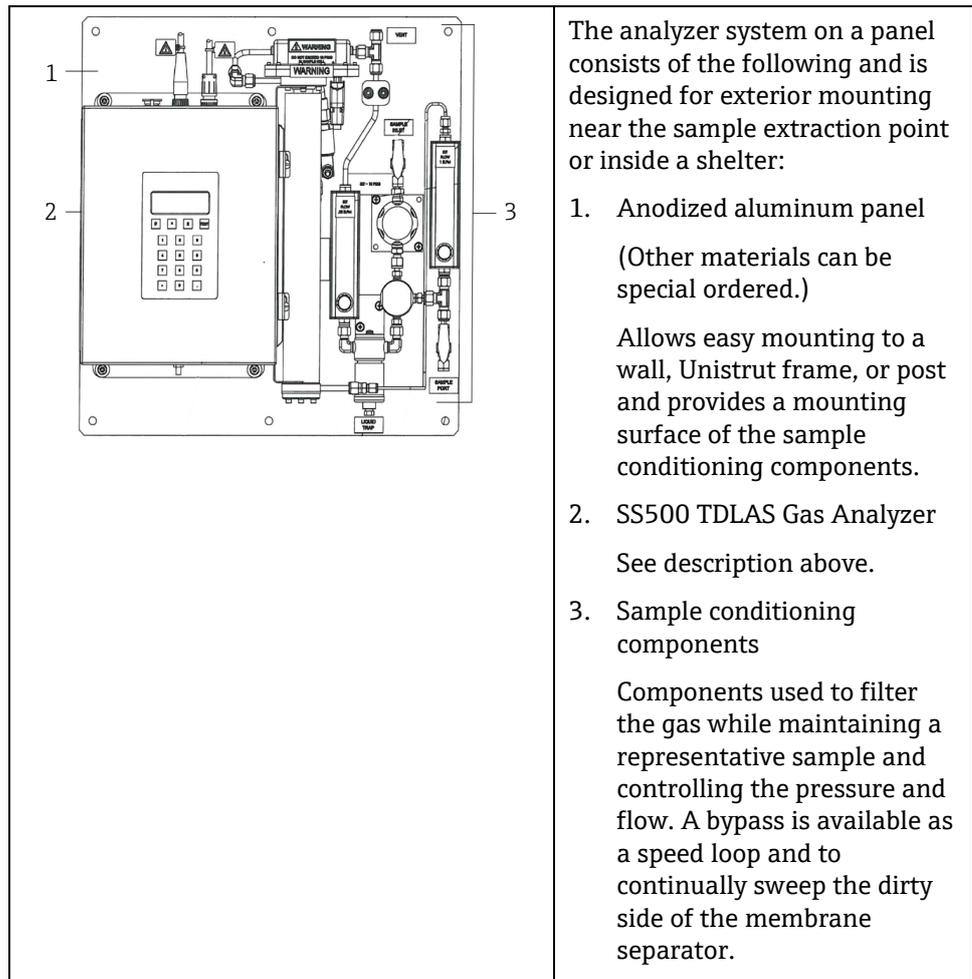
SS500 TDLAS Gas Analyzer – CSA Class I, Division 2

	<p>The base analyzer consists of:</p> <ol style="list-style-type: none"> 1. Optical head Contains the laser, laser temperature control, detector, window, pressure and temperature sensors, optical head electronics. 2. Sample cell and mirror Sample gas flows through the cell via an inlet and outlet port. The laser beam passes through the cell, reflecting from the mirror on the bottom. 3. Controller Contains the power supply, HMI (LCD display and keypad), communications and measurement control electronics.
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SS500XP TDLAS Gas Analyzer – CSA Class I, Division 1

	<p>The explosion proof analyzer consists of the base analyzer inside a cast aluminum enclosure:</p> <ol style="list-style-type: none"> 1. Electronics enclosure Explosion proof enclosure rated to CSA Class I, Div 1 certification. 2. SS500 TDLAS Gas Analyzer controller See Controller description above.
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SS500 TDLAS Gas Analyzer with SCS on a panel



The analyzer system on a panel consists of the following and is designed for exterior mounting near the sample extraction point or inside a shelter:

1. Anodized aluminum panel
(Other materials can be special ordered.)

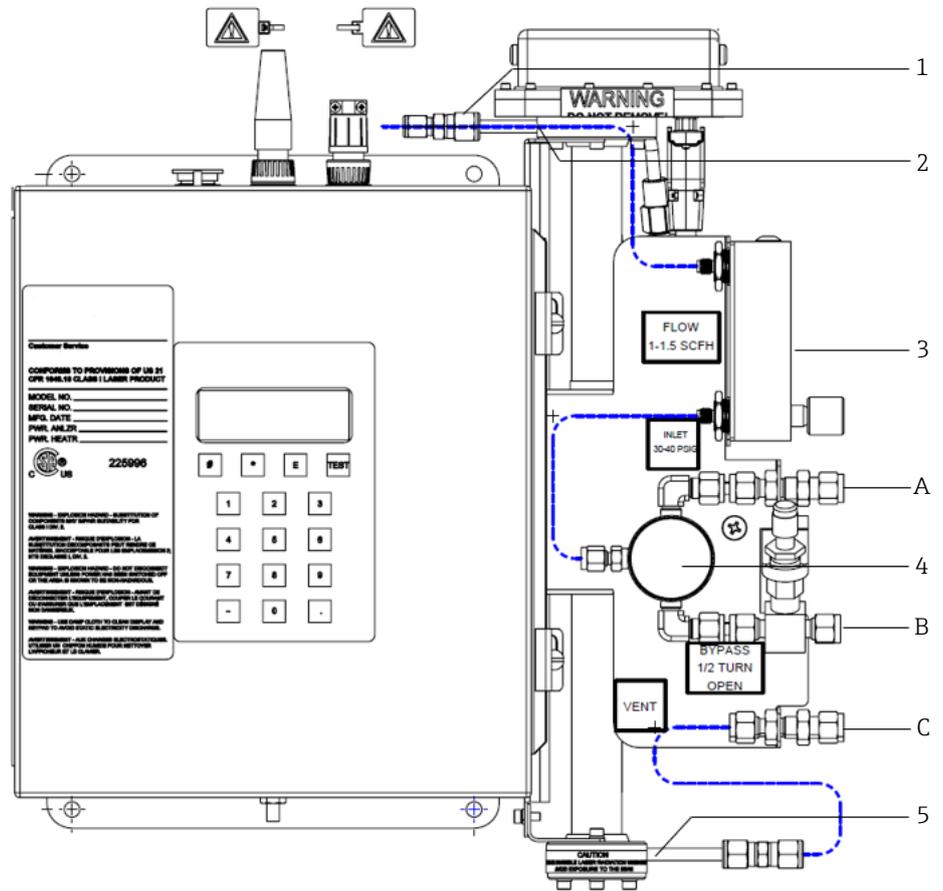
Allows easy mounting to a wall, Unistrut frame, or post and provides a mounting surface of the sample conditioning components.

2. SS500 TDLAS Gas Analyzer
See description above.

3. Sample conditioning components

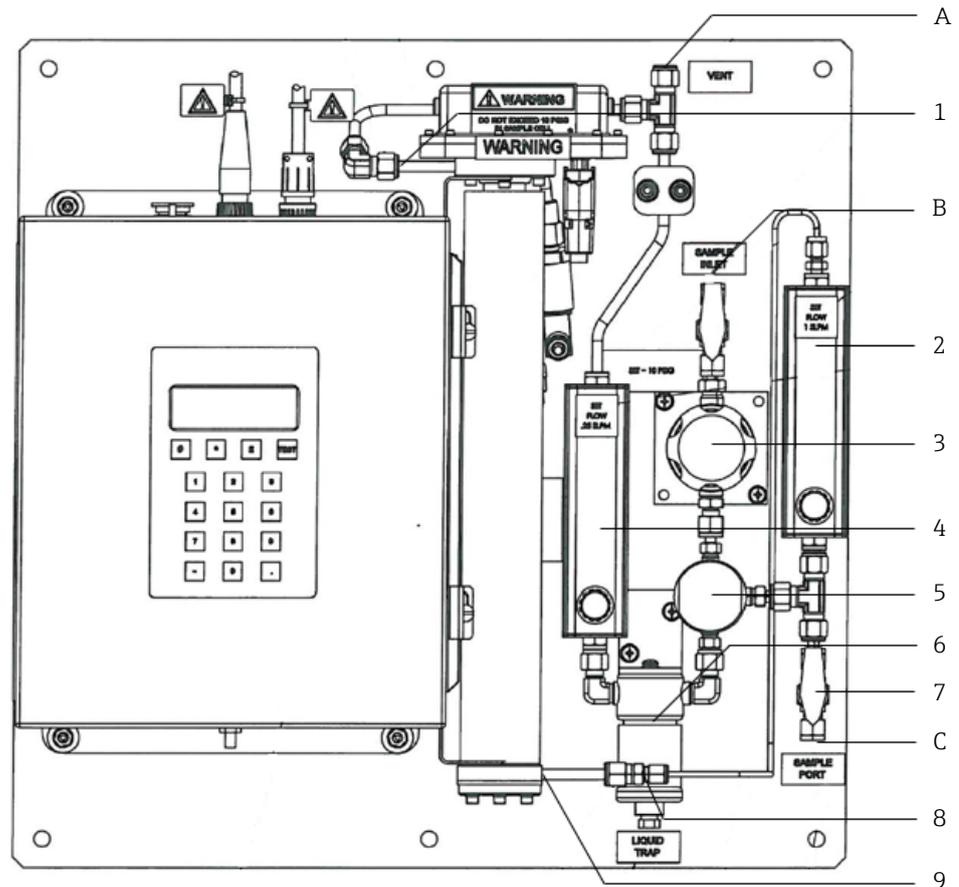
Components used to filter the gas while maintaining a representative sample and controlling the pressure and flow. A bypass is available as a speed loop and to continually sweep the dirty side of the membrane separator.

Equipment architecture Simple SCS



- | | | | |
|---|-------------------------------------|---|--|
| 1 | Check valve | A | Sample in, 140 to 310 kPa (20 to 45 psi) |
| 2 | Cell inlet port | B | Sample bypass vent, to safe area |
| 3 | Analyzer flow indicator and control | C | Sample vent, to safe area |
| 4 | Membrane separator | | |
| 5 | Cell outlet port | | |

Full feature SCS



- | | | | |
|---|--|---|--|
| 1 | Cell outlet port | A | Sample vent, to safe area |
| 2 | Analyzer flow indicator and control | B | Sample in, 140 to 310 kPa (20 to 45 psi) |
| 3 | Pressure regulator | C | Reference gas in, 15 to 70 kPa (2 to 10 psi) |
| 4 | Bypass flow indicator and control (optional) | | |
| 5 | Membrane separator (optional) | | |
| 6 | Liquid trap | | |
| 7 | Reference gas on/off | | |
| 8 | Check valve (optional) | | |
| 9 | Cell inlet port | | |

3 Certificates and approvals

Area classifications	Model	Certifications
	SS500 TDLAS Gas Analyzer	<u>cCSAus:</u> Class I, Division 2, Groups A, B, C, D, T3 Class I, Zone 2 IIC T3/T3C Tambient:: -20 °C to +50 °C
	SS500 TDLAS Gas Analyzer with SCS on panel	<u>cCSAus:</u> Class I, Division 2, Groups A, B, C, D, T3 Class I, Zone 2 IIC T3/T3C Tambient: -20 °C to +50 °C
	SS500XP TDLAS Gas Analyzer	<u>cCSAus:</u> Class I, Division 1, Groups B, C, D, T4 Tambient: -20 °C to +50 °C
	SS500XP TDLAS Gas Analyzer with SCS on panel	<u>cCSAus:</u> Class I, Division 1, Groups B, C, D, T4 Tambient: -20 °C to +50 °C

4 Ordering information

Order codes

Refer to the website (www.endress.com) to locate your local sales channel for more information.

Feature number	Order code	Description
Housing (choose one)		
010	2	Explosion-proof aluminum enclosure (NEMA 7, 4) ¹
	3	Class 1, Division 2, stainless steel enclosure (NEMA 3R)
Measurement range 1 (choose one)		
020	0	H ₂ O range 0.25 to 100 lbs/MMSCF (5 to 2110 ppmv)
Measurement range 2 (choose one)		
030	1	N/A
Gas Inlet (Choose one)		
040	1	N/A
Background gas (choose one)		
050	1	Natural gas, standard (Table 1 and Table 2)
Power supply (choose one)		
060	1	Universal 100/250 VAC, 50/60 Hz, two 4-20 mA outputs
	2	18 to 32 VDC, two 4-20 mA outputs
	3	9 to 16 VDC, two 4-20 mA outputs ³
	4	Universal 100/250 VAC, 50/60 Hz, one 4-20 mA output
	5	18 to 32 VDC, one 4-20 mA output
	6	9 to 16 VDC, one 4-20 mA output ³
Sample conditioning mounting (choose one)		
070	S1	Simple sample system on bracket mounted on the right side of analyzer
	00	None
	01	Full featured sample system on panel with regulator and sample port; analyzer mount separate from panel
	11	Full featured sample system with regulator and sample port mounted with analyzer on panel
	YY	TSP

Feature number	Order code	Description
Liquid trap and bypass options (choose one)		
080	00	Without sampling system
	01	No liquid trap or bypass flowmeter ⁴
	11	With liquid trap, valve, and bypass flowmeter
Enclosure options (choose one)		
090	0	Without sampling system
	1	No enclosure ^{2, 4}
	3	304 stainless steel enclosure for analyzer and sample conditioning system, 24 x 24 inch ^{2, 4}
	5	Heated 304SS enclosure for analyzer and sample conditioning system, 30 x 30 inch ^{2, 4}
	6	Heated 304SS enclosure with heat trace connection, 30 x 30 inch ^{2, 4}
	8	304SS enclosure for analyzer with simple sample system, 24 x 24 inch ^{2, 5}
	9	Simple sample system panel only ^{2, 5}
	Y	TSP
Tag option (Choose one)		
895	T1	Stainless steel tag (up to 2 lines of text)

NOTES

1. When the NEMA 7 XP enclosure is chosen, panel type 1 is not available.
2. An overall enclosure is highly recommended for outdoor installations. For outdoor installations, and applications requiring heated sample systems, the SS500e is the preferred product.
3. 9 to 16 VDC not available with explosion-proof (housing option 2).
4. For panel types '0' and '1' only.
5. For panel type 'S' only.

Gas specifications

Component name	Abbreviation	Allowable component range ¹		
		Natural gas	Rich natural gas	Rich natural gas/pure CO ₂
		Table 1	Table 2	Table 3
Methane	C ₁	90 to 100%	50 to 100%	0 to 50%
Ethane	C ₂	0 to 7%	0 to 20%	0 to 20%
Propane	C ₃	0 to 2%	0 to 15%	0 to 15%
Butanes	C ₄	0 to 1%	0 to 5%	0 to 5%
Pentanes	C ₅	0 to 0.2%	0 to 2%	0 to 2%
Hexanes and heavier	C ₆₊	0 to 0.2%	0 to 2%	0 to 2%
Carbon dioxide	CO ₂	0 to 3%	0 to 20%	50 to 100%
Nitrogen and other inerts	N ₂	0 to 10%	0 to 20%	0 to 20%
Hydrogen sulfide	H ₂ S	0 to 300 ppmv	0 to 5%	0 to 5%
Water	H ₂ O	0 to 5000 ppmv	0 to 5000 ppmv	0 to 5000 ppmv

1. For Table 2 and Table 3, stream composition must be supplied at the time of order placement.

Technical data

Measurement data	
Target components	H ₂ O 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	
Voltage	100 to 240 VAC, 50/60 Hz 9 to 16 VDC or 18 to 32 VDC - optional
Max current	1 amp maximum at 120 VAC 1.6A at 24 VDC, 3.2A 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	Class I, Division 1
Electronics enclosure type	NEMA 3R – 304 stainless steel	NEMA 4, 7, 9 – cast aluminum
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)	565 mm H x 413 mm W x 222 mm D (22.25 x 16.25 x 8.75 inches)
Weight approximately	11.5 kg (25 lbs)	46.8 kg (103 lbs)
Sample cell dimensions	438 mm H x 108 mm W (17.3 x 4.3 inches)	438 mm H x 108 mm W (17.3 x 4.3 inches)
Number of sample cells	1	1
Area classification		
Certification	cCSAus Class I, Division 2, Groups A, B, C, D, T3C cCSAus Class I, Zone 2 IIC T3C	cCSAus Class I, Division 1, Groups B, C, D, T4

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www.addresses.endress.com
