Technical Information

SS3000

TDLAS Gas Analyzer

Dual channel gas analyzer for H_2O and CO_2 in a cost-effective measurement system, which enhances savings by incorporating two sensors in one. Available with panel-mounted sample conditioning systems.

Application

- H_2O and/or CO_2 in natural gas
- H_2O measurement ranges up to 2110 ppmv (100 lbs/MMSCF)
- CO_2 measurement ranges up to 20%

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 SS3000 Dual Channel Gas Analyzer is capable of measuring moisture and carbon dioxide in this cost effective dual channel system, enhancing savings by incorporating two sensors in one.

Rapid response time: The SS3000 analyzer takes four measurements per second with a laser and detector and immediately averages the results. 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.

Trustworthy measurements: Dependable data is an essential element in the quest for improved safety and quality. The SS3000 analyzer delivers precise, reliable measurements using patented Tunable Diode Laser (TDL) technology developed by NASA. Because the TDL sensor never comes 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.

State of the art technology: The analyzer works by shining a laser beam through the sample cell. The laser beam is selected to interact only with the measured compound, creating an absorption signal. The higher the concentration of H_2O/CO_2, the greater absorption of light and the stronger the corresponding absorption signal. Spectrum software analyzes these absorption peaks to produce very accurate and repeatable measurements. Since the calculation is a direct, fundamental measurement, the amount of H_2O/CO_2 present is measured in real-time.

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 SS3000 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.

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
BA02185CEN	Operating Instruction	This manual contains a comprehensive overview of the analyzer and step-by-step installation instructions (SS3000).
GP01181CEN	Description of Device Parameters, HC12	This document provides the user with an overview of the HC12 firmware functionality.

Registered trademarks

Modbus®
Registered trademark of SCHNEIDER AUTOMATION, INC.

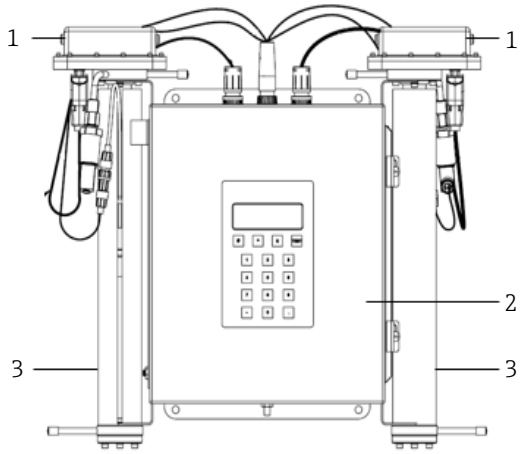
Manufacturer address

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

2 System design

Measuring system

SS3000 TDLAS Gas Analyzer



The base analyzer consists of:

1. Optical heads

   Contains the laser, laser temperature control, detector, window, pressure and temperature sensors, optical head electronics.

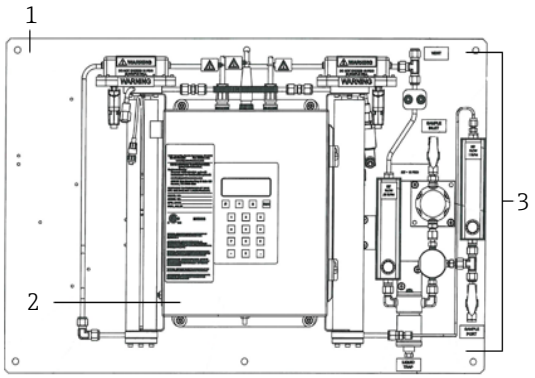
2. Controller

   Contains the power supply, HMI (LCD display and keypad), communications and measurement control electronics.

3. Sample cells and mirrors

   Sample gas flows through the cells via an inlet and outlet port. The laser beam passes through the cell, reflecting from the mirror on the bottom.

SS3000 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.

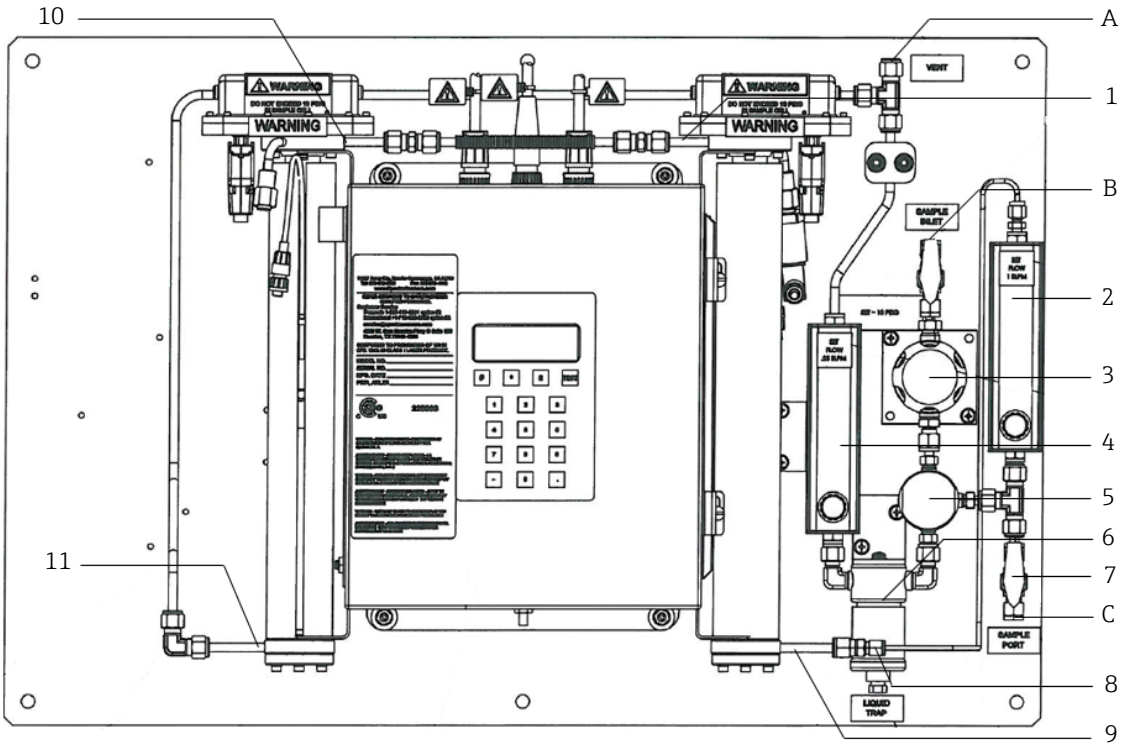
2. SS3000 TDLAS Gas Analyzer

   See description above.

3. Sample conditioning components

   Components used to filter the gas while maintaining a representative sample, and to control the pressure and flow. A bypass is available as a speed loop and to continually sweep the dirty side of the membrane separator. Single or separate sample conditioning systems are available for each cell.

Equipment architecture



1 *Cell 1 outlet port*
2 *Analyzer flow indicator and control*
3 *Pressure regulator*
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 1 inlet port*
10 *Cell 2 inlet port*
11 *Cell 2 outlet port*

A *Sample vent, to safe area*
B *Sample in, 140 to 310 kPa (20 to 45 psi)*
C *Reference gas in, 15 to 70 kPa (2 to 10 psi)*

3 Certificates and approvals

Area classifications

Model	Certifications
SS3000 TDLAS Gas Analyzer	cCSAus: Class I, Division 2, Groups A, B, C, D, T3C Class I, Zone 2 IIC T3/T3C Tambient: -20 °C to +50 °C
SS3000 TDLAS Gas Analyzer with SCS on panel	cCSAus: Class I, Division 2, Groups A, B, C, D, T3C Class I, Zone 2 IIC T3/T3C 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	3	Class 1, Div 2, stainless steel enclosure (NEMA 3R)
Measured component – stream 1 (choose one)		
020	W	H_2O range 0 to 250 lbs/MMSCF (0 to 5275 ppmv) Table 1 background only
	X	Other H_2O range (min 0.5 lbs/MMSCF, max 100 lbs/MMSCF)
	Y	Other CO_2 range (min 0 to 5%, max 0 to 20%)
	1	H_2O range 0 to 20 lbs/MMSCF (0 to 422 ppmv)
	2	CO_2 range 0 to 10%
	3	CO_2 range 0 to 5%
	6	H_2O range 0 to 50 lbs/MMSCF (0 to 1055 ppmv)
	7	CO_2 range 0 to 20%
	8	H_2O range 0 to 100 lbs/MMSCF (0 to 2110 ppmv)
Measured component – stream 2 (choose one)		
030	W	H_2O range 0 to 250 lbs/MMSCF (0 to 5275 ppmv) Table 1 background only
	X	Other H_2O range (min 0.5 lbs/MMSCF, max 100 lbs/MMSCF)
	Y	Other CO_2 range (min 0 to 5%, max 0 to 20%)
	2	H_2O range 0 to 20 lbs/MMSCF (0 to 422 ppmv)
	3	CO_2 range 0 to 10%
	4	CO_2 range 0 to 5%
	6	H_2O range 0 to 50 lbs/MMSCF (0 to 1055 ppmv)
	7	CO_2 range 0 to 20%
	8	H_2O range 0 to 100 lbs/MMSCF (0 to 2110 ppmv)

Feature number	Order code	Description
Gas inlet(s) (choose one)		
040	1	Single gas inlet (common to both flow cells)
	2	Two gas inlets (separate gas streams for each flow cell)
Background gas (Choose one)		
050	X	Other
	1	Natural gas, standard (Table 1)
	2	Natural gas, alternative (Table 2) Must submit composition
	3	Natural gas with high CO_2 (Table 3) Must submit composition[1]
	4	Air
Power supply (choose one)		
060	1	Universal 100/250 VAC, 50/60 Hz
	2	18 to 32 VDC
	3	9 to 16 VDC
Panel type (choose one)		
070	00	No sample conditioning system
	01	Single channel sample conditioning panel for remote installation
	21	Two process streams conditioned (two sample systems on panel)
	31	Single process stream shared by two cells (one sample system)
	YY	TSP
Liquid trap with bypass (choose one)		
080	00	Without sampling system
	01	No liquid trap or bypass flowmeter
	11	(1 or 2) Liquids trap with valve and bypass flowmeter[2]

Feature number	Order code	Description
Sample conditioning mounting (choose one)		
090	0	No sampling conditioning system
	1	Sample conditioning on flat aluminum panel
	3	304 stainless steel enclosure for analyzer and SCS 30 x 30 inch (1 stream) or 36 x 36 inch (2 streams)[3]
	5	Heated 304 stainless steel enclosure for analyzer and SCS 36 x 36 inch
	6	Heated 304 stainless steel enclosure with heat trace connect 36 x 36 inch (1 stream)
	7	Heated 304 stainless steel enclosure with heat trace connection 36 x 36 inch (2 streams)
	Y	TSP
Tag option (choose one)		
895	T1	stainless steel tag (up to 2 lines of text)

NOTES

1. *High CO_2 background requires heated enclosure (choose option 5 or 6 under **Sample conditioning mounting** with 40 °C set point. Repeatability is ±5% of reading for this system. Only order with **Measured component** options 1,6, and 8.*
2. *For panel type with 2 process streams, panel is built with 2 liquid traps with valve and bypass flowmeters.*
3. *An overall enclosure is highly recommended for outdoor installations. For outdoor installations and applications requiring heated sample systems, the SS3000e is the preferred product.*

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%
Hyrdogen sulfide	H_2S	0 to 300 ppmv	0 to 5%	0 to 5%
Water	H_2O	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_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	
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: 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	NEMA 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

* *Intended for indoor installation or within an overall enclosure. For installations requiring NEMA 4X, refer to Model SS2000e.*

TI01653C/66/EN/01.21

www.addresses.endress.com

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