Technical Information

SS3000e

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 enclosured heated sample system.

Applications

- 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
- Not 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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Table of Contents

1 Introduction

Product overview

The Endress+Hauser **SS3000e** 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 SS3000e 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 SS3000e analyzer delivers precise, reliable measurements using patented Tunable Diode Laser Absorption Spectroscopy (TDLAS) technology developed by NASA. Because the TDLAS analyzer 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 SS3000e 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

Each analyzer shipped from the factory is packaged with documents specific to the model that was purchased. All documentation is available on the Endress+Hauser website at www.endress.com.

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

Part number	Document type	Description
BA02164C	Operating Instruction	Provides a comprehensive overview of the analyzer and step-by-step installation instructions (SS3000e)
GP01181C	Description of Device Parameters (HC12)	Provides the user with an overview of the HC12 v2.51 firmware functionality
XA02744C	Safety Instruction	Provides the most common safety issues related to the installation and operation of the SS500e TDLAS Gas analyzer.

Registered trademarks

Modbus®
Registered trademark of SCHNEIDER AUTOMATION, INC.

Manufacturer address

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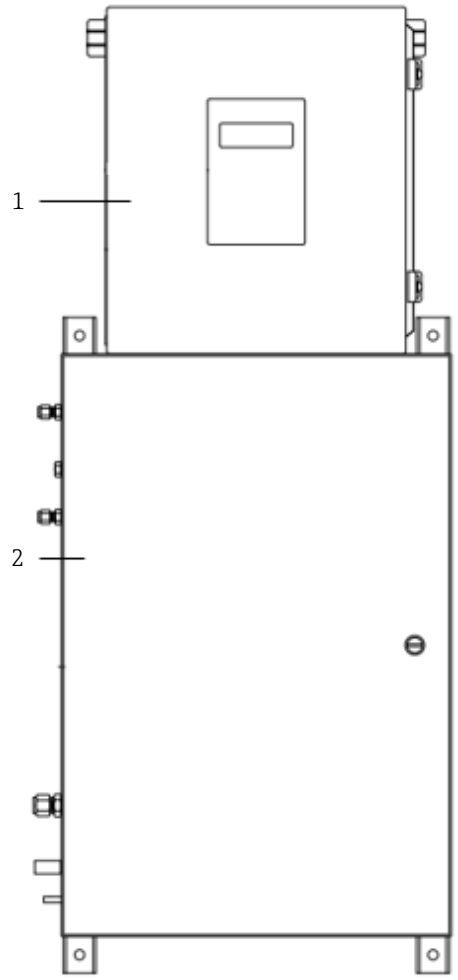
11027 Arrow Route
Rancho Cucamonga, CA 91730
United States
www.endress.com

2 System design

Measuring system

SS3000e TDLAS Gas Analyzer



The base analyzer consists of:

1. Controller

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

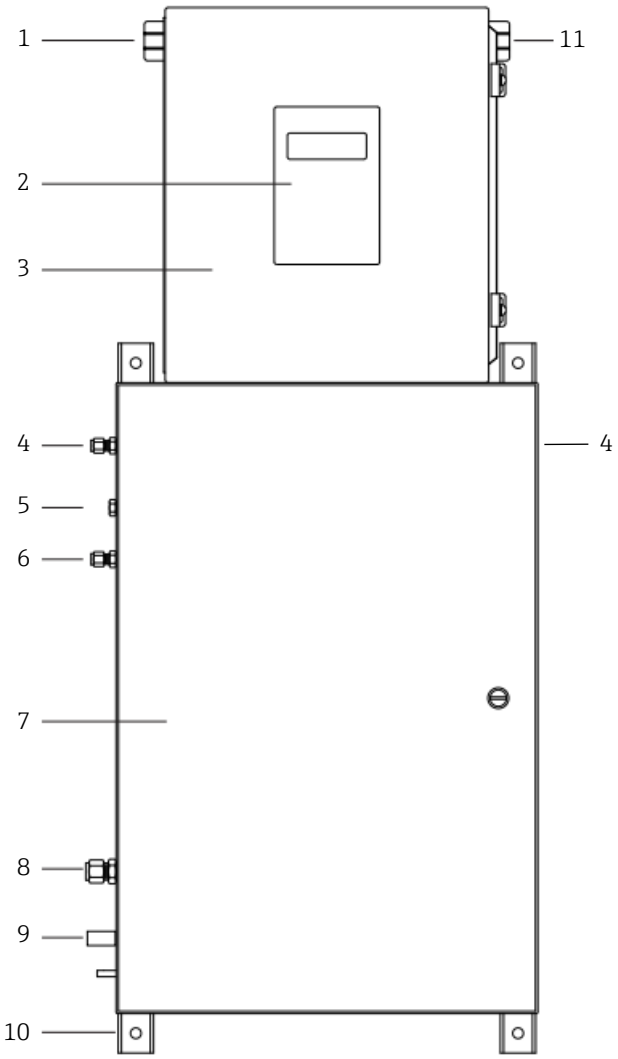
2. Enclosure with optional heater

   Includes sample conditioning system, two optical heads and two sample cells.

   For each measurement, 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.

   Components are 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



1. *Signal wiring*
2. *Analyzer display and keypad*
3. *Analyzer electronics*
4. *Sample inlet (heat-traced bundle sleeve – optional), 140 to 310 kPa (20 to 45 psi); 2 inlet streams total*
5. *Heat trace power connection (optional)*
6. *Validation gas inlet and sampling point, 140 to 310 kPa (20 to 45 psi)*
7. *Sample conditioning system (SCS) and TDLAS cell enclosure*
8. *Sample vent, to safe, area, 700 to 1700 mbar*
9. *SCS enclosure heater power (optional)*
10. *Mounting bracket (four)*
11. *Analyzer power*

3 Certificates and approvals

Area classifications

Model	Certifications
SS3000e TDLAS Gas Analyzer (includes sample conditioning system)	cCSAus: Class I, Division 2, Groups A, B, C, D, T3 (T3C without heater) Class I, Zone 2 IIC T3 (T3C without heater) Tambient: -20 ˚C to +50 ˚C cCSAus: Class I, Division 2, Groups B, C, D, T3 (T3C without heater) Class I, Zone 2 IIB+H_2 T3 (T3C without heater) Tambient: -10 ˚C to +60 ˚C

4 Ordering Information

Order codes

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

Feature number	Order code	Description
Measured component (choose one)		
010	1	H_2O range 2 to 20 lbs/MMSCF (40 to 422 ppmv)
	2	H_2O range 2 to 50 lbs/MMSCF (40 to 1055 ppmv)
	3	H_2O range 2 to 100 lbs/MMSCF (40 to 2110 ppmv)
	4	H_2O range 0 to 20 lbs/MMSCF (0 to 422 ppmv)
	5	H_2O range 0 to 50 lbs/MMSCF (0 to 1055 ppmv)
	6	H_2O range 0 to 100 lbs/MMSCF (0 to 2110 ppmv)
	W	H_2O range 0 to 250 lbs/MMSCF (0 to 5275 ppmv) Table 1 background only
	7	CO_2 range 0 to 5%
	8	CO_2 range 0 to 10%
	9	CO_2 range 0 to 20%
	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%)
Measured component – stream 2 (choose one)		
020	1	H_2O range 2 to 20 lbs/MMSCF (40 to 422 ppmv)
	2	H_2O range 2 to 50 lbs/MMSCF (40 to 1055 ppmv)
	3	H_2O range 2 to 100 lbs/MMSCF (40 to 2110 ppmv)
	4	H_2O range 0 to 20 lbs/MMSCF (0 to 422 ppmv)
	5	H_2O range 0 to 50 lbs/MMSCF (0 to 1055 ppmv)
	6	H_2O range 0 to 100 lbs/MMSCF (0 to 2110 ppmv)
	W	H_2O range 0 to 250 lbs/MMSCF (0 to 5275 ppmv) Table 1 background only
	7	CO_2 range 0 to 5%
	8	CO_2 range 0 to 10%
	9	CO_2 range 0 to 20%
	X	Other H_2O range (min 0.5 lbs/MMSCF, max 100 lbs/MMSCF)
	Y	Other CO_2 range (min 0-5%, max 0-20%)

Feature number	Order code	Description
Background gas (choose one)		
030	1	Natural gas, standard (Table 1)
	2	Natural gas, alternative (Table 2); must submit composition[1]
	3	Natural gas with high CO_2 (Table 3); must submit composition[1,2]
	4	Air
	X	Other
Ambient temperature (choose one)		
040	1	-20 °C to 50 °C (-4 °F to 122 °F)
	2	-10 °C to 60 °C (14 °F to 140 °F)
Input power (choose one)		
050	1	120 VAC
	2	240 VAC
	3	18 to 24 VDC
Serial communications options (choose one)		
060	1	RS232, one per measurement channel
	2	RS485, one per measurement channel
	3	Ethernet, one IP connection for two measurement channels
Electronics enclosure type (choose one)		
070	1	304 stainless steel enclosure (top and bottom)
	2	316 stainless steel enclosure (top and bottom)
	3	316 stainless steel enclosure (top and bottom) with keypad cover[4]
	4	304 stainless steel enclosure for wall mounting[3]
	5	316 stainless steel enclosure for wall mounting[3]
Not available		
080	Not available	

Feature number	Order code	Description
Sample system type (choose one)		
090	0	None
	2	Single stream, dual cell wth regulator, bypass flowmeters, filtration
	3	Dual stream, dual cell wth regulator, bypass flowmeters, filtration
	X	Other
Sample system enclosure material (choose one)		
100	0	None
	1	304 stainless steel
	2	316 stainless steel (for corrosive environments)
Enclosure heater (choose one)		
110	0	None
	1	120 VAC enclosure heater with temperature switch and insulation (20 °C)
	2	240 VAC enclosure heater with temperature switch and insulation (20 °C)
	3	120 VAC enclosure heater with temperature switch and insulation (40 °C)
	4	240 VAC enclosure heater with temperature switch and insulation (40 °C)
Heat-trace connection (choose one)		
120	0	None
	1	Heat-trace tube bundle sleeve 2” and electrical connection[4]
	2	2-stream heat-trace bundle sleeve 2” and electrical connection[4]
Sample return point (choose one)		
130	0	Atmospheric vent (800 to 1400 mbar)
	1	Alternative vent pressure range (950 to 1700 mbar) with check valve
	2	2-stream alternative vent pressure range (950 to 1700 mbar)

Feature number	Order code	Description
Tag option (choose one)		
895	00	No tag
	T1	Stainless steel tag (up to 2 lines of text)

NOTES

1. *Must submit stream composition.*
2. *High CO_2 streams require heated enclosure (choose option 3 or 4 under **Enclosure heater**). Repeatability is ±5% of reading for this stream. Only order with **Measured component** options 4, 5, and 6.*
3. *Does not include lower enclosure or sample conditioning system.*
4. *CE mark not available with this option.*

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	C1	90 to 100%	50 to 100%	0 to 50%
Ethane	C2	0 to 7%	0 to 20%	0 to 20%
Propane	C3	0 to 2%	0 to 15%	0 to 15%
Butanes	C4	0 to 1%	0 to 5%	0 to 5%
Pentanes	C5	0 to 0.2%	0 to 2%	0 to 2%
Hexanes and heavier	C6+	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_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) – 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	
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: 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	

TI01659C/66/EN/01.21

www.addresses.endress.com

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