Technical Information

SS2000e

TDLAS Gas Analyzer

Single channel TDLAS gas analyzer for H_2O or CO_2 that is exceptionally reliable and tailored for the natural gas industry. Available with a heated enclosed sample system. Certified for CSA Class I Division 2 and Class I Zone 2.

Applications

- H_2O 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 **SS2000e** single channel analyzer is extremely reliable and tailored for the needs of the natural gas industry. The sensor measures gas using patented Tunable Diode Laser Absorption Spectroscopy (TDLAS) to determine the concentration of the gas without coming into physical contact with the stream.

Rapid response time: The SS2000e 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 the SS2000e 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 SS2000e 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 SS2000e 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 SS2000e is offered with an integrated sample conditioning system.

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
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.

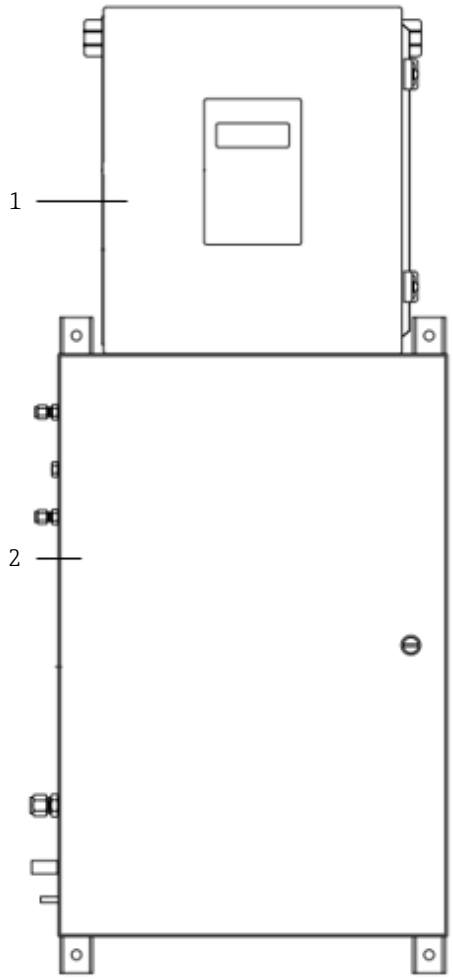
Manufacturer address

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

2 System design

Measuring system

SS2000e TDLAS Gas Analyzer



The base analyzer consists of:

1. Controller

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

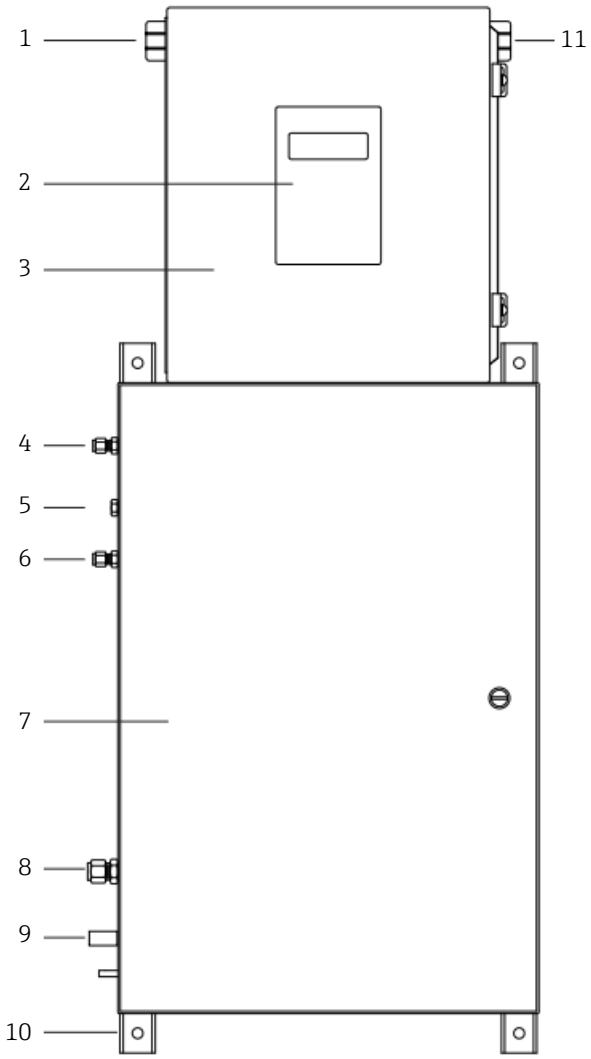
2. Enclosure with optional heater

   Includes sample conditioning system, optical head, and sample cell.

   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. *Validation gas in, 140 to 310 kPa (20 to 45 psi)*
5. *Sample in, 140 to 310 kPa (20 to 45 psi)*
6. *Heat trace power connection*
7. *Sample conditioning system (SCS) and cell enclosure*
8. *Sample vent, to safe area, 700 to 1700 mbar*
9. *SCS enclosure heater power*
10. *Mounting brackets*
11. *Analyzer power*

3 Certificates and approvals

Area classifications

Model	Certifications
SS2000e 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
Measurement range (choose one)		
010	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 6275 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%)
Not available		
020	0	Not available
Stream composition (choose one)		
030	1	Natural gas, standard (refer to Table 1)
	2	Natural gas, alternative (refer to Table 2)[1]
	3	Natural gas with high CO_2 (refer to Table 3)[1,2]
	4	Air
	X	Other
Ambient temperature (choose one)		
040	1	-20 to 50 °C (-4 to 122 °F)
	2	-10 to 60 °C (14 to 140 °F)
Input power (choose one)		
050	1	120 VAC
	2	240 VAC
	3	18 to 24 VDC

Feature number	Order code	Description
Serial communications options (choose one)		
060	1	RS232, one per measurement channel
	2	RS485, one per measurement channel
	3	Ethernet
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[5]
	4	304 stainless steel enclosure for wall mounting[3]
	5	316 stainless steel enclosure for wall mounting[3]
Oxygen measurement (choose one)		
080	0	None
	1	Integrated OXY5500 analyzer 0 to 1000 ppmv O_2 max range[4]
	2	Integrated OXY5500 analyzer 0 to 5% ppmv O_2 max range[4]
	3	Integrated OXY5500 analyzer 0 to 20% ppmv O_2 max range[4]
Not available		
090	0	Not available
Sample system type		
100	0	None
	1	Regulator, bypass, flowmeters, filtration
	X	Other
Sample system enclosure material		
110	0	None
	1	304 stainless steel
	2	316 stainless steel (for corrosive environments)

Feature number	Order code	Description
Enclosure heater		
120	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		
130	0	None
	1	Heat-trace tube bundle sleeve 2” and electrical connection[5]
Sample return point		
140	0	Atmospheric vent (800 to 1400 mbar)
	1	Alternative vent pressure range (950 to 1700 mbar) with check valve
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 stream requires heated enclosure (choose option 3 or 4 under **Enclosure heater**). Repeatability is ±5% of reading in this stream. Only order with **Measurement range** options 4, 5 and 6.*
3. *Does not include lower enclosure or sample conditioning system.*
4. *Available with 304 stainless steel only.*
5. *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 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	
Voltage	100- to 240 VAC, 50/60 Hz 18 to 24 VDC - optional
Max current (unheated)	1 amp maximum at 120 VAC 1.6A at 24 VDC, 3.2A at 12 VDC
Max current (heated)	2 amp 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	NEMA 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	

TI01658C/66/EN/01.21

www.addresses.endress.com

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