

Technical Information

SS2100i-1

TDLAS Gas Analyzer



Single channel single box IECEx/ATEX Zone 1 TDLAS gas analyzer that is exceptionally reliable for measuring trace gas components. Available with enclosed heated sample system.

Applications

- H₂O, CO₂, H₂S, or C₂H₂ measurements in natural gas, refinery, gas processing, LNG, petrochemical, and olefins
- Ranges from low ppmv to %

Key Features

- Touch keypad interface, no tools required
- Simple design, trouble-free operation
- No routine maintenance required
- Field calibration not needed
- No drift or interference from contaminants
- Reliable in harsh environments
- ATEX, IECEx, CNEx, KC, CCOE, RCM Certification

Table of Contents

1 Introduction.....	3	3 Certificates and approvals	7
Product overview.....	3	CE mark	7
Standard documentation.....	4	Ex approval.....	7
Registered trademarks	4	Area classifications	7
Manufacturer address	4	4 Ordering information	8
2 System design.....	5	Product Configurator.....	8
Measuring system.....	5	Gas specifications	9
Equipment architecture.....	6	Application notes.....	10
		Technical data.....	12

1 Introduction

Product overview

Endress+Hauser SS2100i-1 process gas analyzers are exceptionally reliable for measuring trace gas components using SpectraSensors Tunable Diode Laser Absorption Spectroscopy (TDLAS) technology. TDLAS is a high-resolution infrared technique that enables the measurement of specific gases with precision while avoiding interferences that are common with traditional infrared analyzers. The SS2100i-1 is certified for ATEX, IECEx, CNEC, KC, and CCOE.

Simple operation: The operation of the analyzer is very straightforward. Most technical personnel can learn to operate the system in a very brief time. When coupled with the fact the analyzer has very little maintenance requirements, the end result is an extremely low cost of ownership.

At the same time, technical support capability is a crucial element of the product design. There are several health monitoring parameters and remote access is available using service software or directly through the touch sensitive keypad.

Simple installation: The SS2100i-1 is easy to install; connect the power, data link and measured gas line and the analyzer begins working without the need for extensive calibrations or setup.

Reliable: Trustworthy measurements are vital to process analytical applications. The TDLAS sensor is unaffected by contaminants and corrosives since the gas stream never touches the laser or detector. The SS2100i-1 requires little regular maintenance and does not need recalibration or periodic replacement parts due to the inherent stability of TDLAS technology.

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
BA02189C	Operating Instruction	Provides a comprehensive overview of the analyzer and step-by-step installation instructions
GP01177C	Description of Device Parameters (FS 5.16)	Provides the user with an overview of the FS 5.16 firmware functionality
GP01180C	Description of Device Parameters (NS 5.14)	Provides the user with an overview of the NS 5.14 firmware functionality
XA02687C	Safety Instruction	Provides the most common safety issues related to the installation and maintenance of the SS2100i-1 TDLAS Gas Analyzer
BA02206C	SCS Operating Instruction (H ₂ S)	Provides an overview of the H ₂ S Sample Conditioning System (SCS), including components, operations and troubleshooting that may accompany an SS2100i-1 TDLAS Gas Analyzer
BA02207C	SCS Operating Instruction (CO ₂)	Provides an overview of the CO ₂ (or H ₂ O) SCS without a scrubber or dryer, including components, operations and troubleshooting that may accompany an SS2100i-1 TDLAS Gas Analyzer
BA02208C	SCS Operating Instruction (H ₂ O)	Provides an overview of the H ₂ O SCS, including components, operations and troubleshooting that may accompany an SS2100i-1 TDLAS Gas Analyzer

Registered trademarks

Modbus®

Registered trademark of SCHNEIDER AUTOMATION, INC.

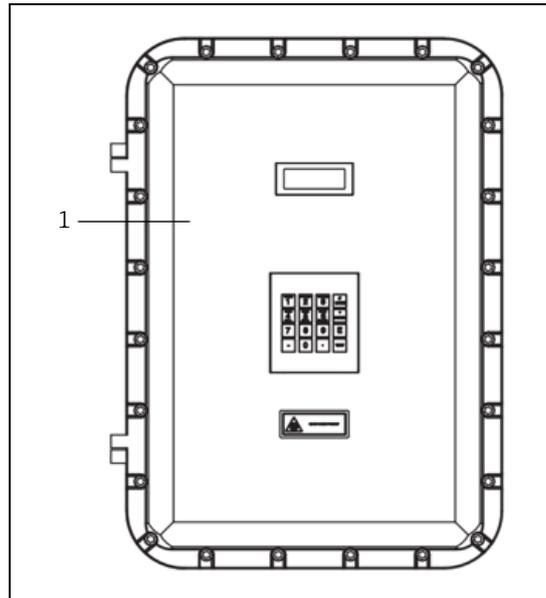
Manufacturer address

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

2 System design

Measuring system

SS2100i-1 TDLAS Gas Analyzer



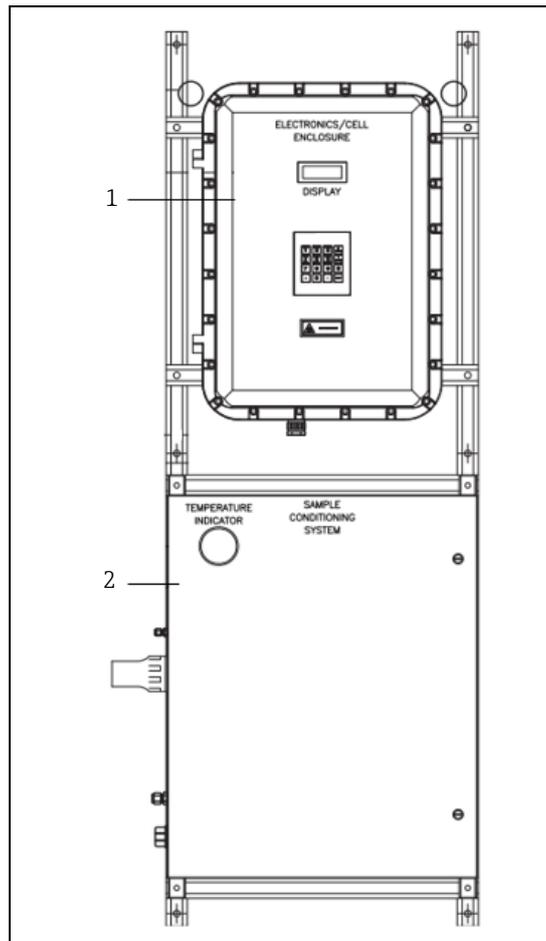
The base analyzer consists of:

1. Analyzer and sample cell electronics

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

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.

SS2000i-1 TDLAS Gas Analyzer with SCS



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:

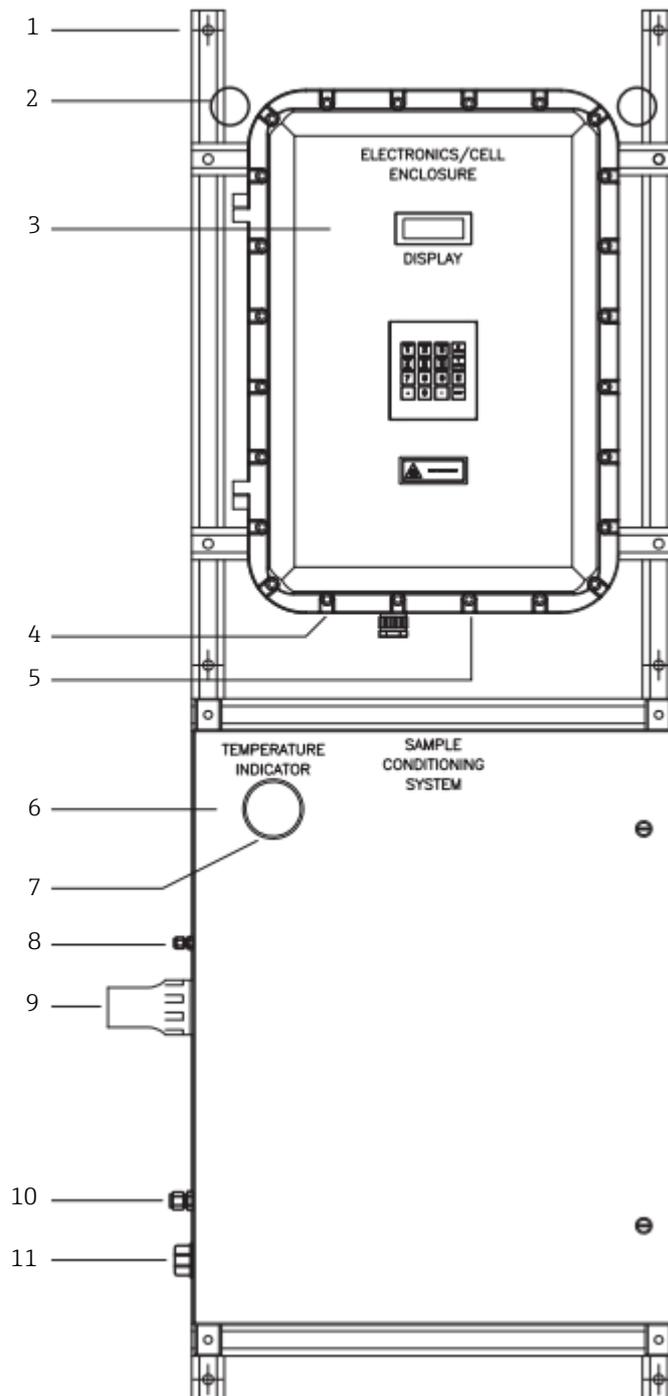
1. SS2100i-1 TDLAS Gas Analyzer

See description above.

2. 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



- | | | | |
|---|--|----|--|
| 1 | Mounting holes (six) | 7 | SCS enclosure temperature gauge |
| 2 | Lifting eye (two) | 8 | Validation gas inlet and sampling point |
| 3 | Analyzer electronics with display and keypad | 9 | Sample inlet (heat trace bundle sleeve - optional) |
| 4 | Analyzer power | 10 | Sample vent |
| 5 | Signal wiring | 11 | SCS enclosure heater power |
| 6 | Sample Conditioning System (SCS) | | |

3 Certificates and approvals

CE mark

The SS2100i-1 TDLAS Gas Analyzer meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

Ex approval

The measuring device is certified for use in hazardous areas and the relevant safety instructions are provided in the separate “Safety Instructions” document. Reference is made to this document on the nameplate.

The Safety Instructions containing all the relevant explosion protection data is available from the Endress+Hauser website.

Area classifications

Model	Certifications
SS2100i-1 TDLAS Gas Analyzer	<p>CE</p> <p><u>ATEX, IECEx:</u></p> <p> Ex II 2G Ex db IIB+H2 T4 Gb;</p> <p>LCIE 11 ATEX 3071x, IECEx LCI 11.0057x; CNEEx 14.3397, CCE P353439/2; KTL15 KB4BO-0082; CML 18JPN1095</p> <p>Tambient: -20 °C to +60 °C</p>

4 Ordering information

Product Configurator

Detailed ordering information is available for your nearest sales organization at www.addresses.endress.com or in the Product Configurator under www.endress.com. To access:

1. Click **Corporate**.
2. Select the country.
3. Click **Products**.
4. Click **Product finder**.
5. Select the product using the filters and search field.
6. Open the product page.
7. Click the **Configure** button to open the Product Configurator.

Product Configurator is a tool for individual product configuration that offers:

- Up-to-the-minute configuration data
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

If a certain product is not available in your region, refer to the website (www.endress.com/contact) to locate your local sales channel for more information.

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 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
Component name	Abbreviation	Allowable component range ¹		
		LNG	Ethylene	
		Table 21	Table 41	
Methane	C1	75 to 100%	0 to 1000 ppmv	
Ethane	C2	0 to 10%	0 to 1000 ppmv	
Propane	C3	0 to 5%	-	
Butanes	C4	0 to 2%	-	
Pentanes	C5	0 to 0.5%	-	
Carbon dioxide	CO ₂	0 to 100 ppmv	-	
Hydrogen sulfide	H ₂ S	0 to 10 ppmv	0 to 1 ppmv	
Ethylene	C ₂ H ₄	-	98.9 to 100%	
Propylene	C ₃ H ₆	-	0 to 3000 ppmv	

1. For Tables 2, 3, 21 and 41, stream composition must be supplied at the time of order placement.

Application notes

The Endress+Hauser SS2100i-1 TDLAS Gas Analyzer is capable of measuring H₂O, CO₂, H₂S or C₂H₂ in a variety of industries and process units.

Refer to the website (www.endress.com/contact) to locate your local sales channel for more information on applications not listed.

Moisture (H₂O) measurements	
Application note	Description
AI01274C	Refining: H ₂ O in Hydrogen Recycle for Refinery Catalytic Reformer H ₂ Recycle Steams
AI01275C	Refining: H ₂ O in Continuous Catalytic Reformer H ₂ Recycle Steams
AI01282C	Refining: H ₂ O in Alkylation Feedstock
Carbon dioxide (CO₂) measurements	
Application note	Description
AI01216C	CO ₂ in Natural Gas Production, Storage, Transportation and Distribution
AI01305C	Natural Gas Processing: CO ₂ in Raw Natural Gas Feed
AI01309C	Natural Gas Processing: CO ₂ in Amine Outlet (Sweet Gas)
AI01306C	Natural Gas Processing: CO ₂ in Y-Grade NGL Fractionation
AI01307C	Natural Gas Processing: CO ₂ in Ethane NGL Fractionation
AI01308C	Natural Gas Processing: CO ₂ in Ethane/Propane Mix NGL Fractionation
AI01256C	LNG: CO ₂ in LNG Amine Unit
AI01290C	Petrochem: CO ₂ in Caustic Wash Tower Inlets
AI01293C	Syngas: CO ₂ in GTL Syngas (Synthol Process) (Coal Liquefaction (CTL)/Benfield Outlet)

Hydrogen sulfide (H₂S) measurements	
Application note	Description
AI01217C	H ₂ S in Natural Gas Production, Storage, Transportation and Distribution
AI01251C	Natural Gas Processing: H ₂ S in Amine Scrubber Outlet
AI01303C	Natural Gas Processing: H ₂ S in Natural Gas Product (Purity/Residue Gas)
AI01304C	Natural Gas Processing: H ₂ S in Raw Gas Feed (Produced Gas)
AI01250C	Natural Gas Processing: H ₂ S in Y-Grade NGL Fractionations
AI01249C	Natural Gas Processing: H ₂ S in Ethane NGL Fractionation
AI01248C	Natural Gas Processing: H ₂ S in Ethane/Propane Mix NGL Fractionation
AI01247C	Natural Gas Processing: H ₂ S in Propane
AI01246C	Natural Gas Processing: H ₂ S in Solid Scavenger Outlet
AI01276C	Refining: H ₂ S in Hydrogen Recycle for Catalytic Reformer
AI01277C	Refining: H ₂ S in Flare Gas
AI01278C	Refining: H ₂ S in Fuel Gas
AI01280C	Refining: H ₂ S in Propane/Propylene Mix
AI01281C	Refining: H ₂ S in Continuous catalytic reformer hydrogen recycle streams
AI01276C	Refining: H ₂ S in Hydrogen Recycle for Catalytic Reformer
AI01273C	Refining: H ₂ S in Amine Treatment Unit Outlet Hydrogen Recycle gas
AI01291C	Petrochem: H ₂ S in UOP C3 Oleflex process reactor effluent
AI01292C	Petrochem: H ₂ S in Caustic Wash Tower Inlets
Acetylene (C₂H₂) measurements	
Application note	Description
AI01285C	Petrochem: C ₂ H ₂ in Mid Bed of Back End Acetylene Converters
AI01286C	Petrochem: C ₂ H ₂ in Outlet of Back End Acetylene Converters
AI01287C	Petrochem: C ₂ H ₂ in Pure Ethylene

Technical data

Measurement data	
Target components	H ₂ O, H ₂ S, CO ₂ , C ₂ H ₂
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	See applicable Application Note
Repeatability	See applicable Application Note
Application data	
Ambient temperature range	-20 °C to 50 °C (-4 °F to 122 °F)
Sample cell pressure range	800 to 1200 mbara - standard 950 to 1700 mbara - optional
Maximum cell pressure	70 kPag (10 psig)
Pressure to sample cabinet	140 to 350 kPag (20 to 50 psig) ¹
Sample flow rate	0.5 to 4.0 slpm (1 to 8.5 scfh) ¹
Bypass flow rate	1 slpm (2 scfh)
Electrical and communication	
Input power, maximum	120 or 240 VAC ±10%, 50 to 60 Hz; ~200W
Analog communication	Isolated analog channels, 120 ohms at 24 VDC maximum Outputs: Qty 2 4-20 mA (measurement value) Inputs: Qty 1 4-20 mA (pipeline pressure)
Serial communication	Ethernet and RS485 half-duplex
Digital signals	Outputs: Qty 5 Hi/Lo alarm, general fault, validation fail ² , validation 1 active ² , validation 2 active ² Inputs: Qty 2 flow alarm ² , validation request ²
Protocol	Modbus Gould RTU or Daniel RTU or ASCII
Diagnostic value examples	Detector power (mirror health), spectrum reference comparison and peak tracking (spectrum quality), cell pressure and temperature (overall system health)
LCD display	Concentration, cell pressure and temperature, diagnostics

¹ Application dependent

² Configuration dependent

Physical	
Electronics enclosure type	IP66 copper-free aluminum with weather resistant polyester powder coating, 80 to 120 micron thickness
Analyzer electronics dimensions	670 mm H x 470 mm W x 377 mm D (26.3 x 18.5 x 14.8 inches)
Analyzer electronics weight	Approximately 86 kg (190 lbs)
Enclosure dimension and weight	Varies – refer to application drawings
Sample cell construction	316L series polished stainless steel
Number of sample cells	1 per analyzer

TI01669C/66/EN/01.21

www.addresses.endress.com
