

Technical Information

J22 TDLAS Gas Analyzer



Extractive TDLAS analyzer for reliable and accurate measurements in Natural Gas stream compositions. Available with panel-mounted sample conditioning systems and enclosed heated sample systems.

Application

- H₂O in Natural Gas
- Measurement ranges up to 6000 ppmv

Device Properties

- Class I, Division 1 and Zone 1 Ex approvals
- Compact controller with up to (3) I/Os
- Backlit display with touch control
- Web server interface for service and diagnostics

Your benefits

- Reliable, accurate measurements
- Advanced diagnostics with Heartbeat Technology™
- Proven technology
- Intuitive and easy user interface operation
- Downloadable PDF verification report

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1 Introduction

Document Function This Technical Information document contains information required to evaluate and specify the related equipment. A brief description of the installation and operation are also included. Additional information is available for operational instruction. See “Standard Documentation”.

Symbols Used **Informational symbols**

Symbol	Description
	Indicates additional information

Standard Documentation All documentation is available:

- On the USB provided with the analyzer
- On the website: www.endress.com

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

Part Number	Document Type	Description
XA02708C	Safety Instruction	Requirements for installing or operating the J22 related to personnel or equipment safety.
BA02152C	Operating Instruction	A complete overview of the operations required to install, commission and maintain the device.

Registered Trade-marks **Modbus®**
Registered trademark of SCHNEIDER AUTOMATION, INC.

HistoROM®, Heartbeat Technology™
Registered or registration-pending trademarks of the Endress+Hauser Group

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

2 Function/System Design

Measuring principle


The J22 operates in the near-to short-wavelength infrared. Each spectrometer consists of a tunable diode light source, sample cell and detector specifically configured to enable high sensitivity measurement of a particular component within the presences of other gas phase constituents in the stream. The spectrometer is controlled by microprocessor-based electronics with embedded software that incorporates advanced operational and data processing algorithms.

Sample conditioning system

A sample conditioning system (SCS) is optional with the J22 TDLAS Gas Analyzer. The SCS has been specifically designed to deliver a sample stream that is representative of the process systems stream at the time of sampling. J22 analyzers are designed for use with extractive natural gas sampling stations.

How the Analyzers Work

The J22 employs SpectraSensors tunable diode laser spectroscopy (TDLAS) to detect the presence of water (H₂O) in sample gases. Absorption spectroscopy is a widely used technique for sensitive trace species detection. Because the measurement is made without contacting the gas, the response is much faster, more accurate and significantly more reliable than traditional surface-based sensors that are subject to surface contamination.

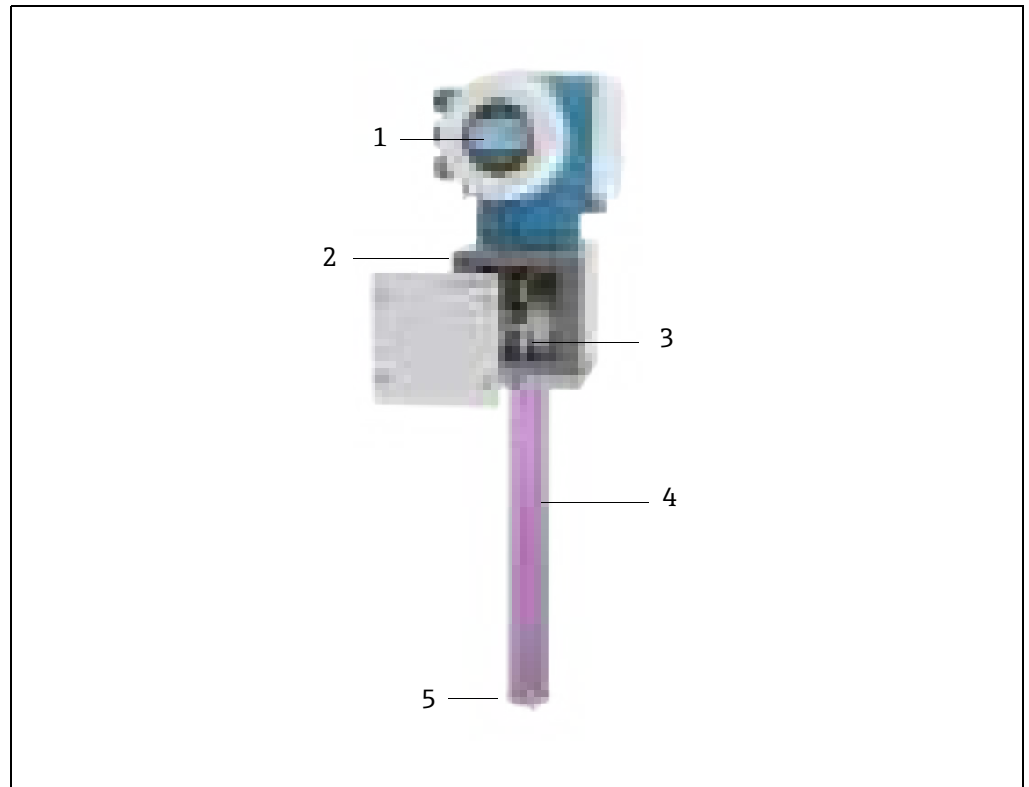
In its simplest form, a diode laser absorption spectrometer consists of a sample cell with a mirror at one end, and a mirror or window at the opposite end, through which the laser beam can pass →  2-1. The laser beam enters the cell and reflects off the mirror(s) making multiple passes through the sample gas and eventually exiting the cell where the remaining beam intensity is measured by a detector. Sample gas flows continuously through the sample cell ensuring that the sample is always representative of the flow in the main pipe.

Molecules in the sample gas each have characteristic absorption bands in the electromagnetic spectrum. When the output of the laser is tuned to a specific wavelength, the molecules with that particular absorption will absorb energy from the incident beam. That is, as the beam of incident intensity, $I_0(\lambda)$, passes through the sample, attenuation occurs via absorption by the trace gas with absorption cross section $\sigma(\lambda)$. According to the Beer-Lambert absorption law, the intensity remaining, $I(\lambda)$, as measured by the detector at the end of the beam path of length l (cell length x number of passes), is given by

$$I(\lambda) = I_0(\lambda) \exp[-\sigma(\lambda)IN] , \quad (1)$$

where N represents the species concentration. Thus, the ratio of the absorption measured when the laser is tuned on-resonance versus off-resonance is directly proportional to the number of molecules of that particular species in the beam path, or

$$N = \frac{-1}{\sigma(\lambda)l} \ln \left[\frac{I(\lambda)}{I_0(\lambda)} \right] . \quad (2)$$

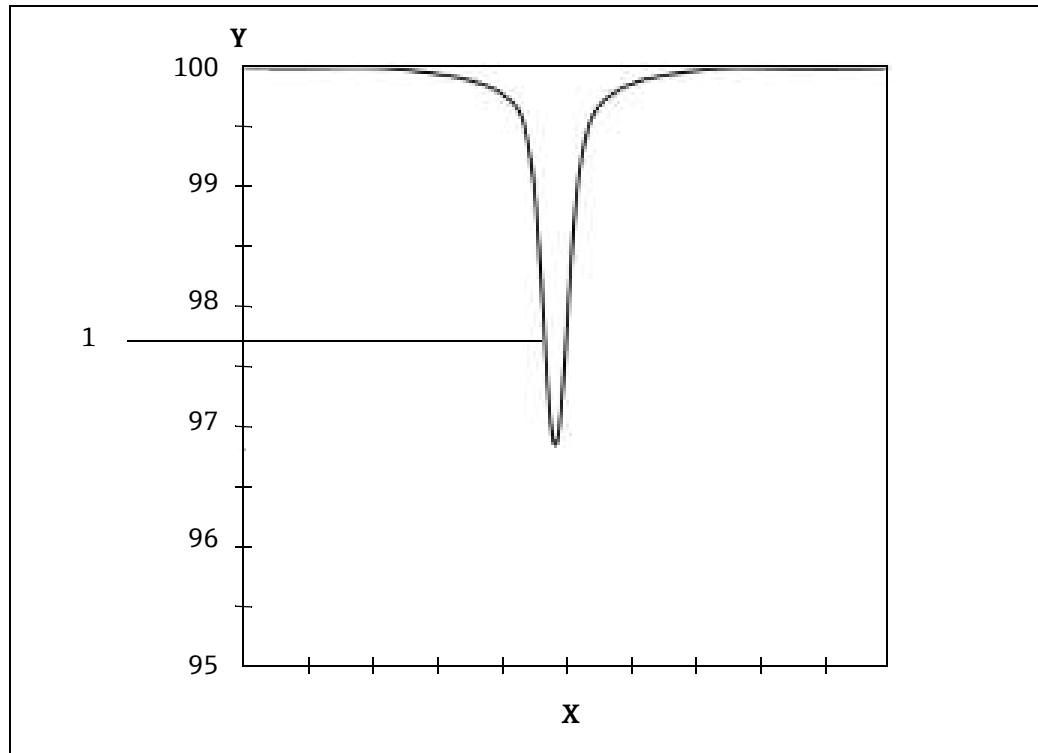


2-1: Cutaway of J22 TDLAS Gas Analyzer spectrometer

- 1 User interface
- 2 Optical head (the laser, detector and TEC are housed behind the optical window)
- 3 Pressure and temperature sensor
- 4 Laser path (2-pass beam with one reflection on the flat mirror)
- 5 Flat mirror

The image → 2-2 shows the typical raw data (simplified) from a laser absorption spectrometer scan including the incident laser intensity, (I_0), and the transmitted intensity, (I). By normalizing the signal by the incident intensity, any laser output fluctuations are canceled, and a typical, yet more pronounced, absorption profile results → 2-3.

Note that contamination of the mirrors results solely in lower overall signal. However, by tuning the laser off-resonance as well as on-resonance and normalizing the data, the technique self calibrates every scan resulting in measurements that are unaffected by mirror contamination.



2-2: Typical normalized absorption signal from a laser diode absorption spectrometer

1 Normalized absorption signal

X axis Wavelength [a.u]

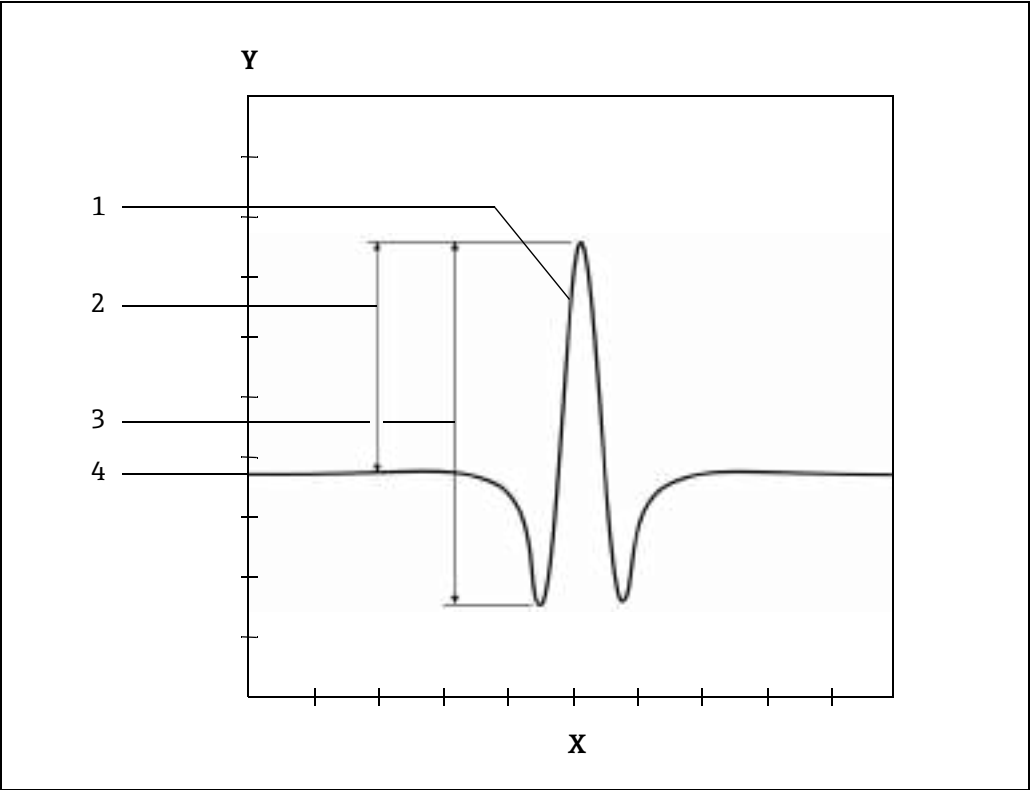
Y axis Signal strength [%]

Wavelength Modulation Spectroscopy (WMS) Signal Detection

Endress+Hauser takes the fundamental absorption spectroscopy concept a step further by using a sophisticated signal detection technique called wavelength modulation spectroscopy (WMS). When employing WMS, the laser drive current is modulated with a kHz sine wave as the laser is rapidly tuned. A lock-in amplifier is then used to detect the harmonic component of the signal that is at twice the modulation frequency ($2f$) → 2-3. This phase-sensitive detection enables the filtering of low-frequency noise caused by turbulence in the sample gas, temperature and/or pressure fluctuations, low-frequency noise in the laser beam or thermal noise in the detector.

With the resulting low-noise signal and use of fast post-processing algorithms, reliable parts per million (ppm) detection levels are possible at real-time response rates (on the order of 1 second).

Measuring trace gases in various mixed hydrocarbon background streams is accomplished by selecting a different optimum diode laser wavelength between 700-3000 nm, which provides the least amount of sensitivity to background stream variations.



2-3: Simple normalized 2f signal; analyte concentration proportional to the peak height or the peak-to-peak height, depending on the algorithm used

1 Normalized 2f spectrum
2 Peak height
3 Peak-to-peak height
X axis Wavelength [a.u.]
Y axis Transmission signal [a.u.]

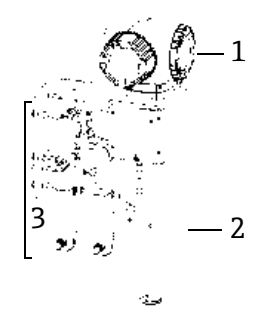
Measuring System

The J22 is offered as a stand-alone analyzer or accompanied by a sample conditioning system on a panel or in an enclosure.

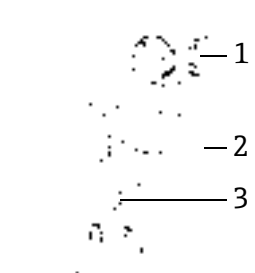
J22 TDLAS Gas Analyzer

	<p>The base analyzer consists of:</p> <ol style="list-style-type: none">1. Controller Contains the power supply, HMI (Web server and 4-line back-lit display), communications and measurement control electronics.2. Optical head Contains the laser, laser temperature control, detector, window, pressure and temperature sensors, optical head electronics.3. Sample cell and mirror Sample gas flows through the cell via an inlet and outlet port. The laser beam passes through the cell, reflecting once from the flat mirror on the bottom.
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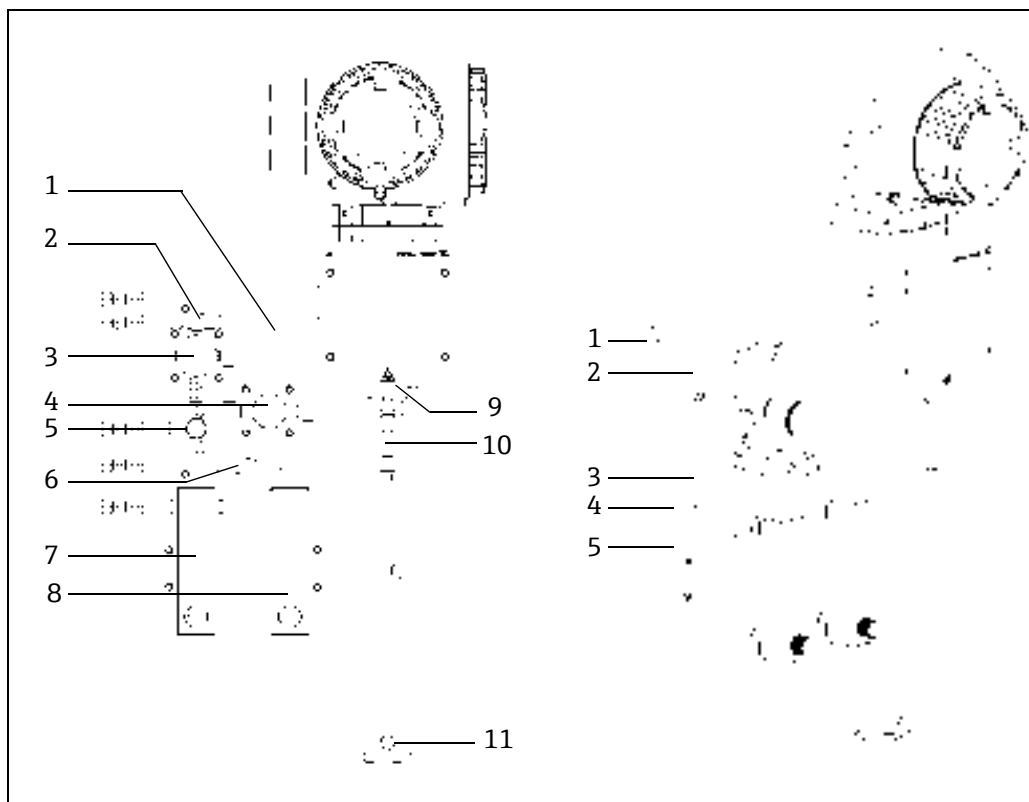
J22 TDLAS Gas Analyzer with SCS on panel

 A technical drawing showing the J22 TDLAS Gas Analyzer mounted on a panel. The analyzer is a circular unit with a central lens. It is connected to a rectangular panel via a bracket. The panel has several ports and a label '3'. A line points from the number '1' to the analyzer, and another line points from the number '2' to the panel. A bracket on the left side of the panel is labeled '3'.	<p>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.</p> <ol style="list-style-type: none">1. J22 TDLAS Gas Analyzer See description above.2. 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 components3. Sample conditioning components Components used to filter the gas while maintaining a representative sample and control the pressure and flow. An optional bypass is available as a speed loop and to continually sweep the dirty side of the membrane separator (→ 34).
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**J22 TDLAS Gas Analyzer with Enclosed SCS,
J22 TDLAS Gas Analyzer with Enclosed SCS, with Heater**

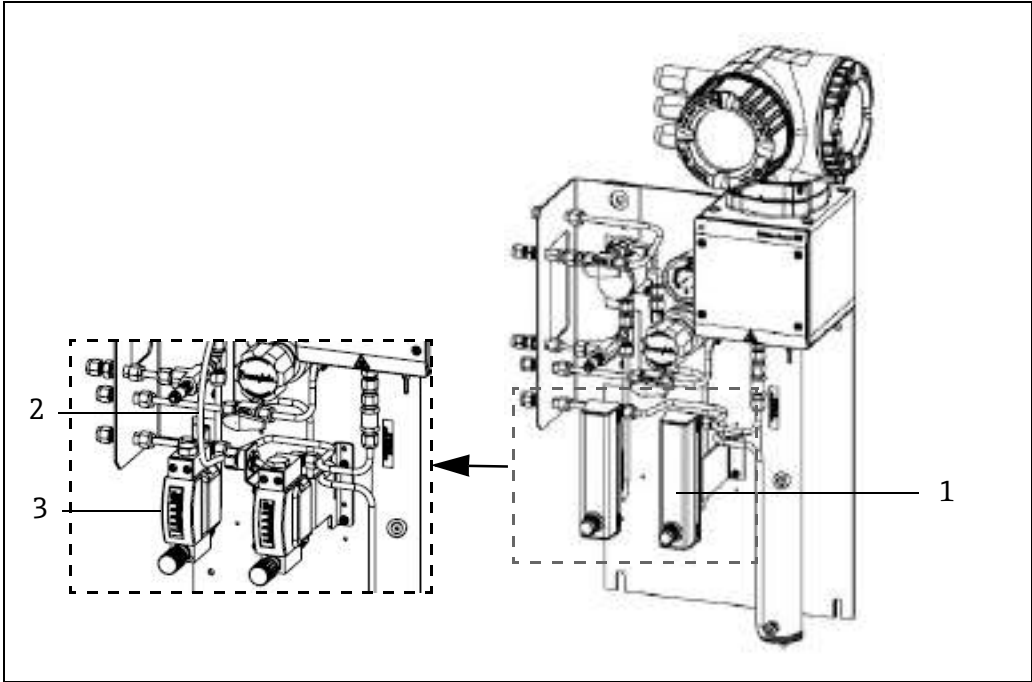
 A technical drawing showing the J22 TDLAS Gas Analyzer mounted inside a rectangular enclosure. The analyzer is a circular unit with a central lens. It is connected to the enclosure via a bracket. The enclosure has several ports and a label '3'. A line points from the number '1' to the analyzer, and another line points from the number '2' to the enclosure. A bracket on the left side of the enclosure is labeled '3'.	<p>The enclosed analyzer system with optional heater consists of the following and is typically used for exterior mounting near the sample extraction point.</p> <ol style="list-style-type: none">1. J22 TDLAS Gas Analyzer See description above.2. 304 stainless steel enclosure (Other materials can be special ordered) Allows easy mounting to a wall, Unistrut frame, or a post and provides a protected environment for the SCS and spectrometer.3. Heater system (optional) Includes an 80-watt heater with thermostat for condensation protection and stable temperatures in colder weather. When a heater is employed, the enclosure will be outfitted with insulation to reduce heat loss and a heat trace boot for the gas inlet.
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Equipment Architecture



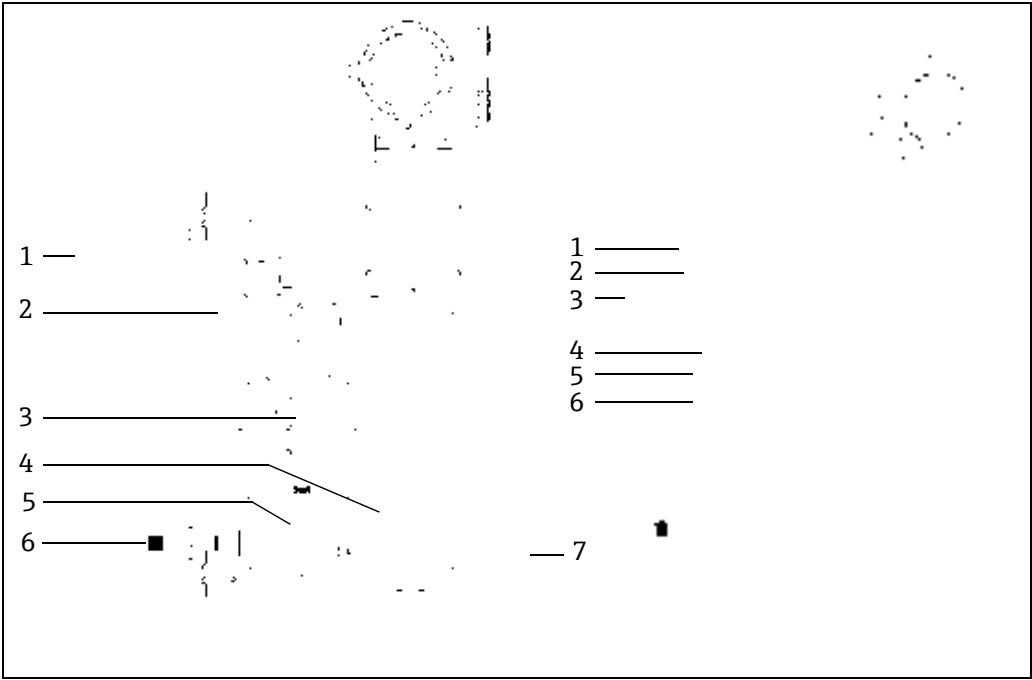
2-4: J22 TDLAS Gas Analyzer with SCS on panel - sample system and gas connections

- | | | | |
|----|---|---|---|
| 1 | Pressure gauge | 1 | Sample purge in, 140-310 kPa (20-45 psi) (optional) |
| 2 | Gas select valve (purge in / sample in) | 2 | Sample in, 140-310 kPa (20-45 psi) |
| 3 | Membrane separator (optional) | 3 | Relief vent, factory set, 350 kPa (50 psig) to safe area (optional) |
| 4 | Pressure regulator | 4 | Reference gas in, 15-70 kPa (2-10 psi) |
| 5 | Pressure relief valve (optional) | 5 | Sample vent, to safe area |
| 6 | Reference gas on / off | | |
| 7 | Flow meter for bypass (optional) | | |
| 8 | Flow meter for analyzer | | |
| 9 | Cell inlet port | | |
| 10 | Check valve (optional) | | |
| 11 | Cell outlet port | | |



2-5: J22 TDLAS Gas Analyzer on Panel, with flow meter options (2)

- 1 Flow meters (bypass and analyzer, optional)
- 2 Flow sensor wire (optional)
- 3 Armored flow meters (optional)



2-6: J22 TDLAS Gas Analyzer with enclosed SCS - sample system and gas connections

- | | |
|--|--|
| 1 Heat trace boot (optional) | 1 Enclosure purge in (optional) |
| 2 Insulation, 5 walls plus door (optional) | 2 Sample purge in, 140-310 kPa (20-45 psi) (optional) |
| 3 Heater block and plate (optional) | 3 Sample in, 140-310 kPa (20-45 psi) |
| 4 Thermostat (optional) | 4 Relief vent, Factory set, 350 kPa (50 psig), to safe area (optional) |
| 5 Heater power in terminal (optional) | 5 Reference gas in, 15-70 kPa (2-10 psi) |
| 6 Cable entry (CSA shown) (optional) | 6 Sample vent, to safe area |
| 7 Enclosure purge out, to safe area | |

Safety

Device-specific security

The J22 offers a range of specific functions to support protective measures for the operator. These functions can be configured by the user and will guarantee greater in-operation safety if used correctly. An overview of the most important functions is provided below.

Function/Interface	Factory Setting	Recommendation
Write protection via hardware write protection switch	Not enabled	On an individual basis following risk assessment.
Access code (also applies to Web Server login)	Not enabled (0000)	Assign a customized access code during commissioning.
Web server	Enabled	On an individual basis following risk assessment.
CDI - RJ45 Service interface	—	On a temporary individual basis following risk assessment.

Protecting access via hardware write protection

Write access to the device parameters via the local display. Web browser can be disabled via a write protection switch (DIP switch on the motherboard). When hardware write protection is enabled, only read access to the parameters is possible.

Hardware write protection is disabled by default from the factory.

Protecting access via a password

Different passwords are available to protect write access to the device parameters.

- **User-specific access code**
Protect write access to the device parameters via the local display, such as Web browser. Access authorization is clearly regulated through the use of a user-specific access code.

User-specific access code

Write access to the device parameters via the local display. Web browser can be protected by the modifiable, user-specific access code.

Access via Web server

The Web server is enabled when the analyzer system is delivered. The Web server can be disabled if necessary (e.g., after commissioning) via the Web server functionality parameter.

The analyzer system and status information can be hidden on the login page. This prevents unauthorized access to the information.

Access via service interface (CDI-RJ45)

The device can be connected to a network via the service interface (CDI-RJ45). Device-specific functions guarantee the secure operation of the J22 in a network. The use of relevant industrial standards and guidelines that have been defined by national and international safety committees, such as IEC/ISA62443 or the IEEE, is recommended. This includes organizational security measures such the assignment of access authorization as well as technical measures such as network segmentation.



Connection to the service interface (CDI-RJ45) shall only be permitted by trained personnel on a temporary basis for the purpose of test, repair or overhaul of the equipment, and only if the area where the equipment is to be installed is known to be non-hazardous.

Communications

Output Type	Modbus RS485 or Modbus TCP over Ethernet (I/O1)	$U_N = 30 \text{ VDC}$ $U_M = 250 \text{ VAC}$ N = nominal, M = maximum
	Relay Output (I/O2 and/or I/O3)	$U_N = 30 \text{ VDC}$ $U_M = 250 \text{ VAC}$ $I_N = 100 \text{ mA DC} / 500 \text{ mA AC}$
	Configurable I/O ¹⁾ (I/O2 and/or I/O3)	$U_N = 30 \text{ VDC}$ $U_M = 250 \text{ VAC}$

1) The configurable I/O can be configured by the HMI and Web server interface, set as a 4-20 mA output to indicate concentration, cell temperature, pressure or dewpoint temperature.

3 Installation

For installation-related safety information → 1.

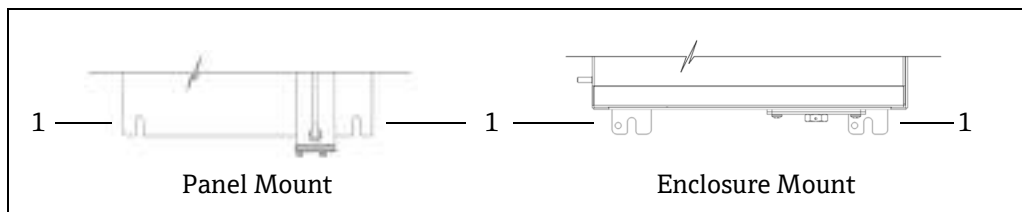
Mounting

The J22 is manufactured for wall- and post-mount installations. Refer to the Operations Instruction for detailed information → 1.



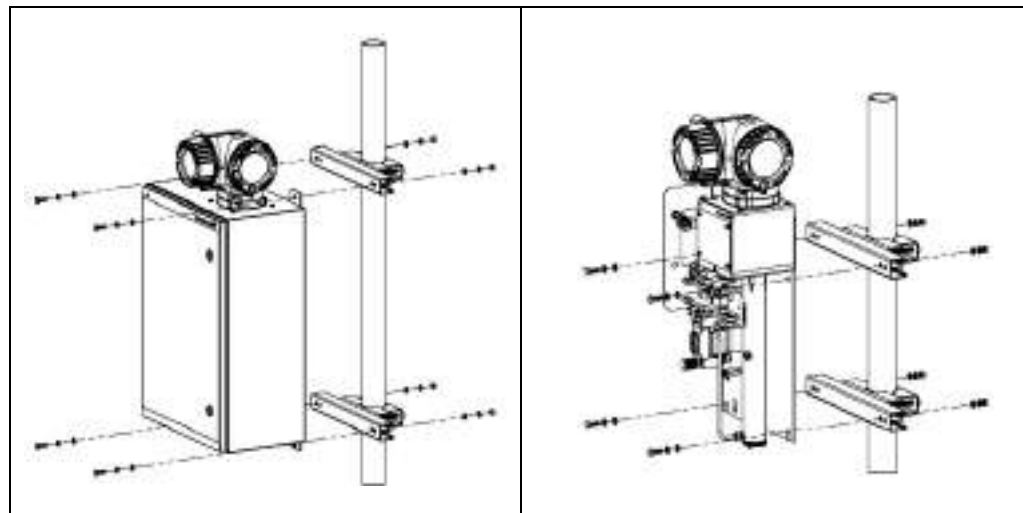
Mounting hardware used for the J22 TDLAS Gas Analyzer must be able to support four times the weight of the instrument (approximately 16 kg (36 lbs) - 43 kg (95 lbs) depending on configuration).

Wall mounted



1 Slotted tabs at base of panel or enclosure, mounting holes (not shown) at top of panel or enclosure

Post mounted



Environment

If operating outdoors:

- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.

Readability of the local display

-20 °C to 60 °C (-4 °F to 140 °F)



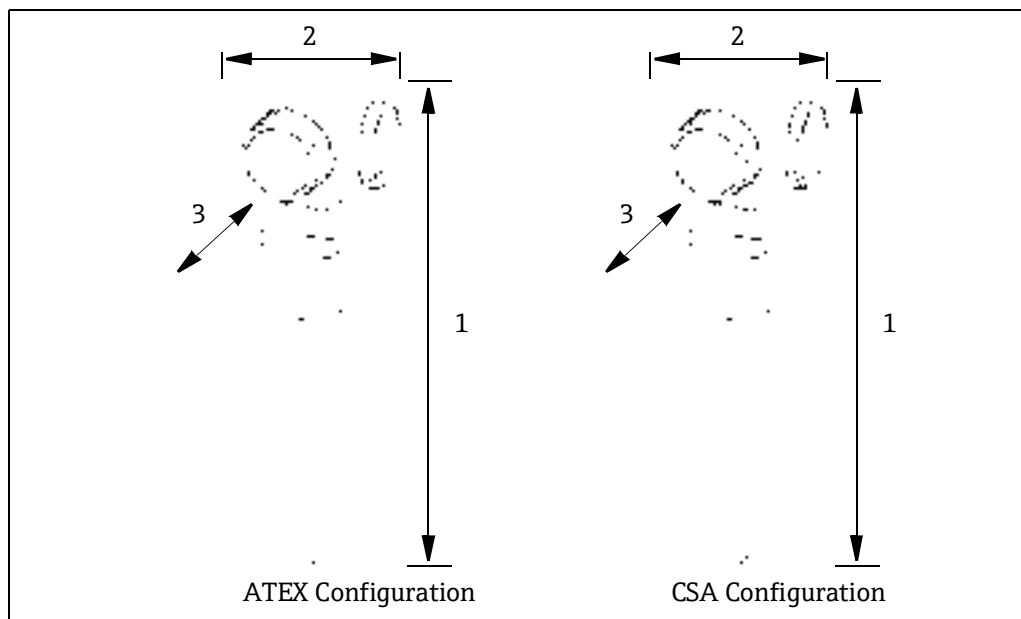
The readability of the display may be impaired at temperatures outside the temperature range.

Storage

- Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures.
- Select a storage location where moisture cannot collect in the J22 controller or enclosure.

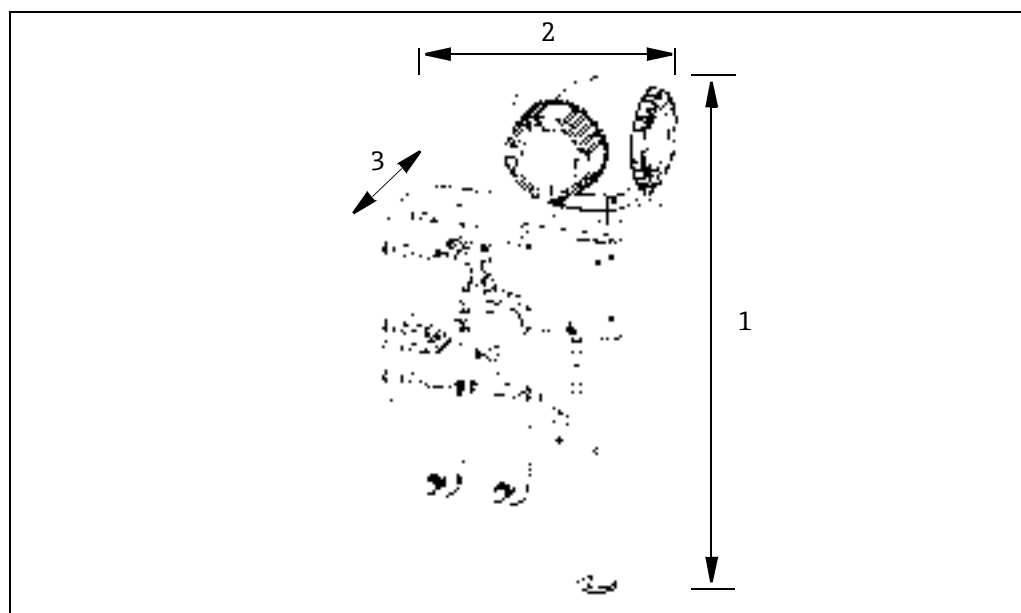
- If protection caps or protective covers are mounted, do not remove before installing the J22.

Dimensions



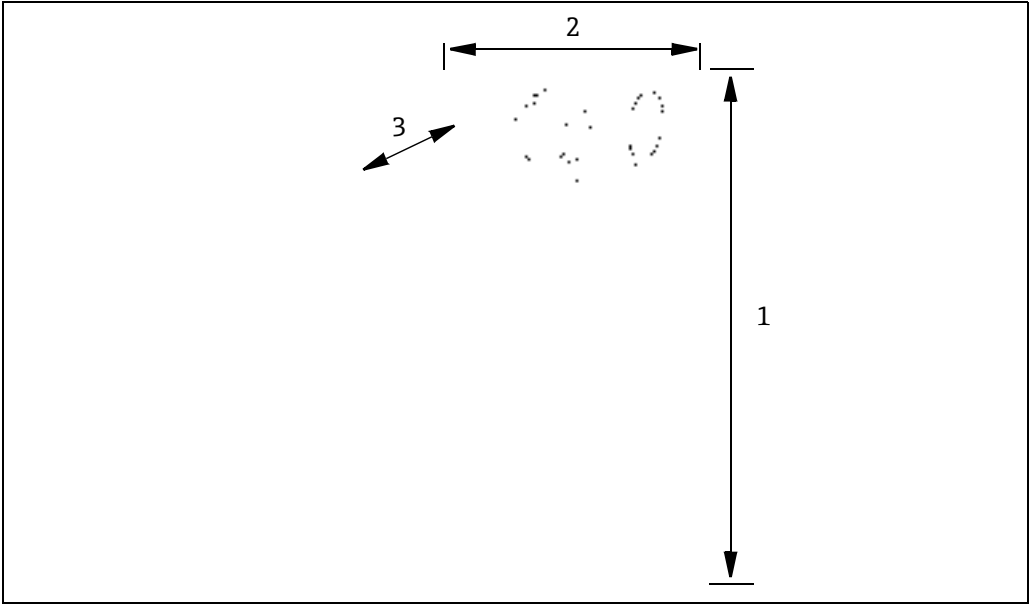
3-1: J22 TDLAS Gas Analyzer

- 1 CSA/ATEX: 727 mm (28.6 in.) High
- 2 CSA: 224 mm (8.8 in.) Wide
ATEX: 192 mm (7.5 in.) Wide
- 3 CSA/ATEX: 236.2 mm (9.3 in.) Deep



3-2: J22 TDLAS Gas Analyzer with SCS on panel

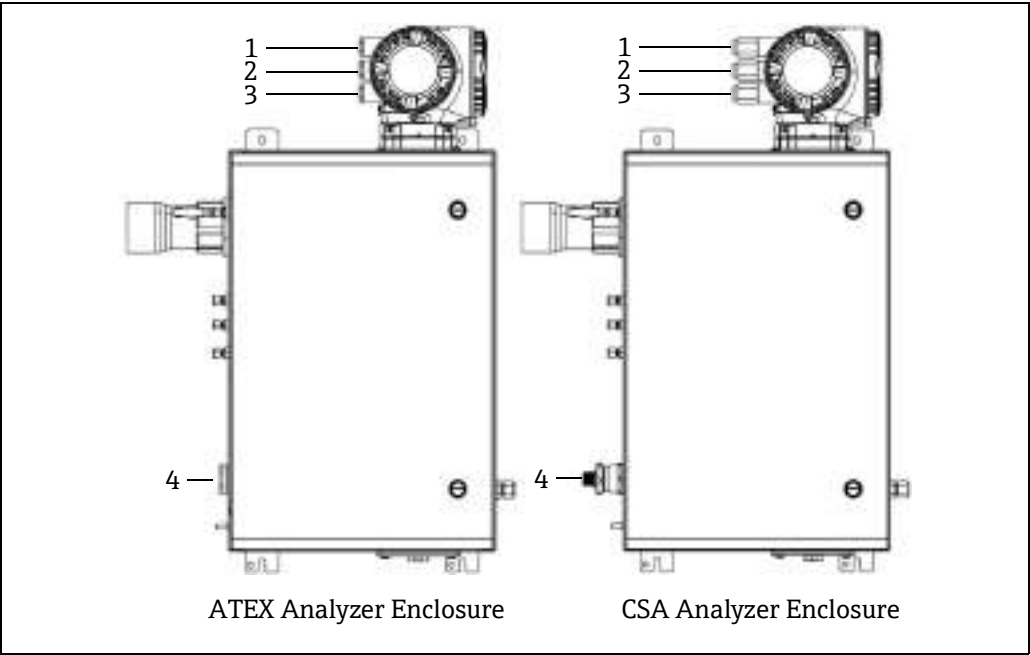
- 1 727 mm (28.6 in.) High
- 2 376 mm (14.8 in.) Wide
- 3 241 mm (9.5 in.) Deep



3-3: J22 TDLAS Gas Analyzer with enclosed SCS

- 1 838 mm (33 in.) High
- 2 406 mm (16 in.) Wide
- 3 255 mm (10 in.) Deep

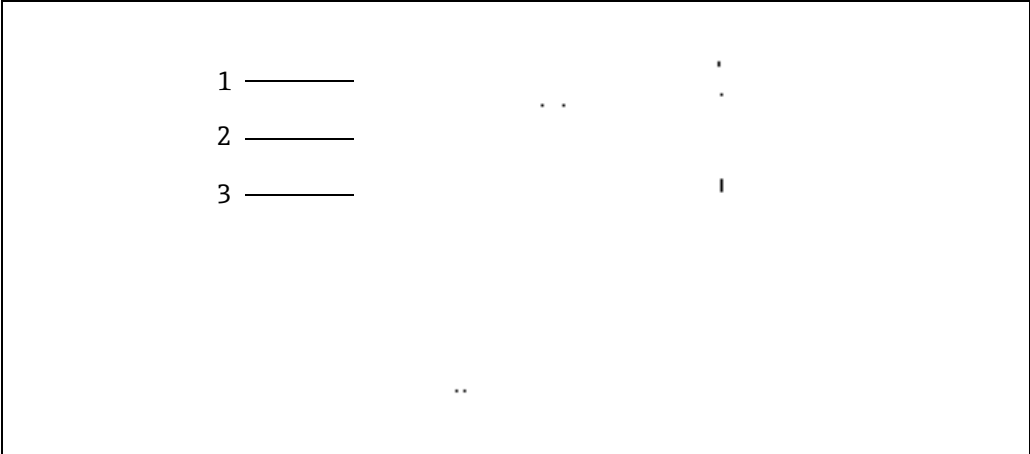
Threaded cable entries



3-4: Cable entry locations. Refer to the following table for entry definitions.

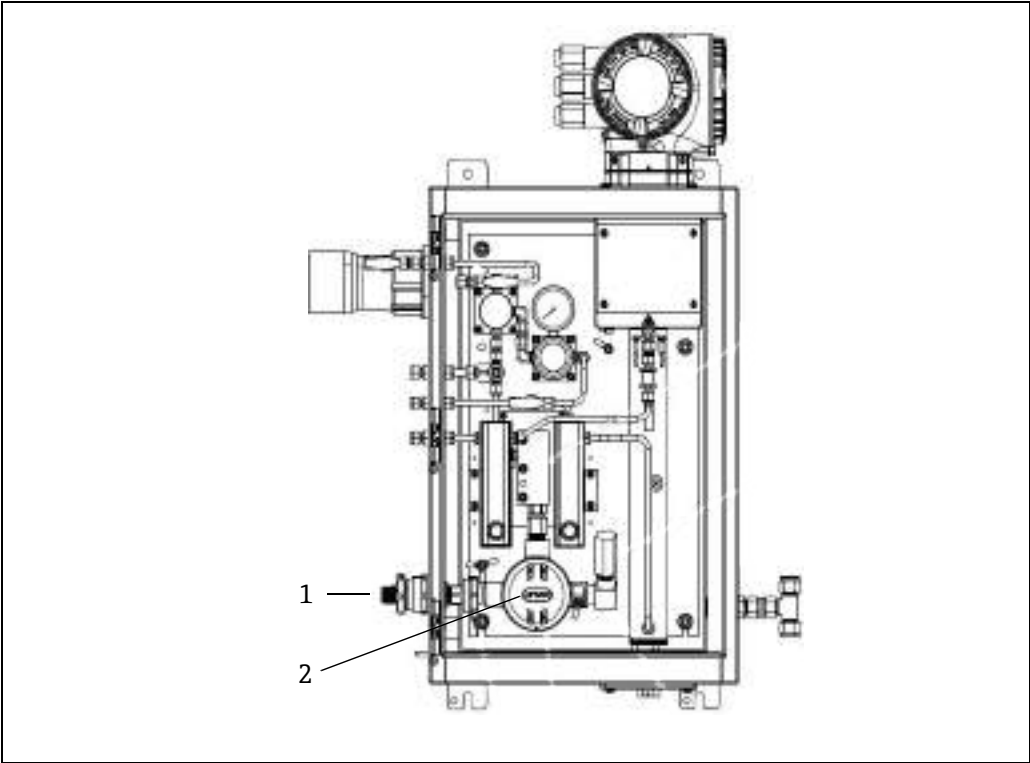
Cable Entry	Description	ATEX, IECEx	cCSAus
1	Controller power	M20 x 1.5	1/2 in. NPTF
2	Modbus output	M20 x 1.5	1/2 in. NPTF
3	(2) Configurable I/O	M20 x 1.5	1/2 in. NPTF
4	Heater power	M25 x 1.5	1/2 in. NPTM

Electrical Connections **Controller connections**



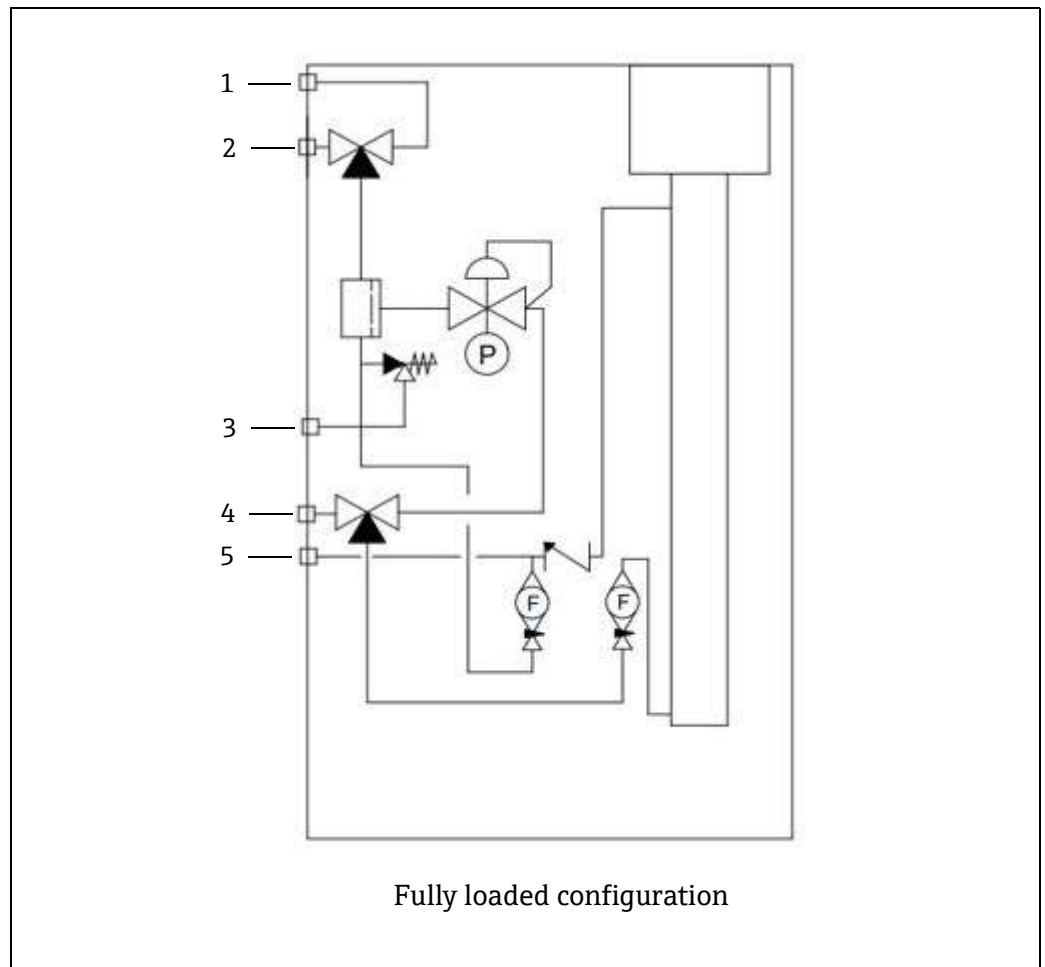
- 1 Cable entry for supply voltage
- 2 Cable entry for signal transmission; IO1
- 3 Cable entry for signal transmission; IO2, IO3

Enclosure heater power



- 1 Threaded entry for heater power
- 2 Heater power junction box (JB)

Tubing Connections



- 1 Sample purge
- 2 Sample supply
- 3 Relief vent
- 4 Validation inlet
- 5 System vent

4 Communications

User Interface

Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnostics
- Expert level

Fast and safe commissioning

- Guided menus (“Make-it-run” wizards) for applications
- Menu guidance with brief descriptions of the individual parameter functions
- Access to the device via Web server

Reliable operation

- Uniform operating philosophy applied to device and operating tools
- If replacing electronic modules, transfer the device configuration via the integrated memory (HistoROM backup) which contains the process and measuring device data and the event logbook. No need to reconfigure.

Efficient diagnostics increase measurement availability

- Troubleshooting measures can be called up via the device and in the operating tools
- Diverse simulation options, logbook for events that occur and optional line recorder functions

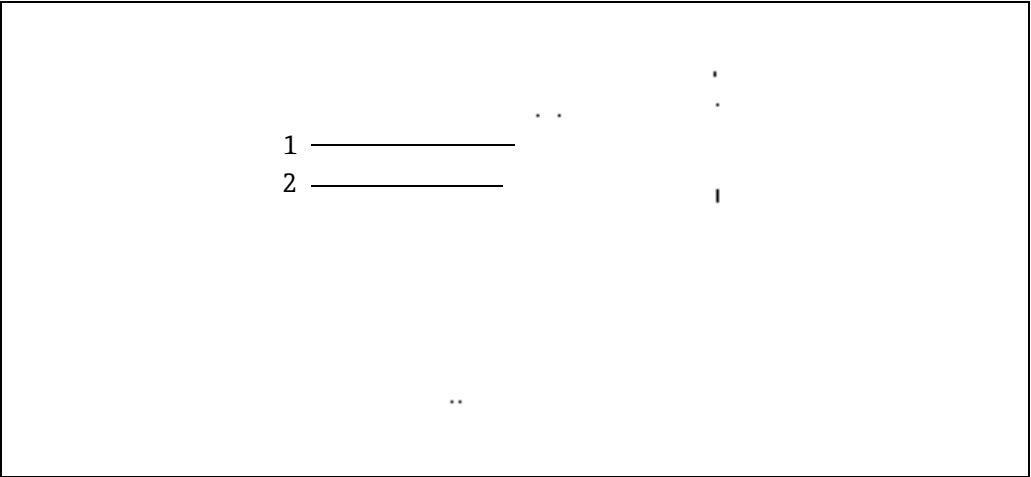
Heartbeat Technology

Package	Description
Heartbeat Verification + Monitoring	<p>Heartbeat Verification Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) “Control of monitoring and measuring equipment”.</p> <ul style="list-style-type: none"> ■ Functional testing in the installed state without interrupting the process. ■ Traceable verification results on request, including a report. ■ Simple testing process via local operation or other operating interfaces. ■ Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications. ■ Extension of calibration intervals according to operator's risk assessment.

Package	Description
Heartbeat Verification + Monitoring	<p>Heartbeat Monitoring</p> <p>Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:</p> <ul style="list-style-type: none">▪ Draw conclusions - using these data and other information - about the impact process influences (such as corrosion, abrasion, buildup etc.) have on the measuring performance over time.▪ Schedule servicing in time.▪ Monitor the process or product quality, e.g., gas pockets.

Local Operation

Via display module



- 1 4-line back-lit display
- 2 Through-glass optical keypad

Display elements

- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: -20 to 60 °C (-4 to 140 °F)
The readability of the display may be impaired at temperatures outside the temperature range.

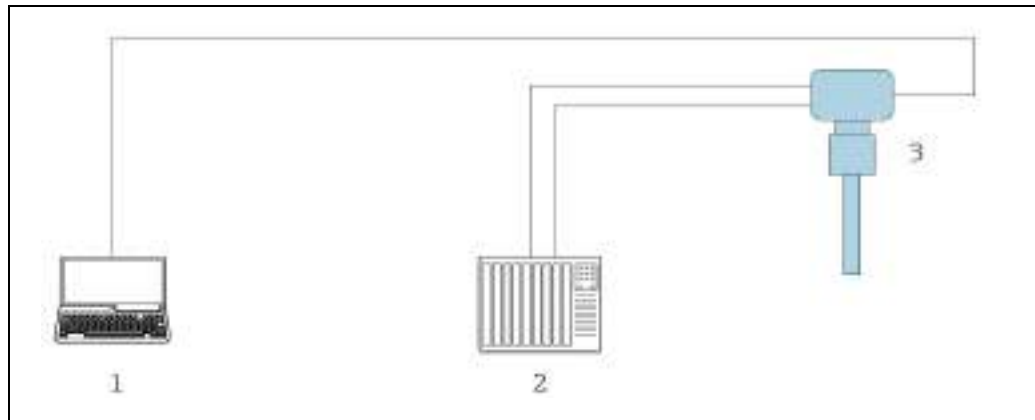
Operating elements

- External operation via touch control (3 optical keys) without opening the housing: ⊕, ⊖, ⊞
- Operating elements also accessible in hazardous areas

Remote Operation

Via Modbus RS485 protocol

This communication interface is available in device versions with a Modbus RS485 output.



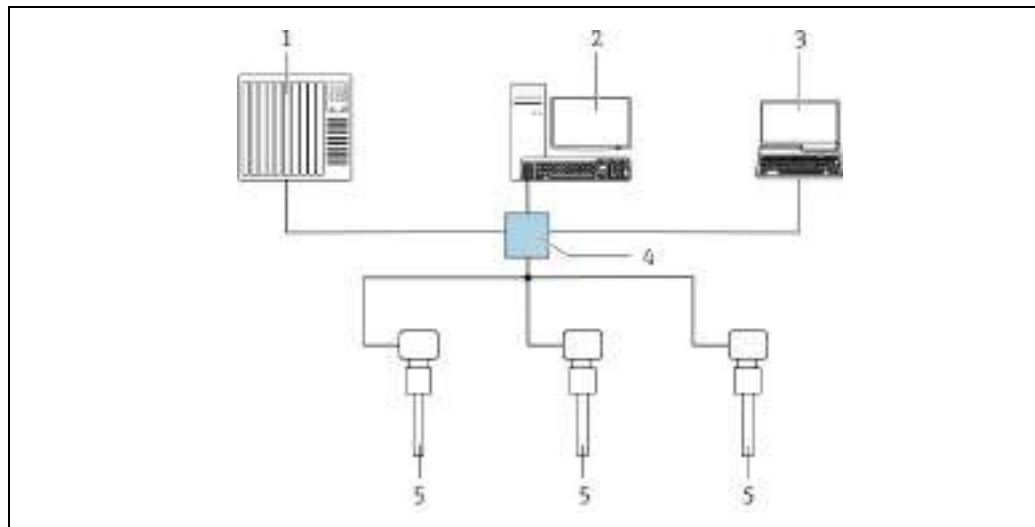
4-1: Options for remote operation via Modbus-RS485 protocol (active)

A0029437

- 1 Control system (e.g. PLC)
- 2 Computer with Web browser (e.g., Internet Explorer) for accessing the integrated device Web server
- 3 Controller

Via Modbus TCP protocol

This communication interface is available via Modbus TCP/IP network: star topology.



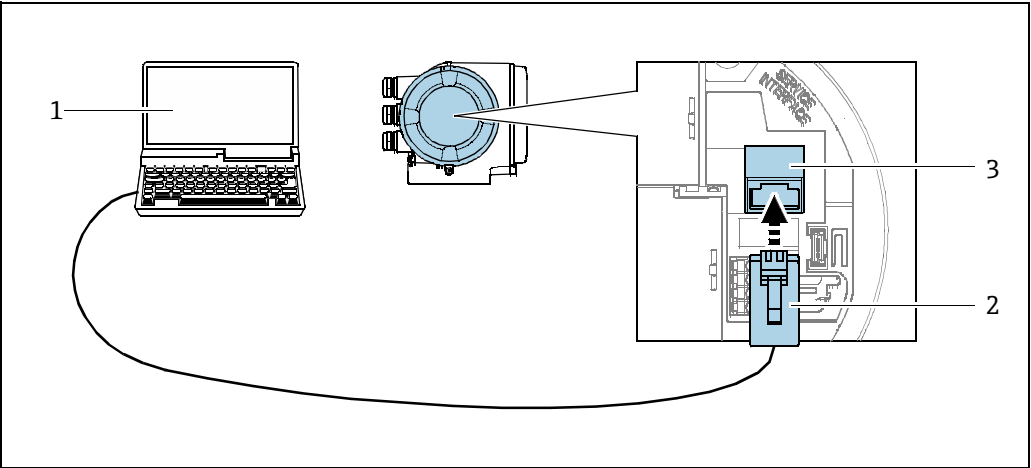
4-2: Options for remote operation via Modbus TCP protocol (star topology)


- 1 Automation / control system (e.g., PLC)
- 2 Workstation for measurement operation
- 3 Computer with Web browser (e.g., Internet Explorer) for accessing the integrated device Web server
- 4 Ethernet switch
- 5 J22 TDLAS Gas Analyzer

Service Interface

Via service interface (CDI-RJ45)

A temporary point-to-point connection can be established to configure the device onsite. With the housing open, the connection is established directly via the service interface (CDI-RJ45) of the device.



 4-3: Connection via service interface (CDI-RJ45) A0027563

- 1 Computer with Web browser (e.g., Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server
- 2 Standard Ethernet connecting cable with RJ45 connector
- 3 Service interface (CDI-RJ45) of the measuring device with access to the integrated Web server

Supported Operating Tools

Different operating tools can be used for local or remote access to the measuring device. Depending on the operating tool used, access is possible with different operating units and via a variety of interfaces.

Supported Operating Tools	Operating Unit	Interface	Additional Information
Web browser	Notebook, PC or tablet with Web browser	CDI-RJ45 service interface	Special documentation for J22

Web server

Thanks to the integrated Web server, the device can be operated and configured via a Web browser and via a service interface (CDI-RJ45) or via a WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is also displayed and allows the user to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.



A0029418-SSI

4-4: Web server user interface

- 1 Function row
- 2 Local display language
- 3 Navigation area

Supported functions

Data exchange between the operating unit (such as a notebook for example) and the measuring device:

- Upload the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
- Export the Heartbeat verification log
- Flash firmware version for device firmware upgrade, for instance
- Download driver for system integration
- Visualize the saved measured values

HistoROM Data Management

The measuring device features HistoROM data management. HistoROM data management comprises both the storage and import/export of key device and process data, making operation and servicing far more reliable, secure and efficient.



When the device is delivered, the factory settings of the configuration data are stored as a backup in the device memory. This memory can be overwritten with an updated data record, for example after commissioning.

Additional information on the data storage concept

There are different types of data storage units in which device data are stored and used by the device:

	Device Memory	T-DAT	S-DAT
Available data	<ul style="list-style-type: none"> ▪ Event logbook such as diagnostic events for example ▪ Parameter data record backup ▪ Device firmware package 	<ul style="list-style-type: none"> ▪ Measured value logging ▪ Current parameter data record (used by firmware at run time) ▪ Maximum indicators (min/ max values) 	<ul style="list-style-type: none"> ▪ Sensor data ▪ Serial number ▪ Calibration data ▪ Device configuration (e.g., SW options, fixed I/O or multi I/O)
Storage location	Fixed on the user interface board in the connection compartment	Attachable to the user interface board in the connection compartment	Fixed in the optical head enclosure

Data backup

Automatic

- The most important device data (sensor and transmitter) are automatically saved in the DAT modules.
- If the transmitter or measuring device is replaced: once the T-DAT containing the previous device data has been exchanged, the new measuring device is ready for operation without any errors.
- If the sensor is replaced: once the sensor has been replaced, new sensor data are transferred from the S-DAT in the measuring device and the measuring device is ready for operation without any errors.
- If exchanging the electronics module (e.g., I/O electronics module): Once the electronics module has been replaced, the software of the module is compared against the current device firmware.

The module software is upgraded or downgraded where necessary. The electronics module is available for use immediately afterwards without compatibility problems.

Manual

- Additional parameter data record (customer set-up parameter settings) in the integrated device memory HistoROM backup for:
 - Data backup function
 - Backup and subsequent restoration of a device configuration in the device memory HistoROM backup
 - Data comparison function:

Comparison of the current device configuration with the device configuration saved in the device memory HistoROM backup

Data transfer

Manual

- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g., with Web server: to duplicate the configuration or to store in an archive (e.g., for backup purposes)

Event list

Automatic

- Extended HistoROM application package gives chronological display of up to 100 event messages in the events list along with a time stamp, plain text description and remedial measures
- The events list can be exported and displayed via a variety of interfaces and operating tools e.g., Web server

Data logging

Manual

Extended HistoROM application package gives:

- Up to 1000 measured values recorded via 1 to 4 channels
- User configurable recording interval
- Up to 250 measured values recorded via each of the 4 memory channels
- Export the measured value log via a variety of interfaces and operating tools e.g., Web server

5 Certificates and Approvals

CE Mark

The J22 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
J22 TDLAS Gas Analyzer	<p><u>cCSAus</u>: Ex db ia [ia Ga] op is IIC T4 Gb Class I, Zone 1, AEx db ia [ia Ga] op is IIC T4 Gb Class I, Division 1, Groups A, B, C, D, T4 Tambient = -20 °C to 60 °C</p> <p><u>ATEX/IECEX/UKEX</u>:  II 2G Ex db ia [ia Ga] ib op is IIC T4 Gb Tambient = -20 °C to 60 °C</p>
J22 TDLAS Gas Analyzer with SCS ¹ on Panel	<p><u>cCSAus</u>: Ex db ia op is IIC T4 Gb Class I, Zone 1, AEx db ia op is IIC T4 Gb Class I, Division 1, Groups A, B, C, D, T4 Tambient = -20 °C to +60 °C</p> <p><u>ATEX/IECEX/UKEX</u>:  II 2G Ex db ia ib op is h IIC T4 Gb Tambient = -20 °C to 60 °C</p>
J22 TDLAS Gas Analyzer with Enclosed SCS ¹	<p><u>cCSAus</u>: Ex db ia op is IIC T4 Gb Class I, Zone 1, AEx db ia op is IIC T4 Gb Class I, Division 1, Groups A, B, C, D, T4 Tambient = -20 °C to 60 °C</p> <p><u>ATEX/IECEX/UKEX</u>:  II 2G Ex db ia ib op is h IIC T4 Gb Tambient = -20 °C to 60 °C</p>
J22 TDLAS Gas Analyzer with Enclosed SCS ¹ , with Heater	<p><u>cCSAus</u>: Ex db ia op is IIC T3 Gb Class I, Zone 1, AEx db ia op is IIC T3 Gb Class I, Division 1, Groups B, C, D, T3 Tambient = -20 °C to 60 °C</p> <p><u>ATEX/IECEX</u>:  II 2G Ex db ia ib op is h IIC T3 Gb Tambient = -20 °C to 60 °C</p>
Ingress Protection	Type 4X, IP66

1 Sample Conditioning System

6 Ordering Information

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

Order Codes

Below is listed the available order codes for the J22 TDLAS Gas Analyzer.

Feature Number	Order Code	Description
Approval (Choose one)		
10	BA	ATEX / IECEx; Z1, db ia ia Ga] ib op is IIC T3/T4Gb
	CB	cCSAus; CL.I DIV1 AEx/Ex db ia [ia Ga] op is IIC T3/T4 Gb ¹
Analyte (Choose one)		
20	H ₂ O	H ₂ O
Measurement Range (Choose one)		
30	AA	0 to 500 ppmv H ₂ O
	AC	0 to 2000 ppmv H ₂ O
	AD	0 to 6000 ppmv H ₂ O
Stream Composition (Choose one)		
50	T2	Natural gas (Table 1 and Table 2)
	T3	Table 3 (stream composition required) ²
Venting Options (Choose one)		
60	A	Atmosphere
	F	Flare ³
Measurement Wetted Materials (Choose one)		
70	V	316 Stainless steel; FKM seals ⁴
Power (Choose one)		
80	A	100 to 240 VAC ⁵
	D	24 VDC ⁵
Output 1 (Choose one)		
90	1	Modbus RTU over RS485 (2-wire)

Feature Number	Order Code	Description
Output 1 (Choose one)		
90	2	Modbus TCP over Ethernet (RJ45)
Output 2 (Choose one)		
100	N	None
	1	Configurable I/O ⁶
	2	Relay output
Output 3 (Choose one)		
110	N	None
	1	Configurable I/O ⁶
	2	Relay output
Controller Housing (Choose one)		
120	1	Coated copper-free aluminum
Controller Mounting (Choose one)		
130	1	Fixed controller mount with HMI
Sample Conditioning System (Choose one)		
140	A	On Panel, anodized aluminum
	B	Enclosed, 304 Stainless Steel
	N	None ⁷
Filtration (Choose one)		
150	1	Membrane separator (no 7 micron filter) with bypass
	2	7 micron filter, no bypass ⁸
	N	None
Sample System Gas Connections (Choose one)		
160	A	Imperial
	B	Metric ⁹
Pressure Regulation (Choose one)		
170	A	Pressure regulator (factory default)

Feature Number	Order Code	Description
Pressure Regulation (Choose one)		
170	B	Pressure regulator plus pressure relief valve (factory default)
	C	Pressure regulator, Parker ¹⁰
	D	Pressure regulator, Parker, plus pressure relief valve
	N	None
Flow Meter (Choose one)		
180	F	Glass tube, factory default
	G	Armored flow meter, factory default
	K	Glass tube, Krohne ¹⁰
	N	None
	P	Armored Krohne flow meter with Krohne flow switches
Heating Options (Choose one)		
190	1	Heated + Heat-Trace Boot, 100 to 240 VAC ¹¹
	8	None
Safety Purge (Choose one)		
200	A	For enclosed SCS (H ₂ S >300 ppm) ¹²
	B	For panel mount SCS (H ₂ S>300 ppm) ¹²
	N	None
Optional (Choose one)		
580 ⁶	JA	Inspection certificate 3.1, EN10204 (MTR) (includes sample system)
	JB	NACE MR0175 / ISO 15156 plus inspection certificate 3.1, EN10204 (MTR) (includes sample system)
	JH	Inspection certificate 3.1, EN10204 (MTR) (analyzer only)
	JI	NACE MR0175 / ISO 15156 plus inspection certificate 3.1, EN10204 (MTR) (analyzer only)
	K9	Special version, TSP - no. to be spec.

NOTES

1. CSA controller is shipped with plugged NPT adapters for power and I/O access.
2. Stream composition must be provided upon order placement. Order will be delayed if stream composition is not provided.
3. Vent to flare option includes a backpressure check valve to prevent gas flow back into the analyzer.
4. FKM, also known as FPM, seals are a fluorinated, carbon-based synthetic rubber.
5. 24 VDC option is valid for controller power only. Sample conditioning system power are AC only. Refer to the “Technical Data” on page 29 for detailed electrical specifications.
6. Configurable I/O can be configured by customer for 4-20mA input, output or digital status/switch output.
7. When choosing “none” for a sample conditioning system, all other options for sample conditioning should be “none” with the exception that a sample system gas connection type should be chosen. Analyzers purchased for mounting in third-party sample system enclosure should order mounting plate through the TSP (custom order) process.
8. When choosing the filter with no bypass option, the pressure regulator with a pressure relief valve is not a valid combination.
9. When choosing the metric sample system gas connection option, Imperial to metric conversion parts will ship in a separate package inside the analyzer crate.
10. When choosing the premium option with Swagelok pressure regulation, the premium flow meter option for Krohne must be chosen.
11. Heating is not available for panel mount sample conditioning systems. Refer to the “Technical Data” on page 29 for detailed electrical specifications.
12. A purge kit is required for applications where H₂S concentration is higher than 300 ppm.
 - a. The safety purge option for the enclosure include two (2) purges; one for the enclosure and one for the sample gas flow tubing.
 - b. There is only one safety purge for the sample gas flow tubing on a panel mount configuration.








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 3, stream composition must be supplied at the time of order placement.

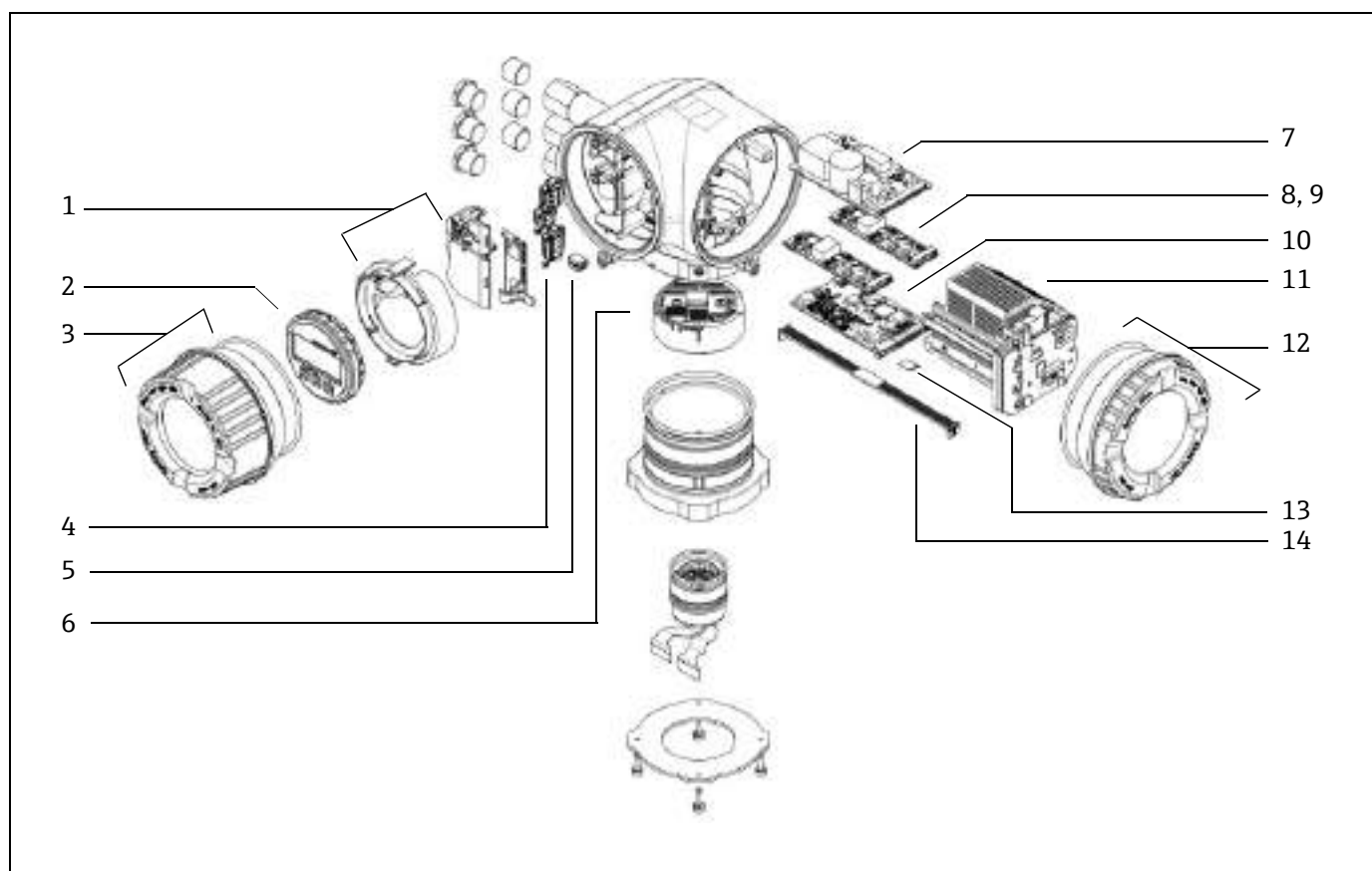
Technical Data

Measurement Data	
Target component	H ₂ O in Natural Gas
Principle of measurement	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement ranges	0 to 500 ppmv (0 to 24 lb/mm scf) 0 to 2000 ppmv (0 to 95 lb/mm scf) 0 to 6000 ppmv (0 to 284 lb/mm scf)
Repeatability	± 1 ppmv or ±1% of reading (whichever is greater)
Accuracy	± 2 ppmv, plus 2% of reading
Application Data	
Ambient temperature range	-20 °C to +60 °C (-4 °F to +140 °F), during operation
Environmental Temperature Range/ Sample Cell Temperature Range	Storage (analyzer and analyzer on panel): -40 °C to +60 °C (-40 °F to +140 °F) Storage (analyzer with enclosed SCS ²): -30 °C to +60 °C (-22 °F to +140 °F) Operation: -20 °C to +60 °C (-4 °F to +140 °F)
Environment: Pollution Degree	J22 is rated Type 4X and IP66 for outdoor use and is considered pollution degree 2 internally
Altitude	Up to 2,000 m
Sample Inlet Pressure	140-310 kPaG (20-45 psi)
Measurement Ranges	500 ppmv = 24 lb/mm scf 2000 ppmv = 95 lb/mm scf 6000 ppmv = 284 lb/mm scf
Sample Cell Operating Pressure Range	800-1200 mbar (standard) 800-1700 mbar (optional)
Sample Flow Rate	0.5-1.0 slpm (1-2 scfh)
Bypass Flow Rate	0.5-1.0 slpm (1-2 scfh)
Electrical and Communication	
Controller display	4-line back-lit display with touch control
Controller operation	Configuration via display or web servers
Controller housing materials	Copper-free aluminum with 60-150 µm polyester resin coating
Outputs and Communications	I/O1: Modbus RTU over RS485 or Modbus TCP over Ethernet I/O2 and 3: Software configurable; set as relay output, analog output (4-20 mA) or digital/status output

Electrical and Communication		
Power supply	Controller: 24 VDC ± 20% or 100 to 240 VAC ± 10%, 50/60 Hz, 10W U _M =250 VAC Optional heater: 100 to 240 VAC ± 10%, 50/60 Hz, 80W	
Output Type	Modbus RS485 or Modbus TCP over Ethernet (IO1)	U _N = 30 VDC U _M = 250 VAC N = nominal, M = maximum
	Relay Output (IO2 and/or IO3)	U _N = 30 VDC U _M =250 VAC I _N =100 mA DC/500 mA AC
	Configurable IO (IO2 or IO3)	U _N =30 VDC U _M =250 VAC
	Intrinsically Safe Output (Flow Switch)	U _o = ± 5.88 V I _o = 4.53 mA P _o = 6.6 mW C _o = 43 μF L _o = 1.74 H
Ingress protection (analyzer and sample system)	IP66, Type 4X	
Sample Conditioning System		
Panel and enclosure materials	Sample panel: anodized aluminum Sample conditioning enclosure: 304 stainless steel	
Inlet pressure range	140 to 310 kPa (20 to 45 psi)	
Sample cell operating pressure range	800 to 1200 mbara (atmosphere) - Standard 800 to 1700 mbara (flare) - Optional	
Maximum cell pressure	50 psig	
Analyzer flow rate	Not including bypass: 0.5 to 1.0 slpm (1 to 2 scfh) Bypass flow: 0.5 slpm (1 scfh) in addition to analyzer flow	
Wetted materials including sample measurement cell	316L stainless steel, Fluoroelastomer (FKM) O-rings, glass	
Sample conditioning components	Includes verification port and options for filtration, pressure regulation, flow meters, flow switches and safety purge	
Certifications and Marks		
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Spare Parts

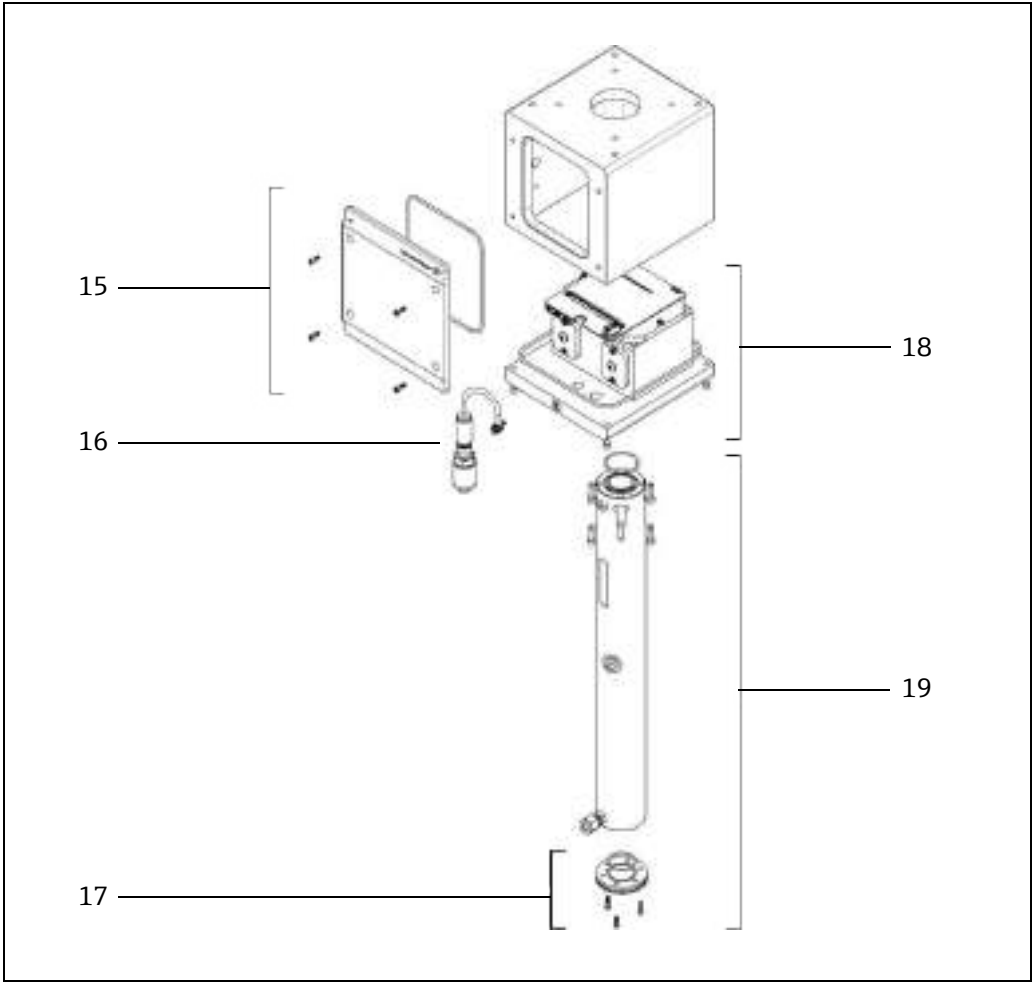
Controller



	Part Number	Description
1	1100002245	Kit, Protective Cover
2	1100002246	Kit, Display Module
3	1100002242	Kit, Cover with Glass, Aluminum
4	1100002248	Kit, Connection Terminal, Option RS485
5	1100002249	Kit, Memory, T-DAT
6	1100002232	Kit, Sensor Electronics 01
7	1100002251	Kit, Power Supply, 100 to 230 VAC
7	1100002252	Kit, Power Supply, 24 VDC
8	1100002253	Kit, I/O Module, Configurable I/O
9	1100002254	Kit, I/O Module, Relay output
10	1100002255	Kit, I/O Module, Slot 1, RS485
10	1100002290	Kit, I/O Module, Slot 1, RJ45
11	1100002247	Kit, Module Cartridge

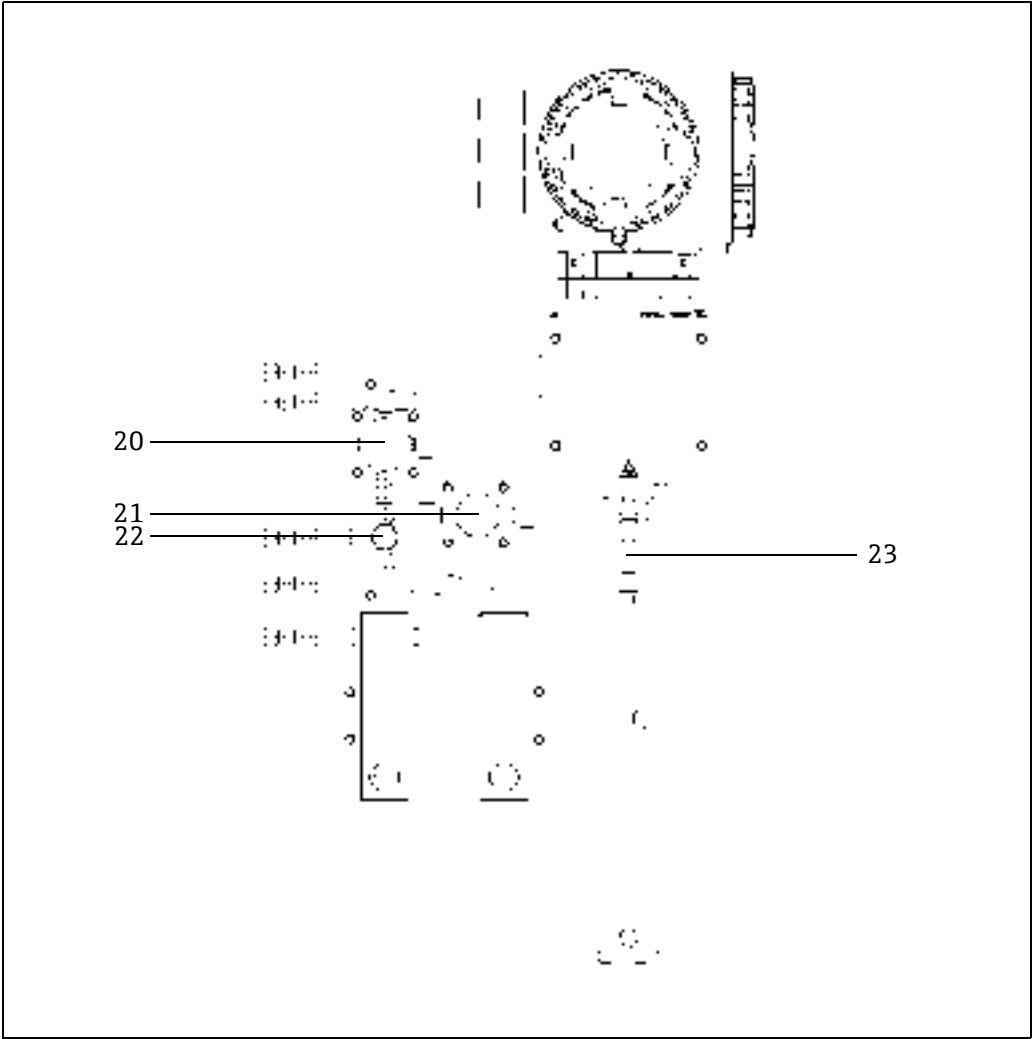
	Part Number	Description
12	1100002243	Kit, Cover, Electronics, Aluminum
13	1100002250	Kit, Memory, Micro SD Card
14	1100002233	Kit, Cable, Controller Sensor

J22 TDLAS Gas Analyzer



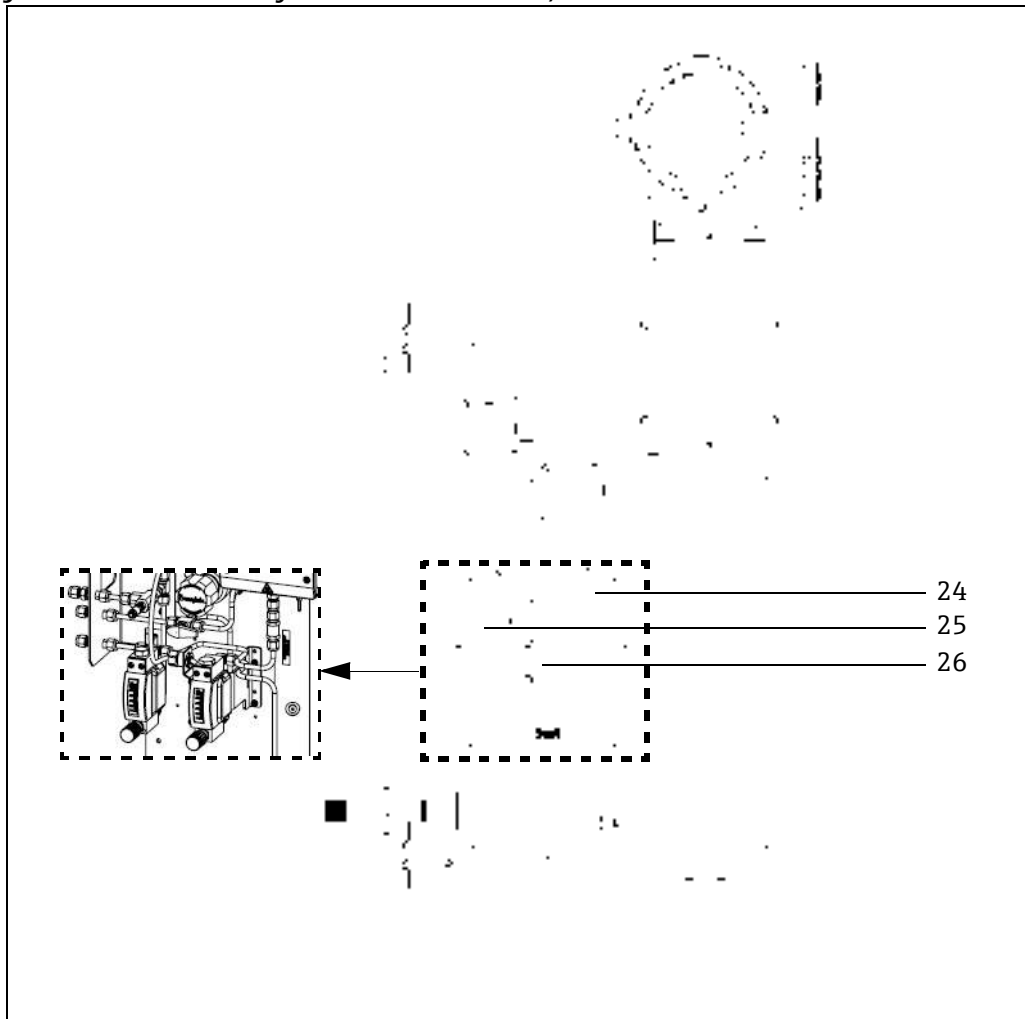
15	1100002234	Kit, Cover, Optical Head Enclosure
16	1100002239	Kit, Pressure Sensor, Digital
17	1100002236	Kit, Mirror, Flat
18	1100002238	Kit, Optical Head 01, Calibrated
19	1100002235	Kit, Cell Tube and Mirror, 0.8 m

J22 TDLAS Gas Analyzer on Panel



Sample Conditioning System (SCS) components and layout are similar for both the panel and enclosed model configurations.

20	1100002259	Kit, Membrane Separator
20	1100002260	Kit, Membrane Separator, Element
21	1100002264	Kit, Pressure Regulator, Swagelok
21	1100002265	Kit, Pressure Regulator
21	1100002266	Kit, Repair, Pressure Regulator
21	1100002267	Kit, Repair, Pressure Regulator, Swagelok
22	1100002263	Kit, Relief Valve
23	1100002262	Kit, Check Valve

J22 TDLAS Gas Analyzer in Enclosed SCS, with Heater

24	1100002281	Kit, Flow Meter, Krohne, Armored, with Flow Switch (ATEX)
24	1100002282	Kit, Flow Meter, Krohne, Armored, with Flow Switch (CSA)
24, 25	1100002276	Kit, Flow Meter, King, Glass
24, 25	1100002277	Kit, Flow Meter, Krohne, Glass
24, 25	1100002278	Kit, Flow Meter, King, Armored
24, 25	1100002279	Kit, Flow Meter, Krohne, Armored
26	1100002271	Kit, Heater, ATEX/IECEx (Enclosed SCS Model Only)
26	1100002272	Kit, Heater, CSA (Enclosed SCS Model Only)
-	1100002270	Kit, Flow Restrictor
-	1100002229	Kit, Metric Fittings

General

-	219900007	Kit, Cleaning Tools, Optical Cell (USA/Canada only)
-	219900017	Kit, Cleaning Tools, Optical Cell, No Chemicals (International)

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