

Bid specifications

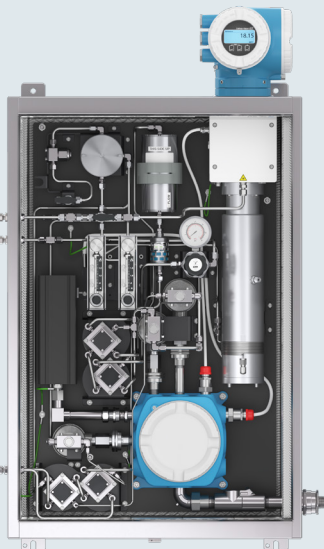
JT33 TDLAS gas analyzer for H₂S in hydrocarbon gas streams

Analyzer performance specifications

- 1.1 The analyzer must perform tunable diode laser absorption spectroscopy (TDLAS) using a near infrared (NIR) laser and solid-state detector for selective, specific measurement of H₂S molar concentration required in the Oil & Gas industry applications including natural gas, natural gas pipeline, natural gas processing, refining, petrochemical applications, and some energy transition applications such as carbon capture and biomethane.
- 1.2 The TDLAS analyzer must quantitatively respond and measure H₂S in a hydrocarbon gas stream over a measurement and calibration range of 0-500 ppmv for gas quality control measurements.
- 1.3 The TDLAS analyzer must have a measurement repeatability of ± 100 ppbv or $\pm 1\%$ of reading (whichever is greater) for gas quality measurements.
- 1.4 The TDLAS accuracy shall be no greater than ± 200 ppbv or 3% of reading (whichever is greater).
- 1.5 The TDLAS analyzer shall have no temperature or pressure sensitivity when used with a heated sample conditioning system and pressure regulator.
- 1.6 Gas must flow continuously through the analyzer sample cell to rapidly detect H₂S concentration changes and provide measurement updates in 1-60 seconds, depending on user-set parameters.
- 1.7 The TDLAS analyzer must be capable of tolerating a stream composition change of $\pm 25\%$ methane and providing accurate H₂S measurements by utilizing differential spectroscopy to account for such changes in stream composition.
- 1.8 The TDLAS analyzer must be capable of tolerating a several percent change in ethane, propane, and CO₂ and providing accurate H₂S measurements when fluctuations occur.

Hardware design specifications

- 2.1 The TDLAS analyzer must be equipped with a sample cell capable of providing accurate H₂S measurements using a multi-pass, Herriot-type sample cell to obtain accurate, low-level H₂S measurements.
- 2.2 The analyzer must be equipped with a solid-state tunable diode laser to output a specific wavelength of NIR light, with no diminution in energy in continuous 24/7 operation.
- 2.3 The TDLAS analyzer must be equipped with a high efficiency scrubber capable of scrubbing sample gas to less than 1 ppb H₂S to obtain an H₂S-free zero spectrum to perform differential spectroscopy for accurate, low-level H₂S measurements.
- 2.4 The analyzer must not require use and replacement of a consumable, lead acetate tape (classified as a hazardous waste) to perform H₂S measurements.
- 2.5 The analyzer must not use a UV-lamp requiring regular replacement and a daily zero calibration to correct for drift from decreasing lamp energy output from continuous 24/7 operation.
- 2.6 The wetted measurement cell components (cell, mirrors, etc.) must be constructed of 316/316L stainless steel (and FKM seals) per NACE MRO175 with electropolished internal surfaces to protect against corrosion and to support short response times.
- 2.7 The mirror(s) in the sample cell should be constructed of polished 316L stainless steel and must be removable and cleanable without disassembling electronics assemblies or other sample system components and must be field replaceable without requiring recalibration or realignment.
- 2.8 The sample cell must be easily removed and cleaned and must be field replaceable without requiring recalibration. The optical head and laser must be field replaceable without recalibration of the TDLAS analyzer.
- 2.9 The pressure sensor must be field replaceable without requiring recalibration.
- 2.10 Electronic assemblies such as the display, keyboard, CPU, laser and detector control, laser temperature controller, and IO boards must be field replaceable.



JT33 TDLAS gas analyzers

- 2.11 The analyzer controller electronics must be housed in a separate compartment from the enclosure with sample system components to avoid corrosion of electronic components.
- 2.12 The TDLAS analyzer must have available options without a sample system (analyzer only) to allow system integration into customer-supplied sample conditioning system.
- 2.13 The analyzer sample system must have an available option for a flow switch which triggers a diagnostic alarm through the analyzer's IO when a low flow condition is detected.
- 2.14 The TDLAS analyzer with the enclosed sample system must have an IP rating of Type 4X and IP66.
- 2.15 The sample system must have an available option for a pressure regulator pressure, relief valve, sample system purge, and glass-tube flow meters that are function-checked and leak-tested during factory integration.
- 2.16 The sample system components requiring regular service and inspection (such as filters) must be easily accessible for rapid field maintenance.

Analyzer certification specifications

- 3.1 The TDLAS analyzer must be available in a configuration certified for use in a CSA Class I, Division 1, and Class I, Zone 1 location.
- 3.2 The TDLAS analyzer must be available in a configuration certified for ATEX, IECEx, and UKEx Zone 1 locations.
- 3.3 The TDLAS analyzer must have an option for an inspection certificate according to EN 10204 type 3.1 material inspection certificate.
- 3.4 The TDLAS analyzer must have an option for an inspection certificate according to NACE MRO175 and ISO 15156.

Instrument firmware and software specifications

- 4.1 The TDLAS analyzer shall use advanced diagnostics technology for access to visible spectral data, plotted and printable.
- 4.2 The TDLAS analyzer firmware must include an algorithm to monitor background spectra and initiate a sample gas scrubbing cycle to obtain an H₂S-free zero spectrum and perform differential spectroscopy whenever the background gas composition changes enough to affect the measurement.
- 4.3 The TDLAS analyzer shall have a connection to a web server to enable the user to view parameters including measured values, instrument health status, and data logging information.
- 4.4 The TDLAS analyzer must use standard alarm behavior that conforms to NAMUR NE107 standards.
- 4.5 The TDLAS analyzer must provide 4-20 mA outputs conforming to NAMUR NE43, with fault signals available below 3.6 mA and above 21 mA.
- 4.6 The TDLAS analyzer must perform measurement and spectra self-checks which trigger alarms when measurement is out of specification.
- 4.7 The TDLAS analyzer shall have a diagnostic report downloadable PDF file via the web server application which reports internal and external verification results.
- 4.8 The TDLAS analyzer must have an event log available to view device changes in the display or web server.
- 4.9 The TDLAS analyzer must have data logging history including measured concentration, cell pressure, cell temperature, laser temperature, event history, and periodically-saved spectrum. There shall be a ≥1GB removable micro-SD card with alarms and data logs. There shall also be a separate removable memory chip which allows replacement of electronics without the need to update all parameters.
- 4.10 The TDLAS analyzer shall have auto-validation capability to initiate a measurement check using the keypad, web server, or Modbus.
- 4.11 The TDLAS analyzer firmware must enable the user to program the analyzer to automatically perform a validation check (at a user-set time interval) to verify the analyzer is operating properly within its factory-certified calibration range.

Analyzer calibration and validation specifications

- 5.1 A calibration report documenting results of the factory calibration test must be provided in the shipment with the TDLAS analyzer.
- 5.2 The TDLAS analyzer supplier must provide the option of a factory acceptance text (FAT) to witness analyzer calibration.
- 5.3 The TDLAS supplier must provide serial number-specific documentation downloadable from the manufacturer's website.
- 5.4 The TDLAS analyzer must be factory calibrated using a NIST-certified H₂S gas standard.
- 5.5 The TDLAS analyzer supplier must provide the user the option to choose either a manual validation or automated, unattended validation configuration using an H₂S gas standard.

Analyzer communications specifications

- 6.1 The TDLAS analyzer must support one or two configurable isolated inputs or outputs that can be configured to be 4-20 mA or status (switch) output via firmware setting.
- 6.2 The TDLAS analyzer must support Modbus RTU communication via RS485, and optionally Modbus TCP over Ethernet connection. The TDLAS analyzer must offer a choice of one or two relays for general fault, user assignable.

Optional equipment specifications

- 7.1 The TDLAS analyzer supplier should offer mounting for the analyzer to easily be mounted in a rack with sunshade, 3-sided shelter, or inside of an environmentally controlled room to ensure the optimum performance.