IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx CSAE 24.0001X**

Certificate history:
Issue 0 (2024-03-05)

Status: **Current**

Issue No: 1

Date of Issue: 2024-09-10

Applicant: **Endress+Hauser Optical Analysis Inc**
11027 Arrow Route
Rancho Cucamonga CA 91730
United States of America

Equipment: **JT33 TDLAS Spectrometer, JT33 TDLAS Gas Analyzer (No Sample System), JT33 TDLAS Gas Analyzer System.**

Optional accessory:

Type of Protection: **Flameproof “db” Intrinsic safety "ia" "ib" Optical radiation "op is" non-electrical "h"**

Marking: **JT33 TDLAS Spectrometer**

Ex db ia [ia Ga] ib op is IIC T4 Gb

-20°C ≤ Ta ≤ +60°C

JT33 TDLAS Gas Analyzer (No Sample System)

Ex db ia [ia Ga] ib op is h IIC T4 Gb

-20°C ≤ Ta ≤ +60°C

JT33 TDLAS Gas Analyzer System

Ex db ia [ia Ga] ib op is h IIC T3 Gb

-20°C ≤ Ta ≤ +60°C

Dual Seal Without Annunciation

Approved for issue on behalf of the IECEx Certification Body: **Michelle Halliwell**

Position: **Director Operations, UK & Industrial Europe**

Signature:
(for printed version)

Date:
(for printed version)

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

CSA Group Testing UK Ltd
Unit 6, Hawarden Industrial Park
Hawarden, Deeside CH5 3US
United Kingdom

IECEx Certificate of Conformity

Certificate No.: **IECEx CSAE 24.0001X**

Date of issue: 2024-09-10 Issue No: 1

Manufacturer: **Endress+Hauser Optical Analysis Inc**
11027 Arrow Route
Rancho Cucamonga CA 91730
United States of America

Manufacturing locations: **Endress+Hauser Optical Analysis Inc**
11027 Arrow Route
Rancho Cucamonga CA 91730
United States of America

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Edition:7.0	Explosive atmospheres - Part 0: Equipment - General requirements
IEC 60079-1:2014 Edition:7.0	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-11:2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-28:2015 Edition:2	Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation
IEC TS 60079-40:2015 Edition:1.0	Explosive atmospheres - Part 40: Requirements for process sealing between flammable process fluids
ISO 80079-36:2016 Edition:1.0	Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic methods and requirements

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

GB/CSAE/ExTR24.0008/00 GB/CSAE/ExTR24.0044/00

Quality Assessment Report:

GB/CML/QAR21.0014/03

IECEx Certificate of Conformity

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The JT33 TDLAS Analyzer is a laser-based gas analyzer that measures the concentration of a compound or “analyte” such as H2S. The technology employed is Tunable Diode Laser Absorption Spectroscopy (TDLAS). The measurement output is a volumetric concentration, or ratio of a specific analyte in a gas mixture such as natural gas. The volumetric ratio can be converted to other units of measure using internal conversion factors and calculations.

The JT33 TDLAS Gas Analyzer System is comprised of a sample cell, intrinsically safe optical head and an electronics assembly platform within a pre-certified flameproof enclosure. The cell is a sealed tube through which the gas mixture flows. The cell has a gas inlet and a gas outlet. On one end of the tube is a window through which a beam of infrared laser light travels, which in turn reflects on internal mirrors. In this arrangement, the gas mixture does not contact the optoelectronics. Pressure, and in some cases temperature sensors, are employed in the cell assembly to compensate for the effects of pressure and temperature changes in the gas.

The optical head is mounted on top of the cell and contains the laser, optical detector, and a thermoelectric cooler to control the laser temperature. The optical head also contains the optical head electronics which are directly connected to the optoelectronics in the optical head. The optical head electronics board also communicates with the electronics assembly and the MAC (Measurement Accessory Controller). The MAC is rated100-240 VAC, 50/60 Hz; or 24 VDC, 67 W. AC versions of the MAC support a heater, which, when installed, increases the maximum power consumption to 275 W.

The electronics assembly is mounted on top of the optical head, within a flameproof enclosure. The electronics assembly, which can be powered by 100-240 VAC ± 10% or 24VDC ± 20% source, contains the sensor electronics which connects to the optical head via the RS232 protocol through a 10-pin ribbon cable assembly.

The sensor electronics and the optical head electronics operate on a 30V DC supply using the same 10-pin ribbon cable. The sensor electronics generate the laser drive signal that is sent through the optical head electronics and to the laser in the optical head. Signals from the detectors are amplified by the optical head electronics and sent to the sensor electronics where they are digitized. The sensor electronics process the digital data and sends the gas concentration measurements the electronics display and I/O modules.

The MAC microcontroller firmware operates digital temperature controls. It receives directions from the optical head electronics to set temperature targets, and report status of the temperature control. There is one heater assigned to the MAC which is switched on and off, and one sensing thermistor the MAC is used to measure the ambient temperature inside the heated enclosure.

The electronics assembly displays the concentration measurement on an LCD display and has a through-the glass 3-button keypad interface for user input. The flameproof enclosure of the electronics assembly also houses the electrical terminals for field wiring connections. The JT33 is offered with various analogue and digital outputs which may be employed in automation or communication systems to deliver its measurements and applicable diagnostic messages and alarms to remote devices. Additionally, the electronics assembly has a Service Port which allows interaction with the JT33 TDLAS SPECTROMOTER on a standard web browser using a laptop or tablet. This connection is for use by the manufacturer or trained personnel for test, repair, or overhaul interaction of the equipment under non-hazardous conditions, ie, when no explosive atmosphere is present. Assessment of the performance of this service port and its associated software is outside the scope of this certification.

The JT33 TDLAS Gas Analyzer is used as an “extractive” measuring device, where the gas sample is extracted from a vessel or pipeline and transported to the analyzer which may be mounted up to 100m from the sample tap point. The JT33 TDLAS Gas Analyzer may be configured without sample conditioning on a panel or heated enclosure as described above. An optional IP66 rated enclosure may be included which surrounds the measurement cell, MAC, and sample conditioning system.

The JT33 TDLAS Gas Analyzer operates at near-atmospheric pressure. The sample return is routed and vented to a safe location in the atmosphere or vented to a flare or other apparatus depending on the application.

The maximum working pressure (MWP) of the equipment is listed as 800-1200 mbara, or 800-1700 mbara (model dependant). This is the pressure range at which the manufacturer has determined the equipment can operate. However, the equipment was assessed to withstand a pressure of 75 lbf/in^{2}g (psig) against IEC TS 60079-40:2015 Edition 1.0.

The equipment has been separately assessed against the requirements of IEC 60529 and it meets IP66.

See annexe for equipment continued & conditions of manufacture

SPECIFIC CONDITIONS OF USE: YES as shown below:
See Annexe

IECEx Certificate of Conformity

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
Variation 1 – This variation introduced the following changes:

1. Introduction and IP66 assessment of the windowed version of the JT33 TDLAS Gas Analyzer System.
2. Temperature assessments resulting in the process temperature rating of all models increasing from +50°C to +60°C and the ambient temperature rating of the JT33 TDLAS Gas Analyzer System increasing from +50°C to +60°
3. Introduction of alternative O-ring materials in the process wetted parts of the system.
4. Minor alterations were made to the Product Description.

Annex:

IECEx CSAE 24.0001X Annexe Issue 1.pdf

Equipment continued

Three main variants of the JT33 TDLAS Spectrometer are available. The JT33 TDLAS Spectrometer; the JT33 TDLAS Gas Analyzer (No Sample System); the JT33 TDLAS Gas Analyzer System.

The JT33 TDLAS Spectrometer

The JT33 TDLAS Spectrometer consists of an Ex d flameproof electronics compartment (top), intrinsically safe optical head (center) and a measurement cell tube (bottom).

JT33 TDLAS Gas Analyzer (No Sample System)

The JT33 TDLAS Gas Analyzer is configured with pre-certified equipment on a panel available for customers who have the need to integrate this panel version into their own sample conditioning system. The panel is assembled with two or three solenoid valves, pressure regulator, scrubber, and MAC. As described above, MAC is linked with the JT33 TDLAS Spectrometer via serial cable to receive commands to energize solenoids valves which divert sample gas to flow through the scrubber prior to entering the measurement cell. A pressure regulator is located upstream of the measurement cell to ensure it does not operate above 69KPa (10 psig).

JT33 TDLAS Gas Analyzer System

JT33 TDLAS GAS ANALYZER ENC. SCS HEATED is a turnkey assembly configured with pre-certified equipment, including the heater, solenoid valves, scrubber, filter, isolation valves, enclosure and sample conditioning system (SCS). The "SCS" allows more precise control of the sample gas before it flows through the spectrometer.

Ratings:

JT33 TDLAS Spectrometer: 100-240 VAC 50/60Hz ± 10%, Um = 250V; or 24VDC ± 20%, 10 W, Um = 250V.
I/01: Terminal 26 and 27, Un = 30Vdc, Um = 250Vac
I/02: Terminal 24 and 25, Un = 30Vdc, Um = 250Vac or Un = 30Vdc, In = 100mAdc/500mAac, Um = 250Vac
I/03: Terminal 22 and 23, Un = 30Vdc, Um = 250Vac or Un = 30Vdc, In = 100mAdc/500mAac, Um = 250Vac
J6 Optical Head Enclosure (Flow Switch): Uo/Voc = 5.88V, Io/Isc = 4.53mA, Po = 6.66mW, Co/Ca = 43µF, Lo/La = 1.74H (Uo/Voc may be + or – 5.88V with respect to Pin 2 of J6)

Measurement Accessory Controller (MAC): 100-240 VAC, 50/60 Hz, 275 W; or 24 VDC, 67 W.
J6 SOVS, J11 HEAT SCS, J12 AC IN: Um = 250V
J5 SCS THRM – Pin 1 w.r.t. Pin 2: Ui = 0, Ci = 0, Li = 0, Uo = +5.88V, -1V, Io = 1.18mA (resistively limited), Po = 1.78mW, Co = 40µF, Lo = >1H

Model Code Structure

Headings without sub-options are not considered critical to the design of the equipment. Where sub options are shown, these are the only options endorsed by CSA. For order codes listed as 'special' from the manufacturer, only the JT33 TDLAS Spectrometer is a CSA certified part.

JT33 –

10 – Approval
BA: ATEX/IECEx/UKEx Zone 1

CSA Group Testing UK Ltd.
Unit 6 Hawarden Industrial Park,
Hawarden Deeside CH5 3US, UK.

20 – Analyte
30 – H2S Measurement Range
40 – H2O Measurement Range
50 – Additional Measurement Range
60 – O2 Measurement Range
70 – Stream Composition
80 – Venting to
    A: Atmosphere
    F: Flare
90 – Special Application
100 – Measurement Wetted Materials
    1: 316 Stainless Steel; FKM Seals (Viton) Seals
    2: 316 Stainless Steel; FFKM (Kalrez) Seals
110 – Power Controller
    A: 100 – 240 VAC ± 10%
    D: 24 VDC ± 20%
120 – Output:Input 1
130 – Output:Input 2
140 – Output:Input 3
145 – Ambient Temperature
    1: -20 to +50°C (-4 to + 122°F)
    2: -10 to +60°C (+14 to +140°F)
150 – Controller Housing Material
    1: Coated Copper-Free Alu
    2: 316 Stainless Steel
160 – Controller Mounting
    1: Fixed controller mount with integral HMI
    2: Panel mount spectrometer; use for feature 170, option N only
170 – Sample Conditioning System and Enclosure
    D: 304 Stainless Steel
    E: 316 Stainless Steel
    H: 304 Stainless Steel, with window
    J: 316 Stainless Steel, with window
    N: None
180 – Validation Options
    1: Manual validation
    2: Auto validation, 1-point
    4: Air operated auto-validation, 1-point
    5: Air operated auto-validation, 2-point
    N: None
190 – Filtration
200 – Sample System Gas Connection
    A: Imperial
    B: Metric
210 – Pressure Regulation
    B: Pressure Regulator plus Pressure Relief Valve
    D: Pressure Regulator, Premium, plus Pressure Relief Valve
    N: None
220 – Flow Meter
    F: Glass Tube, Factory Default

CSA Group Testing UK Ltd.
Unit 6 Hawarden Industrial Park,
Hawarden Deeside CH5 3US, UK.

K: Glass Tube, Premium (KROHNE)
L: Armored Flowmeter, Factory Default (King)
M: Armored Flowmeter with premium (KROHNE) flow switches
N: None

230 – Heated Sample Conditioning System (SCS)
1: Heated, no Heat-Trace Boot, 100 VAC
2: Heated and Heat-Trace Boot, 100 VAC
3: Heated, no Heat-Trace Boot, 120 VAC
4: Heated and Heat-Trace Boot, 120 VAC
5: Heated, no Heat-Trace Boot, 230 VAC
6: Heated and Heat-Trace Boot, 230 VAC
7: Heated, no Heat-Trace Boot, 240 VAC
8: Heated and Heat-Trace Boot, 240 VAC
9/10/11: No heating for system integrators
12: No heating "Spectrometer Only" version

240 – Application Specific
N: None, note – this subheading is for connection of application specific parts not assessed by CSA.

500 – Operating Language Display
530 – Validation Gas
580 – Test, Certificate, Declaration
590 – Additional Approval
895 – Marking
Z1: Tag

Specific Conditions of Use

i. The flameproof joints of this equipment are other than the minimums specified in IEC 60079-1 and shall not be repaired by the user.
ii. When supplied, the Measurement Accessory Controller (MAC) shall be used with field wiring and cable entry devices suitable for a temperature of at least 75°C.
iii. When cable entry devices are provided by the end user for the MAC, these shall meet the requirements of IP66 following the tests of enclosures as defined in IEC 60079-0.
iv. When J5 of the MAC is considered as a field wiring connection, the installer shall use cable whose inner cores have a minimum radial insulation thickness of ≥ 0.5 mm.
v. The JT33 TDLAS Spectrometer and JT33 TDLAS Gas Analyzer (No Sample System) shall be installed in an enclosure that is suitable for the environment of use and that provides protection against mechanical impact. The user shall ensure that the surrounding temperature of the optical head does not exceed 60°C and that the surrounding temperature of the MAC does not exceed 70°C.
vi. To ensure the degree of protection is maintained, the user shall ensure that the cover seal of the G3xx enclosure (transmitter) is flat with no bends in the seal surface before securing the cover. Seals that are not flat are to be replaced.
vii. Adhesive labels and the powder coating of models of the equipment with an aluminium enclosure are non-conducting materials and may generate an ignition-capable level of electrostatic discharge under certain extreme conditions. The user should ensure that the Equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam) which might cause a build-up of electrostatic charges on these non-conducting surfaces. Additionally, cleaning of the equipment should be done only with a damp cloth.
viii. An optional stainless-steel label tag which may be present on the transmitters of this equipment is not bonded to earth. The maximum average capacitance of the tag determined by measurement is max.

CSA Group Testing UK Ltd.
Unit 6 Hawarden Industrial Park,
Hawarden Deeside CH5 3US, UK.

30 pF. This shall be considered by the user to determine suitability of the equipment in a specific application.

ix. This equipment is intended to operate at constant pressure and has not been assessed for the effects of persistent fluctuations of pressure within the operating range. Therefore, the user shall ensure that the pressure fluctuation within the Sample Cell Tube of the equipment does not routinely exceed 5 lbf/in^2 (psi).

x. The equipment shall be supplied from an Overvoltage Cat II source only.

xi. The JT33 TDLAS Spectrometer is not capable of passing a 500V r.m.s. dielectric strength test between the intrinsically safe Flow Switch connection circuits and enclosure according to Clause 6.3.13 of IEC 60079-11:2011. This shall be taken into account during equipment installation.

xii. The Measurement Accuracy Controller (MAC) is not capable of passing a 500V r.m.s. dielectric strength test between the intrinsically Thermistor connection circuits and enclosure according to Clause 6.3.13 of IEC 60079-11:2011. This shall be taken into account during equipment installation.

xiii. The installation of the JT33 TDLAS Gas Analyzer (No Sample System) shall incorporate an electrical bonding conductor connected between the JT33 TDLAS Spectrometer Optical Head enclosure and the panel on which the Measurement Accuracy Controller (MAC) is installed.

xiv. Any connection to the JT33 TDLAS Spectrometer intrinsically safe Flow Switch connector shall be made via a certified M12 x 1.5 Ex be IIC IP66 rated certified cable gland suitable for a temperature range of -20°C to +60°C, that shall be fitted in an Optical Head enclosure entry. The connection is made to a printed circuit board mounted four Pin black connector J6 via a mating free Molex connector part number 502351-0401 fitted with MOLEX crimp contacts part number 5600850101. Access to the connection is gained by removal of the Optical Head enclosure which shall be refitted using a fastener torque of 2Nm.

xv. Any connection to the Measurement Accuracy Controller (MAC) intrinsically safe Thermistor printed circuit board mounted connector J5 SCS THRM shall be made via a mating free TE CONNECTIVITY AMP receptacle part number 6-179228-2 fitted with TE CONNECTIVITY AMP crimp contacts part number 179227-4.

Conditions of Manufacture

i. The equipment covered by this certificate incorporates previously certified devices; it is therefore the responsibility of the manufacturer to continually monitor the status of the certification associated with these devices, and the manufacturer shall inform CSA UK of any modifications of the devices that may impinge upon the explosion safety design of the equipment.

Description	Certificate Number
E+H G305 and G307 Enclosures	IECEx SIR 11.0050U
Intertec CP heater CP Multitherm BPA 200 T3 F, CP Multitherm BPA 160 T3 F	IECEx PTB 07.0052X
Versa SOV DSM-3301-316-XDDT-D024	IECEx CSA 16.0029X
Bifold SOV FP06P-S1-04-32-NU-V-77U-24D-57-K85-H2S	IECEx BAS 10.0008
E+H MAC	IECEx CSAE 23.0030X
CMP Blanking Element Type 747DAT15 (1/2") 747DAT25 (3/4")	IECEx CML 18.0177X
Hawke Barrier Gland CBS656NA0.500.50NP & CBS656NA0.750.75NP	IECEx CML 19.0048X
CMP Barrier Gland 25PX2K1RA532 & 20S16PXSS2KREX1EX531	IECEx CML 18.0182X
Killark Conduit Elbow GUML-2M-EX	IECEx QPS 16.0012X
Conduit Elbow CMP Type 787DT2T25	IECEx CML 18.0176U
HLS Conduit Elbow N. 1/2.1/2.N	IECEx SIR 07.0044U
CMP Conduit Union Type 780DT1T1	IECEx CML 18.0190X

CSA Group Testing UK Ltd.
Unit 6 Hawarden Industrial Park,
Hawarden Deeside CH5 3US, UK.

Description	Certificate Number
CMP Gland 40A2F1RA5	IECEx CML 18.0179X
Quintex Line Bushing LBSN21202/0.5END (NICKEL PLATED) LBSN21202/0.5ENDVA (316SS)	IECEx EPS 11.0004X
E+H Proline 300/500 Electronics	IECEx CSA 16.0006U
E+H Display Type DP-PA**	IECEx KEM 08.0048U
KROHNE Messtechnik GmbH Variable Area Flowmeter type DK32 / R1 / .. / L / .. / ..- Ex	IECEx KIWA 18.0007X

ii. It is the responsibility of the manufacturer to ensure that the correct cable types are used with the entry devices specified for this equipment.

CSA Group Testing UK Ltd.
Unit 6 Hawarden Industrial Park,
Hawarden Deeside CH5 3US, UK.