



UNITED KINGDOM CONFORMITY ASSESSMENT

1 UK TYPE EXAMINATION CERTIFICATE

2 Equipment Intended for use in Potentially Explosive Atmospheres

UKSI 2016:1107 (as amended) – Schedule 3A, Part 1

3 Certificate Number: CSAE 21UKEX1072X Issue: 1

4 Product: J22 TDLAS Gas Analyzer, J22 TDLAS Gas Analyzer SCS on Panel, J22 TDLAS Gas Analyzer Encl. SCS, J22 TDLAS Gas Analyzer Encl. SCS Heated

5 Manufacturer: Endress+Hauser Optical Analysis Inc.

6 Address: 11027 Arrow Route, Rancho Cucamonga, California, 91730, USA

7 This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 CSA Group Testing UK Limited, Approved Body number 0518, in accordance with Regulation 42 of the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016, UKSI 2016:1107 (as amended), certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Schedule 1 of the Regulations. The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

- EN IEC 60079-0:2018 EN 60079-1:2014+AC:2018-09 EN 60079-11:2012
- EN 60079-28:2015 EN ISO 80079-36:2016+AC:2019

Except in respect of those requirements listed at Section 16 of the schedule to this certificate. The above standards may not appear on the UKAS Scope of Accreditation, but have been added through flexible scope of accreditation, which is available on request.

10 If the sign 'X' is placed after the certificate number, it indicates that the product is subject to Specific Conditions of Use identified in the schedule to this certificate.

11 This UK TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Regulations apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12 The marking of this product shall be in accordance with Regulation 41 and include the following:

J22 TDLAS Gas Analyzer

J22 TDLAS Gas Analyzer SCS on Panel or J22 TDLAS Gas Analyzer Encl. SCS



II 2G
Ex db ia [ia Ga] ib op is IIC T4 Gb
-20°C ≤ Ta ≤ +60°C



II 2G
Ex db ia ib op is h IIC T4 Gb
-20°C ≤ Ta ≤ +60°C

J22 TDLAS Gas Analyzer Encl. SCS Heated



II 2G
Ex db ia ib op is h IIC T3 Gb
-20°C ≤ Ta ≤ +60°C

Name: J A May
Title: Director of Operations



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13 DESCRIPTION OF PRODUCT

The core model of the J22 TDLAS Gas Analyzer consists of a flameproof electronics compartment, intrinsically safe optical head and a measurement cell.

The J22 TDLAS Gas Analyzer with Sample Conditioning System, henceforth referred to as the 'SCS', on a panel combines the J22 TDLAS Gas Analyzer with the non-electrical SCS to precondition the analyte before examination within the cell.

The J22 TDLAS Gas Analyzer with SCS in an enclosure can be configured with or without a pre-certified terminal box, heater and thermostat.

The J22 TDLAS Gas Analyzer is a laser-based gas analyzer that measures the concentration of a compound or "analyte" such as H₂O. 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 or air. The volumetric ratio can be converted to other units of measure using internal conversion factors and calculations.

The analyzer 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 from a mirror. In this arrangement, the gas mixture does not contact the laser or any other 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.

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 \pm 10% or 19.2-28.8 VDC 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 electronics assembly displays the concentration measurement on an LCD display and also 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 J22 comes 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 J22 TDLAS Gas Analyzer on a standard web browser using a laptop or tablet. This connection is for use by the manufacturer or trained

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personnel for test, repair or overhaul interaction of the equipment under non-hazardous, explosive atmosphere free conditions.

The J22 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 J22 TDLAS Gas Analyzer may be configured without sample conditioning. Optional hardware is also available to condition the sample before it enters the gas analyzer. An optional IP66/Type 4X rated enclosure may be included which surrounds the “cell” and the sample conditioning system. The sample conditioning system (SCS) is required to filter and remove solid and liquid particulate and to control the flow and pressure of the gas. In some cases, an optional heater (powered independently from the analyzer) is used to control the temperature inside the enclosed SCS. An optional pressure relief valve and purge system are available. The effectiveness of this purge system has not been assessed by CSA.

The J22 TDLAS Gas Analyzer operates at near-atmospheric pressure and at an ambient temperature between negative -20 to +60 degrees centigrade. After the passing through the J22 TDLAS Gas analyzer, the sample is routed and vented to a safe location in the atmosphere or vented to a flare or other apparatus.

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

J22 TDLAS Gas Analyzer

Rated: 100 - 240Vac, 50/60 Hz \pm 10%, Um = 250V or 19.2 – 28.8 Vdc, max., Um 250V, 10 W.

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

Flow Switch: J6 (Optical Head Enclosure), Uo = 5.88V, Io = 4.53mA, Po = 6.66mW, Co = 43 μ F, Lo = 1.74H (Uo may be + or – 5.88V with respect to Pin 2 of J6)

J22 TDLAS Gas Analyzer SCS on Panel & J22 TDLAS Gas Analyzer Encl. SCS

Rated: 100 - 240Vac, 50/60 Hz \pm 10%, Um = 250V or 19.2 – 28.8 Vdc, max., Um 250V, 10 W.

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

J22 TDLAS Gas Analyzer Encl. SCS Heated

Rated: 100 - 240Vac, 50/60 Hz \pm 10%, Um = 250V or 19.2 – 28.8 Vdc, max., Um = 250V, 10 W.

Heater: 100 - 240 Vac, 50/60 Hz \pm 10%, 80 W.

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

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Model Code Structure

J22 – ABCDEFGHIJKLMNOPQRSTUVWXYZ

A – Approval

BA - ATEX / IECEx Zone 1

B – Analyte

C – Measurement Range

D – Measurement Range 2

E – Stream Composition

F – Venting to

G – Process Wetted Materials

V - 316 Stainless Steel; FKM Seals

H – Supply Parameters

A - 100-240 VAC (50/60 Hz) \pm 10%

D – 24 VDC \pm 20%

I – Output; Input 1

J – Output; Input 2

K – Output; Input 3

L – Electronics Housing

1 - Coated Copper-Free Aluminum

M – Controller Mounting

N – Sample Conditioning System (SCS)

A - On Panel, Aluminum

B - Enclosed, 304 Stainless Steel

N – None

O – Filtration

P – Sample System Gas Connections

A – Imperial

B – Metric

Q – Pressure Regulation

R – Flow Meter

A - Armored, factory default

B - Armored, Krohne

F - Glass Tube, factory default

K - Glass Tube, Krohne

N - None

S – Heating Options

1 - Heated + Heat-Trace Boot, 100 - 240 VAC \pm 10%

8 – None

T – Purge

U – Operating Language Display

V – Test/Certificate/Declaration

W – Marking

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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.

Variation 1 - This variation introduced the following changes:

- i. Change of manufacturer name from SpectraSensors Inc. to Endress+Hauser Optical Analysis Inc.
- ii. Specification of intrinsic safety 'Ex ia' parameters at a previously unused flow switch connector J6 of the J22 TDLAS Gas Analyzer to cover user connection of intrinsically safe equipment at this connector. The addition of 'ia [ia Ga]' to the certification coding to cover this connection and its associated circuitry.
- iii. Introduction of the option for an intrinsically safe 'Ex ia' flowmeter with flow switch to be fitted as part of the Sample Conditioning System, the flow switch of the flowmeter being electrically connected to the previously unused intrinsically safe 'Ex ia' connection at connector J6 in the J22 TDLAS Gas Analyzer. The addition of 'ia' to the certification coding to cover the fitting of this flowmeter with flow switch.
- iv. The use of alternative internal p.c.b. assemblies, including an alternative terminal board assembly, to provide Modbus Ethernet/IP at I/O1 as an optional alternative to the Modbus RS485 at I/O1.
- v. Clarification that internal board configurations and setting can optionally provide either Relay Output or 4-20mA Input/Output (Passive/Active) at I/O2 - I/O3.
- vi. Modifications to the design of the TLM Module.
- vii. Minor modifications to an internal pressure sensor.
- viii. Introduction of alternative non-return valves Swagelock SS-CHS4-1/3 and DK-LOK CORP. V33A-D-4T-1/3 to the Sample Conditioning System.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Reports and Certificate History

Issue	Date	Report number	Comment
0	09 July 2021	R80074463A	The release of the prime certificate.
1	28 February 2022	R80099539A R80099539B	The introduction of Variation 1.

15 SPECIFIC CONDITIONS OF USE (denoted by X after the certificate number)

- 15.1 The flameproof joints of this equipment are other than the minimums specified in IEC/EN 60079-1 and shall not be repaired by the user.
- 15.2 Adhesive labels, the powder coating of models of the equipment with an aluminium enclosure, and coated parts of the flowmeter with flow switch 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.

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- 15.3 The optional stainless-steel label tag is not bonded to earth. The maximum average capacitance of the tag determined by measurement is max. 30 pF. This shall be considered by the user to determine suitability of the equipment in a specific application.
- 15.4 For models of the J22 TDLAS Gas Analyzer with SCS mounted within an enclosure, the inner sheath of the supply cable for the heater circuit shall be sheathed with thermoplastic, thermosetting, or elastomeric material. It shall be circular and compact. Any bedding or sheath shall be extruded. Fillers, if any, shall be non-hygroscopic. The minimum length of the cable shall exceed 3 meters.
- 15.5 The temperature of the process medium shall be within the ambient temperature rating of the equipment.
- 15.6 The equipment is not capable of passing a 500V r.m.s. dielectric strength test in accordance with Clause 6.3.13 of EN IEC 60079-11:2012 between the Intrinsically Safe Flow Switch connection circuits and the equipment enclosure. This shall be taken into account in any equipment installation.
- 16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS (REGULATIONS SCHEDULE 1)**
In addition to the Essential Health and Safety Requirements covered by the standards listed in Section 9, all other requirements are demonstrated in the relevant reports.
- 17 **PRODUCTION CONTROL**
 - 17.1 Holders of this certificate are required to comply with production control requirements defined in Schedule 3A, as applicable, and CSA Group Testing UK Regulations for Certificate Holders.
 - 17.2 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 SL-***THERM Block Heater	PTB 02 ATEX 1116 X
Intertec TA Thermostat	PTB 03 ATEX 1136 X
Adalet XIHS Terminal Box	DEMKO 12 ATEX 1115099U
CMP Type 737 Adapter/Reducer	CML 18ATEX1320X
CMP A2F Cable Gland	CML 18ATEX1321X IECEX CML 18.0179X
Hazardous Locations Solutions Type N conduit elbow	IECEX SIR 07.0044U
Proline 300/500 Electronics	IECEX CSA 16.0006U
Display Type DP-PA**	IECEX KEM 08.0048X
KROHNE Messtechnik GmbH Variable Area Flowmeter type DK32 / R1 / .. / L / .. / .. – Ex	KIWA 18ATEX0008 X



Certificate Annexe

Certificate Number: CSAE 21UKEX1072X

Product: J22 TDLAS Gas Analyzer, J22 TDLAS Gas Analyzer SCS on Panel, J22 TDLAS Gas Analyzer Encl. SCS, J22 TDLAS Gas Analyzer Encl. SCS Heated

Manufacturer: Endress+Hauser Optical Analysis Inc.

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Drawing	Sheets	Rev.	Date (Stamp)	Title
4900002311	1 to 4	C	16 Feb 21	J22 Analyzer Product Description Document
MPI-100025	1 of 1	A	16 Feb 21	Manufacturing Process Instruction Potting Process RT 622, Exd and CLASS-1 DIVISION-1 XP
EX0900000012	1 to 2	E	16 Feb 21	Housing, Conn Stem, H328
EX0900000025	1 to 2	C	16 Feb 21	Enclosure, Optical Head
EX0900000026	1 of 1	B	16 Feb 21	Cover, Opt Head Enclosure
EX0900000028	1 of 1	A	16 Feb 21	Hot Plate, TLM
EX0900000029	1 of 1	A	16 Feb 21	Cold Plate, TLM
EX0900000030	1 of 1	A	16 Feb 21	Cover, Opt Block
EX0900000032	1 of 1	A	16 Feb 21	Opt block, WW, DD, Cert
EX1300000038	1 of 1	B	16 Feb 21	Gasket, H328 Collar / Opt Enclsr
EX1300000039	1 of 1	B	16 Feb 21	Gasket, Enclosure Access
EX1700000004	1 to 6	D	07 Jun 21	Label, J22 Rating
EX2100000002	1 to 2	B	16 Feb 21	Bushing + 28 Contacts
EX2100000010	1 to 2	A	16 Feb 21	Conn, 28-Pin, 90V Isolation
EX2900000010	1 to 4	D	07 Jun 21	PCBA, Optical Head Assembly
EX2900000010-00	1 to 3	E	07 Jun 21	BOM, Optical Head Electronics
EX2900000011	1 to 12	B	07 Jun 21	PCB, Optical Head Fabrication Notes
EX2900000012	1 to 9	C	07 Jun 21	Schem, Optical Head Electronics
EX2900000020	1 to 4	E	07 Jun 21	PCBA, ISEM Analog Board Assembly
EX2900000020-00	1 to 3	E	07 Jun 21	BOM, ISEM Analog
EX2900000021	1 to 14	C	07 Jun 21	PCB, ISEM Analog Board Fabrication Notes
EX2900000022	1 to 9	C	07 Jun 21	Schem, ISEM Analog
EX2900000030	1 to 4	D	07 Jun 21	PCBA, ISEM Digital MCU Assembly
EX2900000030-00	1 to 2	D	07 Jun 21	BOM, ISEM Digital MCU Board
EX2900000031	1 to 16	B	07 Jun 21	PCB, ISEM Digital MCU Fabrication Notes
EX2900000032	1 to 17	B	07 Jun 21	Schem, ISEM Digital MCU
EX2900000040	1 to 3	A	16 Feb 21	PCBA, Transition-Laser/Detector Assembly Side-A
EX2900000040-00	1 to 2	A	16 Feb 21	BOM, PCBA Assy, Transition – Laser/Detector
EX2900000041	1 to 10	A	16 Feb 21	PCB, Transition-Laser/Detector Fabrication Notes
EX2900000042	1 to 3	A	16 Feb 21	Schem, Transition – Laser/Detector
EX2900000071	1 to 5	B	16 Feb 21	PCB, TLM Flex Fabrication Notes
EX2900000072	1 to 3	B	16 Feb 21	Schem, TLM Flex
EX2900000081	1 to 7	C	16 Feb 21	PCB, ISEM 28 Flex, Analog Fabrication Notes
EX2900000082	1 to 3	A	16 Feb 21	Schem, ISEM 28 Flex, Analog
EX2900000091	1 to 7	C	16 Feb 21	PCB, ISEM 28 Flex, Digital Fabrication Notes
EX2900000092	1 to 3	A	16 Feb 21	Schem, ISEM 28 Flex, Digital



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Product: J22 TDLAS Gas Analyzer, J22 TDLAS Gas Analyzer SCS on Panel, J22 TDLAS Gas Analyzer Encl. SCS, J22 TDLAS Gas Analyzer Encl. SCS Heated

Manufacturer: Endress+Hauser Optical Analysis Inc.

Drawing	Sheets	Rev.	Date (Stamp)	Title
EX2900000141	1 to 3	A	16 Feb 21	PCB Heat Spreader TLM (2x5)
EX2900000161	1 to 4	A	16 Feb 21	PCB Flex, PDMx1
EX2900000162	1 to 3	A	16 Feb 21	Schematic, PCB FLEX, PDMx1
EX2900000171	1 to 4	A	16 Feb 21	PCB, ISEM Shield
EX5500000004	1 to 2	B	16 Feb 21	Pressure Sensor, Digital
EX6000000009	1 of 1	A	16 Feb 21	Cable, P3 to ISE MCU Digital Brd
EX6000000012	1 of 1	A	16 Feb 21	Cable Assy, Pressure, Digital
EX8000000062	1 to 3	C	16 Feb 21	Isem Interface Module Assy
EX8000000092	1 to 3	E	16 Feb 21	Analyzer Assy, 0.8m, Unit Sealing
EX8000000093	1 to 4	C	16 Feb 21	Analyzer System Assy, Unit Sealing
EX8000000104	1 of 1	A	16 Feb 21	Cover Assy, Opt Block
EX8000000107	1 to 2	C	18 Jun 21	Det Module, Parabolic, TO18, Sig
EX8000000111	1 to 2	A	16 Feb 21	Optical Head Assy, Cert
EX8000000112	1 to 3	D	16 Feb 21	Analyzer Assy, Cert
EX8000000113	1 to 5	A	16 Feb 21	TLM ASSY, Cert
EX8000000114	1 to 11	A	16 Feb 21	SCS Assy, Enclosure, J22, Certification
EX8700000015	1 of 1	A	16 Feb 21	T-Plate Assy, 0.8m

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Drawing	Sheets	Rev.	Date (Stamp)	Title
EX0900000028	1 of 1	B	02 Feb 22	Hot Plate, TLM
EX0900000029	1 of 1	B	02 Feb 22	Cold Plate, TLM
EX1700000004	1 to 6	G	16 Feb 22	Label, J22 Rating
EX2900000071	1 to 5	C	02 Feb 22	PCB, TLM Flex Fabrication Notes
EX5500000004	1 and 2	D	16 Feb 22	Pressure Sensor, Digital
EX8000000055	1 of 1	A	02 Feb 22	Hot Plate – TEC Asst, TLM
EX8000000055	1 of 1	C	09 Feb 22	Hot Plate – TEC Asst, TLM
EX8000000092	1 to 3	F	09 Feb 22	Analyzer Assy, 0.8M, Unit Sealing
EX8000000112	1 to 4	E	09 Feb 22	Analyzer Assy, Cert
EX8000000113	1 to 5	C	09 Feb 22	TLM ASSY, Cert
EX8000000114	1 to 11	C	11 Feb 22	SCS Assy, Enclosure, J22, Certification

