



# 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](http://www.iecex.com)

Certificate No.: **IECEX CSAE 22.0020X** Page 1 of 4 [Certificate history:](#)  
Status: **Current** Issue No: 1 [Issue 0 \(2022-08-18\)](#)  
Date of Issue: 2023-07-28  
Applicant: **Endress + Hauser Optical Analysis, Inc.**  
371 Parkland Plaza  
Ann Arbor MI 48103  
**United States of America**  
Equipment: **Raman Probe**  
Optional accessory:  
Type of Protection: **Intrinsic Safety "ia" & Optical Radiation "op is"**  
Marking: Refer to Annexe

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)

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Certificate issued by:

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





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Certificate No.: **IECEX CSAE 22.0020X** Page 2 of 4

Date of issue: 2023-07-28 Issue No: 1

Manufacturer: **Endress + Hauser Optical Analysis, Inc.**  
371 Parkland Plaza  
Ann Arbor MI 48103  
**United States of America**

Manufacturing locations: **Endress + Hauser Optical Analysis, Inc.**  
371 Parkland Plaza  
Ann Arbor MI 48103  
**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](#) Explosive atmospheres - Part 0: Equipment - General requirements  
Edition:7.0

[IEC 60079-11:2011](#) Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"  
Edition:6.0

[IEC 60079-28:2015](#) Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation  
Edition:2

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/ExTR22.0068/00](#) [GB/CSAE/ExTR23.0063/00](#)

Quality Assessment Report:

[DE/TUR/QAR11.0001/06](#)



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Date of issue: 2023-07-28

Issue No: 1

## EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The Endress+Hauser Optical Analysis, Inc. (formerly Kaiser Optical Systems, Inc.) Raman probe system consists of the separate probes, their connecting cable and I.S. barrier. The construction includes a small connection board at the termination end of the cable, being populated only with trace paths and physical cable termination points. The barrier is to be mounted: either in a non-hazardous (unclassified) location, or in a hazardous location (Classified) if it is suitably protected by another protection technique.

The following components are critical to the operation and performance of this equipment:

I.S. Barrier: GM Intl., Cat. No. D 1032 Q is a 4-channel switch / proximity detector repeater, Ex ec [ia Ga] IIC T4 Gc/ [Ex ia Ga] IIC and II (1)G [Ex ia Ga] IIC; Rated: Tamb = -20°C to +60°C (Refer to drawing 4002396) (Note: The IS barrier, located in the base unit analyzer, provides intrinsically safe outputs to the probes.) Note: The I.S. Barrier is not part of this certification.

Raman Fiber Cable Part 2011635: Optical Cable Corporation, Type AWM, Group I/II, cCSAus, stranded copper conductors imbedded in cable with optical fibers, Rated: 30 V max., 24 AWG copper conductors, 80°C, maximum length: 258,920 feet. Note: The Raman Fiber Cable is not part of this certification.

Probes: The following are stainless steel liquid probes, leak and burst tested, with the resistor mounted in series with the LED (simple apparatus from an intrinsically safe perspective). The LED's purpose is to provide indication of whether the conductors/fibre is energized / cut or not. Refer to probe drawings for examples.

Refer to Annexe for additional EQUIPMENT information.

## SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The fibre optic cable linking the laser output to the Rxn-41 probe shall be installed so that the minimum bend radius specified by the cable manufacturer is not exceeded.
2. The fibre optic cable shall be installed in a manner such that the cable is not subjected to strain or pulling at the entry of the optical cable into to the probe assembly.
3. Where it is necessary to monitor the process level to ensure that the optical beam is not exposed to a potentially explosive atmosphere, the devices used to monitor the level shall be intrinsically safe or classed as simple apparatus and be installed so as to provide (for EPL Ga) a fault tolerance of 2. Where the EPL required for the area of installation is lower than Ga, the reliability of the control mechanism may also be reduced. The functional safety of this arrangement has not been assessed as part of this certification and it is the responsibility of the installer / user to ensure that an appropriate mechanism is in place, commensurate with the required EPL.
4. When the probe is manufactured from Titanium, the probe shall be installed so that it cannot be subjected to impact or friction.
5. Rxn-20 probe focusing optics must not reduce the beam diameter below 3.4mm.
6. Laser power interlocks must be set for the Rxn-20 probe without focusing optics installed.



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Date of issue: 2023-07-28

Issue No: 1

**DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)**

**Issue 1** – this Issue introduced the following changes:

1. Update drawing 4002396 to change units of length back to the initial correct units of “foot” rather than “meter”.

**Annex:**

[IECEX CSAE 22.0020X Issue 1 Annexe.pdf](#)

**Annexe to: IECEx CSAE 22.0020X Issue 1**

**Applicant: Endress+Hauser Optical Analysis, Inc.**

**Apparatus: Raman Probe**



## Marking

Ex ia op is IIA or IIB or IIB + H2 or IIC T3 or T4 or T6 Ga

Gas group and temperature class is to be marked on the probe using the following table:

Apparatus group Temperature Class Temperature Class (°C)	IIA		IIB Only		IIB+H2	IIC	
	T3	T4	T3	T4	T3	T4	T6
Power (mW) Rxn-41 Series Probe	150	35	35	35	35	35	15
Power (mW) Rxn-40 Series Probe	150	35	35	35	35	35	15
Power (mW) Rxn-30 Series without sintered filter	150	35	35	35	35	35	15
Power (mW) Rxn-30 Series with sintered filter (20 µm)	150	35	115	35	100	35	15
Power (mW) Rxn-20 Series Probe	150	35	35	35	35	35	15

Alternative markings:

When the probe is in contact with a process that is zoned as non-hazardous and the emitting optical power is greater than the limits set out in the above table the marking of the probe shall be:

Ex ia IIC T6 Gb

OR

When the probe window is submerged in a liquid sample and when the surrounding area will become hazardous only when the liquid is not present. Additional redundant interlocking is to be utilized to ensure that a sufficient liquid level is maintained as to only keep the system output on while adequately submerged (see specific conditions of use). In this situation the marking of the probe shall be:

Ex ia IIA or IIB or IIB+H2 or IIC T3 or T4 or T6 Ga

## EQUIPMENT (continued)

The Rxn-41 and Rxn-40 Raman Probes are for Process Control and allow direct installation into reaction vessels or process streams.

Rxn-41 Series Probe: (Refer to Drawing 2009483)

LED: Leecraft, L75R-R2-2211, mounted with 6-inch wire leads CSA/UL rated for 105°C, Red, Rated: 2 Vdc  
Through-hole Metal Film Resistor: Dale, SFR25 series  
(Alternate: Resistor): Yageo, MFR-25 series

Rxn-40 Series Probe: (Refer to Drawing 2013340)

LED: Lumex, SSL-LXA228SRC-TR11, Rated: 5V, 60 mW  
Surface-mount Thick Metal Film Resistor: Yageo, RC0805  
(Alternate: Resistor): Rohm, MCR10 0805  
(Alternate: Resistor): Panasonic ERJ60805

The Rxn-30 Probe has been designed to meet sensing needs of gas-phase chemistries. A sintered filter may be included to exclude dust particles greater than 20µm in diameter, permitting an increase in optical power.

**Date: 28 July 2023**

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**Annexe to: IECEx CSAE 22.0020X Issue 1**

**Applicant: Endress+Hauser Optical Analysis, Inc.**

**Apparatus: Raman Probe**



Rxn-30 Series Probe: (Refer to Drawing 2013339)

LED: Lumex, SSL-LXA228SRC-TR11, Rated: 5V, 60 mW  
Surface-mount Thick Metal Film Resistor: Yageo, RC0805  
(Alternate: Resistor): Rohm, MCR10 0805  
(Alternate: Resistor): Panasonic ERJ60805

The Rxn-20 Probe has been designed to meet sensing needs requiring a large spot size.

The optical output of the laser within the analyser is connected by a fibre optical cable with fibre breakage detection mechanism to the Probe which is in contact with the process. The laser power is controlled by the analyzer which incorporates the Endress+Hauser Optical Analysis, Inc. Integrated Invictus Interlock System. The laser power provided by the analyzer is adjusted and subsequently monitored to ensure that the laser power exiting the probe is within the following limits:

Apparatus Group	IIA		IIB Only		IIB + H2	IIC	
	T3	T4	T3	T4	T3	T4	T6
Temperature Class							
Temperature Class (°C)							
Power (mW) Rxn-41 Series Probe	150	35	35	35	35	35	15
Power (mW) Rxn-40 Series Probe	150	35	35	35	35	35	15
Power (mW) Rxn-30 Series without sintered filter	150	35	35	35	35	35	15
Power (mW) Rxn-30 Series with sintered filter (20 µm)	150	35	115	35	100	35	15
Power (mW) Rxn-20 Series Probe	150	35	35	35	35	35	15

Above table includes the maximum optical power to be supplied for the probe (optical connector)

The maximum optical power is supplied to the probe by an external controller that is not covered under this certificate. The final installation shall be subjected to acceptance of local authority having jurisdiction.

The tabulated power levels refer to surface areas not exceeding 400mm<sup>2</sup>.

Ambient temperature rating range of the probes: -20°C to +40°C

Intrinsic safety parameters are as follows:

The probe IS input parameters for the fibre breakage loop are as follows:

U<sub>i</sub> = 9.6 V, I<sub>i</sub> = 10 mA, P<sub>i</sub> = 24 mW, C<sub>i</sub> = 0, L<sub>i</sub> = 0

A temperature measurement RTD (Resistance Temperature Detector) may be provided. This device is in thermal contact with the probe case adjacent to the sapphire window.

The probe IS input parameters for the temperature measurement circuit are as follows:

U<sub>i</sub> = 10.8 V, I<sub>i</sub> = 9 mA, P<sub>i</sub> = 24 mW, C<sub>i</sub> = 0, L<sub>i</sub> = 0