



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 22.0067X** Page 1 of 5 [Certificate history:](#)
Issue 0 (2023-03-16)

Status: **Current** Issue No: 1

Date of Issue: 2023-11-23

Applicant: **Endress+Hauser Optical Analysis Inc**
371 Parkland Plaza
Ann Arbor 48103
United States of America

Equipment: **Optograf Analyser Raman RXN5 Series Analyser**

Optional accessory:

Type of Protection: **Increased Safety, Intrinsically Safe, Optical System with Interlocks and Purged**

Marking: **Ex ec ic [ia Ga] [op sh Gb] pzc IIC T4 Gc**
Ta = -20°C to +50°C

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





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

Manufacturing locations: **Endress+Hauser Optical Analysis Inc**
371 Parkland Plaza
Ann Arbor 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 60079-2:2014](#) Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p"
Edition:6

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

[IEC 60079-7:2017](#) Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
Edition:5.1

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/ExTR23.0018/00](#)

[GB/CSAE/ExTR23.0018/01](#)

Quality Assessment Report:

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



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The Optograf/ RXN5 analyser is designed to monitor, analyze, or optimize reaction chemistry in multiple vessels using the analytical technique of "Raman" spectroscopy. The equipment utilizes a computer- controlled spectrometer and laser to accomplish this.

General

The Optograf analyser (which may also be referred to as "RXN5" in addition to or as an alternative to "Optograph") consists of a steel enclosure, painted mild steel or stainless steel, which is mounted in a Zone 2 hazardous location and provides intrinsically safe and fiber-optical signals up to 4 probes located in either Zone 1 or Zone 0 hazardous areas.

The system enclosure is protected by purge and pressurization, provided by a certified [pzc] purging controller ("CYCLOPS Z" Purge Indicator) manufactured by Purge Solutions, Inc. (not part of this certification).

The purged and pressurized enclosure includes a TFT display touchscreen mounted behind a toughened glass window.

Main Enclosure Laser Output & Spectrometer Input

The laser beam within the enclosure is routed through various optical instruments before being made available at up to 4 bulkhead connectors contained within the connector box compartment. From here, fibre optic cables take the laser light to the process probe which is in contact with the process being monitored. Up to 4 probes may be connected.

The laser power level is controlled by the computer within the pressurized enclosure and monitored by the power interlock circuitry. This arrangement is 2 fault tolerant and suitable for Category 1 applications / EPL Gb.

Fibre Breakage Interlock

A special condition of safe use is listed on the certificate that the fibre optic cable must be installed taking into account the minimum bend radius specified by the cable manufacturer.

Cutting the wires or shorting them together is detected by an IS Galvanic Isolator (GM International Galvanic Isolator D1032Q – which is not part of this certification as it has its own certification) within the pressurized enclosure, which provides a volt-free relay contact for each probe to the laser power interlock mechanism, which will turn the laser off. Either a single, 4 channel isolator may be used, or up to 2 dual channel units, depending upon the system specification. The output contacts of the isolator's output channel are connected to the interlock input of the respective laser for that channel.

The arrangement for detective fibre breakage is single fault tolerant and considered to be acceptable for category 2 applications, with the exception of the Galvanic Isolator providing the IS signal to the monitoring loop.

Laser Power Interlock

The laser power is adjusted for each application so that the appropriate optical power level exits the probe. Because the length of the fibre optic cable is variable, the power input into the fibre will be higher than the power that exits from the probe.

The laser power is set by the laser module and a dual channel laser power monitoring circuit is provided that checks the power level produced by the laser and turns off the laser should the power exceed the pre-set maximum limit.

The output of the laser is routed through a beam splitter that divides the light between 2 photo detectors and the main output. The interlock circuitry provides 2 separate paths where the voltage generated by the current through the photo detectors is compared against a pre-set voltage. Provided that the generated voltage is lower than the pre-set voltage and corresponding to the laser power being lower than the limit, the power to the laser shall remain connected. Consequently, if either channel of the circuit detects that the power exceeds the limit, the laser is turned off.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The fibre optic cable linking the laser output to the pilot probe shall be installed so that the minimum bend radius specified by the cable manufacturer is not exceeded.
2. 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 a fault tolerance of 2 for EPL Ga equipment or a fault tolerance of 1 for EPL Gb equipment. 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.
3. The user shall purge the enclosure prior to start-up and upon loss of pressurization in accordance with the instructions marks on the Optograf enclosure. An appropriate means of isolation shall be provided by the user, appropriately certified for the area of use and correctly installed.
4. Parts of the enclosure may represent an electrostatic risk. Refer to the manufacturer's instructions.
5. Where IS Galvanic Isolators are added to the main enclosure in order to produce IS signals to external apparatus not covered by this certification, the IS Galvanic Isolators shall have an ambient working temperature upper limit of at least 60°C. The IS parameters pertaining to these isolators shall be conveyed to the user in an appropriate manner. The IS nature of any such circuits has not been assessed as part of this certification and this certificate is not to be taken as indication that these IS circuits comply with relevant requirements.



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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

Issue 1 – this Issue introduced the following changes:

1. Update Rxn5 label by changing minimum overpressure rating from 0.4" to 0.2" water column
2. Change adhesive label material from "3M-9502" to "3M-9472LE"



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**Additional information:
Conditions of Manufacture**

- The pressurized enclosure shall be subject to the routine tests:
 - Leakage test
 - Functional test of the pressurization controls and purge timer
- The laser power interlock and fibre-breakage interlock systems operation shall be verified.
- 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 certifications of the following Ex equipment:
 - GM Galvanic Isolator (D1032Q) (IECEX BVS 07.0027X)
 - Purge Solutions CYCLOPS Z- Purge Indicator (IECEX EXV 19.0006X)
 - Hummel AG Cable Gland (IECEX BVS 07.0019X)