

Explosion-Proof Electrical Machine Appliance Type Certification
 防爆構造電気機械器具型式検定合格証

Applicant <u>OR</u> Importer 申請者	Endress+Hauser Optical Analysis, Inc. 371 Parkland Plaza Ann Arbor, Michigan 48103, United States of America
Manufacturer OR OEM (if importer is listed) 製造者	Endress+Hauser Optical Analysis, Inc. 371 Parkland Plaza Ann Arbor, Michigan 48103, United States of America
Product name 品名	Optograf Analyser
Model name 型式の名称	Raman RXN5 Series Analyser
Protection concept Type 防爆構造の種類	Intrinsic Safety "ia", Protection of equipment and transmission systems using optical radiation "op sh", Increased safety "ec" and Pressurised Enclosures "pzc"
Protection concept, Gas Group, Temperature Class 対象ガス又は蒸気の 発火度及び爆発等級	Ex ec ic [ia Ga] [op sh Gb] pzc IIC T4 Gc Ta = -20°C to +50°C
Rating 定格	Non-IS input: Um = 253VAC Interlock Loop Parameters Uo = 9.6V dc Io = 10 mA Po = 24 mW Co = 3.6 uF (Group IIC) Lo = 379 mH (Group IIC) L/R Ratio = 1.53 mH/Ω Purge Parameters Internal free volume: 2.93 Cubic Feet Minimum purge regulator pressure: 1.5 psi Minimum purge duration: 9.5 minutes Minimum overpressure: 0.2" Water Column Maximum overpressure: 13" Water Column Maximum leakage rate: 120 cu ft/hour Air Supply: 1.0 psi minimum to 1.5 psi maximum
Conditions of Safe Use 使用条件	Refer to the certificate Annexe
Certificate number 型式検定合格番号	第 CSAUK 23JPN111X 号
Validity Period 有効期間	Name of Type Examiner 型式検定者の所属及び氏名
From YYYY/MM/DD to YYYY/MM/DD 2024 年 04 月 19 日から 2027 年 04 月 18 日まで	プリンスパル テクニカル リード Principal Technical Lead ブリン スペンサー Bryn Spencer

The equipment has passed the Type inspection based on the machinery inspection rules.
 機械等検定規則による型式検定に合格したことを証明する。

YYYY, MM, DD

2024 年 04 月 19 日

Type Test
型式検定実施者

Director of CSA Group UK Ltd
CSA グループテストイング UK LTD

Michelle Halliwell
ミシェル・ハリウエル





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

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. The following shall be considered when using the Hummel AG cable gland type HSK-M-EX, size 1/2"NPT:
 - Tightening torque: 8 Nm
 - Clamping range: 6 to 12 mm