

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

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| Applicant OR 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 | Raman Probe | |
| Model name 型式の名称 | Rxn-41 Series Rxn-40 Series | Rxn-30 Series Rxn-20 Series |
| Protection concept Type 防爆構造の種類 | Intrinsic Safety "ia", Protection of equipment and transmission systems using optical radiation "op is" | |
| 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 ia op is IIB T3 Ga Ta = -20°C to +40°C | |
| Rating 定格 | Refer to the certificate Annexe | |
| 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 22JPN124X 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 2023 年 10 月 27 日から 2024 年 10 月 26 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 | |
| From // to // 年 月 日から 年 月 日まで | | |
| From // to // 年 月 日から 年 月 日まで | | |
| From // to // 年 月 日から 年 月 日まで | | |

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

2023 年 10 月 27 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 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.

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.

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 400mm².

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:

$U_i = 9.6 \text{ V}$, $I_i = 10 \text{ mA}$, $P_i = 24 \text{ mW}$, $C_i = 0$, $L_i = 0$

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:

$U_i = 10.8 \text{ V}$, $I_i = 9 \text{ mA}$, $P_i = 24 \text{ mW}$, $C_i = 0$, $L_i = 0$

Specific Conditions of Use

- i. 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.
- ii. 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.
- iii. 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.



- iv. When the probe is manufactured from Titanium, the probe shall be installed so that it cannot be subjected to impact or friction.
- v. Rxn-20 probe focusing optics must not reduce the beam diameter below 3.4mm.
- vi. Laser power interlocks must be set for the Rxn-20 probe without focusing optics installed.