

# Safety Instructions

## Rxn-40 Raman spectroscopic probe





# Rxn-40 Raman spectroscopic probe

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## Warnings

Structure of Information	Meaning
<p><b>⚠ WARNING</b></p> <p><b>Causes (/consequences)</b> If necessary, consequences of non-compliance (if applicable) ▶ Corrective action</p>	<p>This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.</p>
<p><b>⚠ CAUTION</b></p> <p><b>Causes (/consequences)</b> If necessary, consequences of non-compliance (if applicable) ▶ Corrective action</p>	<p>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.</p>
<p><b>NOTICE</b></p> <p><b>Cause/situation</b> If necessary, consequences of non-compliance (if applicable) ▶ Action/note</p>	<p>This symbol alerts you to situations which may result in damage to property.</p>

Table 1. Warnings

## Symbols






Symbol	Description
	The Laser Radiation symbol is used to alert the user to the danger of exposure to hazardous visible laser radiation when using the Raman Rxn system.
	The High Voltage symbol that alerts people to the presence of electric potential large enough to cause injury or damage. In certain industries, high voltage refers to voltage above a certain threshold. Equipment and conductors that carry high voltage warrant special safety requirements and procedures.
	The CSA Certification Mark indicates that the product was tested against and met the applicable North American standards requirements.
	The WEEE symbol indicates that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling.
	The CE Marking indicates conformity with health, safety, and environmental protection standards for products sold within the European Economic Area (EEA).

Table 2. Symbols

## U.S. export compliance

The policy of Endress+Hauser is strict compliance with U.S. export control laws as detailed in the website of the [Bureau of Industry and Security](#) at the U.S. Department of Commerce.

# 1 Certificates and approvals

## 1.1 Certificates and approvals: production center

Document	Document Number	Products / Processes	Standards / Requirements
ISO 14001:2015 and ISO 45001:2018 Declaration of Conformance	ZE4002039C/61/EN/01.21 4002039 (manufacturer)	Design and Manufacture of Raman Spectrographic Instruments including Software; Specialty Holographic Assemblies, Elements and Components	<a href="#">ISO 14001:2015</a> <a href="#">ISO 45001:2018</a>
ISO 9001:2015 Certificate	Certificate Registration No. 74 300 2705	Design and Manufacture of Raman Spectrographic Instruments including Software; Specialty Holographic Assemblies, Elements and Components	<a href="#">ISO 9001:2015</a>
Quality Assurance Notification (QAN) Raman Analyzers and Probes	Certificate Registr. No. 01 220 093059	Production, final inspection and testing of Endress+Hauser Rxn2, Rxn4 and Rxn5 Analyzer Base Units and Raman Rxn-41, Rxn-40, Rxn-30 and Rxn-20 Probes. Types of protection: "d", "p", "I", "op is"	<a href="#">Directive 2014/34/EU Annex IV</a>
IECEX Quality Assessment Report (QAR) Certificate	QAR Reference No. DE/TUR/QAR11.0001/05	Analyzer Base Units and Raman Rxn-40 and Rxn-30 Probes Optical Systems, Rxn5 Analyzer Base Units, Raman Rxn-40, Rxn-30 and, Rxn-20 Probes  Protection concept: Flameproof enclosure - Ex d; Pressurized enclosures "p"; Intrinsic safety "I"; Optical radiation "op is"	Not applicable

Table 3. Production center certifications

## 1.2 Declarations of conformity: probes and optics

Document (Manufacturer Doc #)	Products	Regulations	Standards	Certification
EC/EU Declaration of Conformity: Probes and Optics (EU00994C/66/EN/01.22)	Probes, Probeheads, and Probehead Immersion Optics (IO) Rxn-30, Rxn-20, Rxn-41, Rxn-40	European Directives: ATEX 2014/34/EU RoHS 2011/65/EU	Applied harmonized standards or normative documents: <a href="#">EN 60529 2013</a> <a href="#">EN 60079-0 2018</a> <a href="#">EN 60079-11 2012</a> <a href="#">EN 60079-28 2015</a>	CE-Type Examination Certificate No. ITS10ATEX17085X  Issued by Intertek (2575)  Quality assurance TÜVRheinland (0035)
Non-ATEX Declaration of Conformity: Probes and Optics (4002034)	Probes, Probeheads, Non-Contact Optics, and Probehead Immersion Optics (IO) Rxn-30, Rxn-20, Rxn-41, Rxn-40, Immersion Optics, Rxn-10 Probe, Non-Contact Optics	European Directives: PED 2014/68/EU RoHS 2011/65/EU	Applied harmonized standards or normative documents: <a href="#">EN 60529 2013</a>	Conformity assessment procedure followed module PED: Module A  Quality assurance TÜVRheinland (0035)
Supplier Declaration: Compliance to HALAL Industrial Production Standards (4004815)	Raman Probes	Not applicable	<a href="#">CAC/GL 24-1997</a> General Guidelines for use of the term "HALAL"	Not applicable

Table 4. Declarations of Conformity for probes and optics

### 1.3 Certificates and approvals: probes and optics

#### 1.3.1 CSA Certificate of Compliance: Raman probes

**Certificate # 2413954**

The Rxn-40 Raman spectroscopic probe has been approved for use in hazardous areas in the United States and Canada by the [Canadian Standards Association](#) when installed in accordance with the Hazardous Area Installation Drawing (4002396).

The products are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Figure 1. Label showing equipment is approved for use in hazardous areas in the United States and Canada

**Products:** CLASS - C225804 - PROCESS CONTROL EQUIPMENT Intrinsically Safe, Entity - For Hazardous Locations  
 CLASS - C225884 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations - Certified to US Standards

**Marking:** Ex ia op is IIA or IIB or IIB + H2 or IIC T3 or T4 or T6 Ga  
 Class I, Division 1, Groups A, B, C, D T3/T4/T6  
 Class I, Zone 0 AEx ia op is IIA or IIB or IIB + H2 or IIC T3 or T4 or T6 Ga  
 Class I, Division 1, Groups A, B, C, D T3/T4/T6

**Alternate marking** when the probe window is not in contact with a hazardous area: Ex ia IIC T6 Gb

Apparatus Group	IIA		IIB Only		IIB + H <sub>2</sub>	IIC	
Temperature Class	T3	T4	T3	T4	T3	T4	T6
Temperature Class (°C)							
Power (mW) Rxn-40 Series Probe	150	35	35	35	35	35	15

Table 5. 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 the certificate. The final installation shall be subjected to acceptance of local authority having jurisdiction.

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

**Conditions of certification:**

1. The fibre optic cable linking the laser output to the 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.

**Applicable requirements/standards:**

- CSA Standard C22.2 No. 0-10 General Requirements - Canadian Electrical Code, Part II
- CAN/CSA-60079-0:18 Electrical apparatus for explosive gas atmospheres – Part 0: General requirements
- CAN/CSA-60079-11:14 Electrical apparatus for explosive gas atmospheres – Part 11: Intrinsic safety “i”
- CAN/CSA-C22.2 No. 60529:16 Degrees of protection provided by enclosures (IP Code)
- CAN/CSA-C22.2 No. 60079-28:16 Electrical apparatus for explosive gas atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation
- CAN/CSA-C22.2 No. 61010-1:18 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
- ANSI/UL Standard 913, 8th Ed. Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
- ANSI/UL 60079-0:2019, 7th Ed. Electrical Apparatus for Explosive Gas Atmospheres – Part 0: General Requirements
- ANSI/UL 60079-11:2013, 6th Ed. Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety “i”
- ANSI/UL 60079-28-2017 Electrical apparatus for explosive gas atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation
- ANSI/UL 61010-1-2018 Third Edition Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements

### 1.3.2 IECEx Certificate of Conformity: Raman probes

#### Certificate # IECEx ITS 14.0015X

The Rxn-40 probe can also be marked for [International Electrotechnical Commission](#) (IEC) Certification Systems for Explosive Atmospheres when installed in accordance with the Hazardous Area Installation Drawing (4002396).

<b>Type of Protection:</b>	Ex ia op is or op sh
<b>Marking:</b>	Ex ia op is IIA or IIB or IIB + H <sub>2</sub> or IIC T3 or T4 or T6 Ga IECEX ITS 14.0015X
<b>Alternate marking</b> when the probe window is submerged in liquid with safety interlock via level sensing or similar means:	Ex ia op sh IIA or IIB or IIC T6 Ga
<b>Alternate marking</b> when the probe window is not in contact with a hazardous area:	Ex ia IIC T6 Gb

Apparatus Group	IIA		IIB Only		IIB + H <sub>2</sub>	IIC	
Temperature Class	T3	T4	T3	T4	T3	T4	T6
Temperature Class (°C)	<200	<135	<200	<135	<200	<135	<85
Power (mW) Rxn-40 Series Probe	150	35	35	35	35	35	15

Table 6. Limits of laser power exiting the probe

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

#### Conditions of certification:

1. The fibre optic cable linking the laser output to the 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.

#### Applicable requirements/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](#) Edition:7.0 Explosive atmospheres - Part 0: Equipment - General requirements
- [IEC 60079-11:2011](#) Edition:6.0 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
- [EN 60079-28:2015](#) Edition:2 Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation



### 1.3.3 ATEX Certificate: Raman probes

#### Certificate # ITS10ATEX17085X R.0

The Rxn-40 probe has been third-party approved for use in hazardous areas in accordance with Article 17 of Directive-2014/34/EU of the European Parliament and of the Council dated 26 February 2014. The Rxn-40 probe has been certified to the ATEX Directive for use in Europe, as well as in other countries accepting ATEX-certified equipment.



Figure 2. ATEX label for use in hazardous areas

#### Marking:



II 2/1 G Ex ia op is IIA or IIB or IIB+H<sub>2</sub> or IIC T3 or T4 or T6 Ga

**Alternate marking** when the probe window is submerged in liquid with safety interlock via level sensing or similar means:

Ex ia op sh IIA or IIB or IIC T6 Ga

**Alternate marking** when the probe window is not in contact with a hazardous area:

Ex ia IIC T6 Gb

Apparatus Group	IIA		IIB Only		IIB + H <sub>2</sub>	IIC	
	T3	T4	T3	T4	T3	T4	T6
Temperature Class	T3	T4	T3	T4	T3	T4	T6
Temperature Class (°C)	<200	<135	<200	<135	<200	<135	<85
Power (mW)	150	35	35	35	35	35	15
Rxn-40 Series Probe							

Table 7. Limits of laser power exiting the probe

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

#### Conditions of certification:

1. The fibre optic cable linking the laser output to the 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 / Category 1G) a fault tolerance of 2. Where the EPL required for the area of installation is lower than Ga / Category 1G, 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 / EquipmentCategory.
4. When the probe is manufactured from Titanium, the probe shall be installed so that it cannot be subjected to impact or friction.

#### Applicable requirements/standards:

Compliance with the relevant Essential Health and Safety Requirements has been assured by compliance with the requirements identified in the following:

- [EN IEC 60079-0:2018](#)
- [EN 60079-11:2012](#)
- [EN 60079-28:2015](#)

## 1.4 Certifications and markings

Endress+Hauser offers certifications for the Rxn-40 probe to the standards below. Select the desired certification(s) and the probe or probe tag is marked accordingly.

Type	Description
ATEX marking and installations	<ul style="list-style-type: none"> <li>▪ ATEX marking is available as an option during the quoting process. Available markings: II 2/1 G Ex ia op is IIA or IIB or IIB+H2 or IIC T3 or T4 or T6 Ga</li> <li>▪ Prior to the order, the marking for the particular probe/application must be determined. The customer must do one of the following:               <ul style="list-style-type: none"> <li>○ Work with purchasing to identify the required marking OR</li> <li>○ Provide Endress+Hauser with a completed copy of the Hazardous Area Equipment Assessment (4002266).</li> </ul> </li> <li>▪ Endress+Hauser will mark the Rxn-40 probes according to the customer's provided information. Endress+Hauser is not responsible for the customer's inaccuracies.</li> </ul> <p><b>⚠ WARNING</b></p> <p><b>In an ATEX-governed environment, only ATEX-marked probes may be used.</b></p>
North American hazardous area marking and installations	<ul style="list-style-type: none"> <li>▪ CSA marking is available as an option during the quoting process. Available markings: Ex ia op is IIA or IIB or IIB + H2 or IIC T3 or T4 or T6 Ga Class I, Zone 0 AEx ia op is IIA or IIB or IIB + H2 or IIC T3 or T4 or T6 Ga Class I, Division 1, Groups A, B, C, D T3/T4/T6</li> <li>▪ Prior to the order, the marking for the particular probe/application must be determined. The customer must do one of the following:               <ul style="list-style-type: none"> <li>○ Work with purchasing to identify the required marking OR</li> <li>○ Provide Endress+Hauser with a completed copy of the Hazardous Area Equipment Assessment (4002266).</li> </ul> </li> <li>▪ Endress+Hauser will mark the Rxn-40 probes according to the customer's provided information. Endress+Hauser is not responsible for the customer's inaccuracies.</li> <li>▪ For North American applications into classified environments, the probe set will have the CSA mark and can be considered intrinsically safe when installed according to the Hazardous Area Installation Drawing (4002396).</li> </ul> <p><b>⚠ WARNING</b></p> <p><b>In a CSA-governed environment, only CSA-marked probes may be used.</b></p>
IECEX hazardous area marking and installations	<ul style="list-style-type: none"> <li>▪ IECEX marking is available as an option during the quoting process. Available markings: Ex ia op is IIA or IIB or IIB + H2 or IIC T3 or T4 or T6 Ga IECEX ITS 14.0015X</li> <li>▪ Prior to the order, the marking for the particular probe/application must be determined. The customer must do one of the following:               <ul style="list-style-type: none"> <li>○ Work with purchasing to identify the required marking OR</li> <li>○ Provide Endress+Hauser with a completed copy of the Hazardous Area Equipment Assessment (4002266).</li> </ul> </li> <li>▪ Endress+Hauser will mark the Rxn-40 probes according to the customer's provided information. Endress+Hauser is not responsible for the customer's inaccuracies.</li> <li>▪ For IECEX applications into classified environments, the probe set will have the IECEX mark and can be considered intrinsically safe when installed according to the Hazardous Area Installation Drawing (4002396).</li> </ul> <p><b>⚠ WARNING</b></p> <p><b>In an IECEX-governed environment, only IECEX-marked probes may be used.</b></p>

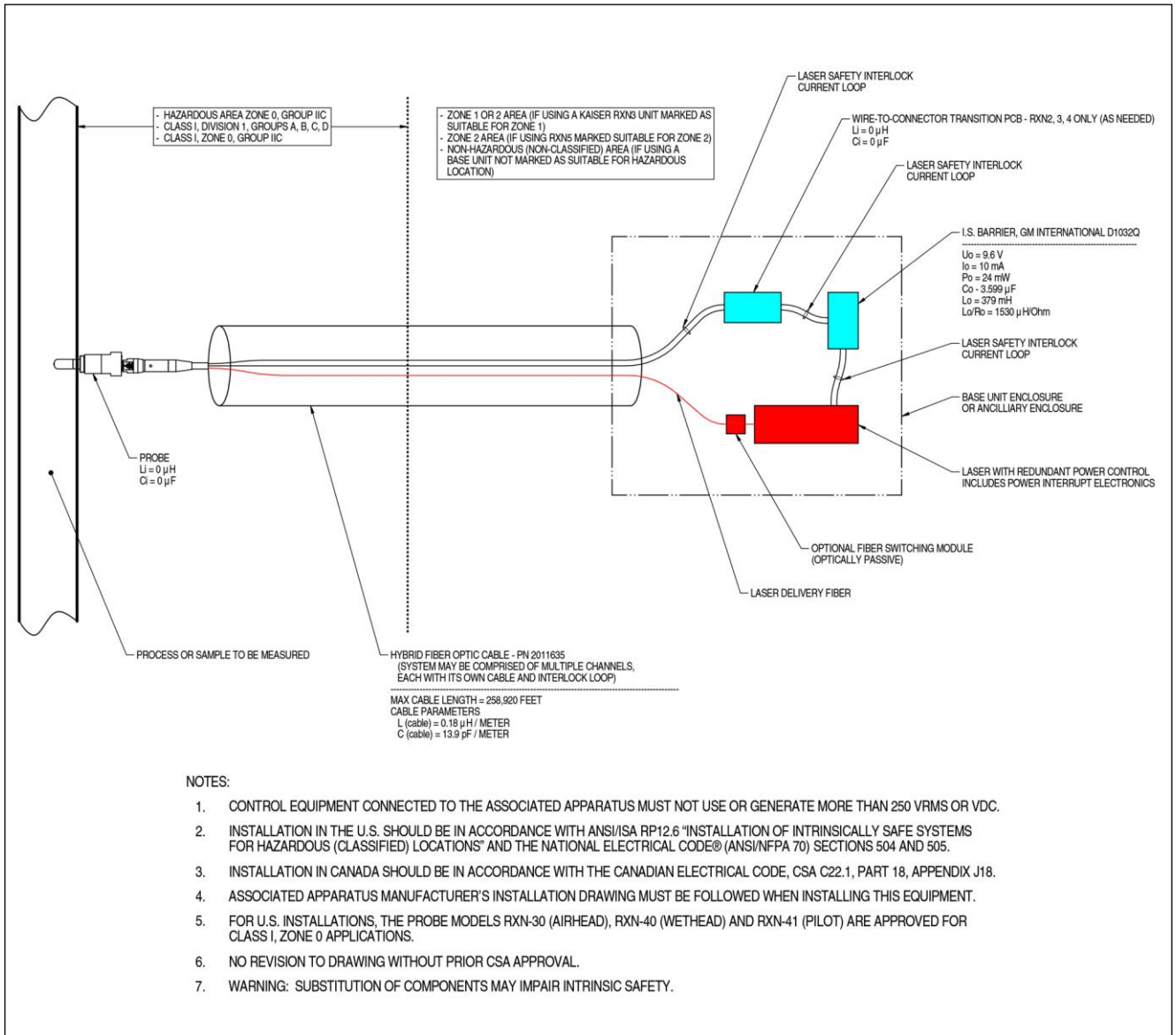
Table 8. Certifications and markings

## 2 Hazardous area installation

The probe has been designed for direct insertion in slip-streams, drain-valves, reactors, circulation loops, blend headers, and inlet or outlet pipework. The probe must be installed according to the Hazardous Area Installation Drawing (4002396).

**NOTICE**

**When installing the probe *in situ*, the user must provide the strain relief to the fiber optic cable at the probe installation location.**



A0049010

Figure 3. Hazardous Area Installation Drawing (4002396 version X5)

[www.addresses.endress.com](http://www.addresses.endress.com)

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