



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 ITS 14.0015X** Page 1 of 4 [Certificate history:](#)
Status: **Current** Issue No: 2 [Issue 1 \(2015-03-17\)](#)
[Issue 0 \(2014-07-18\)](#)
Date of Issue: 2020-04-21
Applicant: **KAISER OPTICAL SYSTEMS, INC.**
371 Parkland Plaza
Ann Arbor
MI 48103
USA
United States of America
Equipment: **Raman Probes**
Optional accessory:
Type of Protection: **Ex ia op is or op sh**
Marking: Ex ia op is IIA or IIB or IIB + H2 or IIC T3 or T4 or T6 Ga*
IECEX ITS 14.0015X
* See equipment description for applicable Gas Groups and T Classes and annex for alternative markings.

Approved for issue on behalf of the IECEx
Certification Body:

P Moss

Position:

Certification Officer

Signature:
(for printed version)

Date:

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:

Intertek Testing & Certification Limited
ITS House, Cleeve Road
Leatherhead
Surrey, KT22 7SA
United Kingdom



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Manufacturer: **KAISER OPTICAL SYSTEMS**
371 Parkland Plaza
Ann Arbor
MI 48103, USA
United States of America

Additional
manufacturing
locations:

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 Report:

[GB/ITS/ExTR14.0015/01](#)

Quality Assessment Report:

[DE/TUR/QAR11.0001/03](#)



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The Kaiser Optical Systems, Inc. Raman Probes comprise 4 probe types:

The Pilot and WetHead Raman Probes are for Process Control and allow direct installation into reaction vessels or process streams.

The AirHead Probe has been designed to meet the 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.

The PhAT Probe has been designed to meet sensing needs requiring a large spot size.

Refer to the annex for further details of permitted power levels, gas groups and marking codes.

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. 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 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. PhAT probe focusing optics must not reduce the beam diameter below 3.4mm.
6. Laser power interlocks must be set for the PhAT probe without focusing optics installed.



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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

Issue 1:

Update to certification standards and QAR reference.

Issue 2:

Update to certification standards and QAR Reference.

Introduction of alternative connection method to the pilot probe.

Addition of specific condition for use concerning the prevention of strain on the fibre-optic cable entry to the probe.

Annex:

[Annex for IECEx Certificate of Conformity IECEx ITS 14.0015X Issue 2.pdf](#)



Annex to IECEx Certificate of Conformity

Certificate No:	IECEx ITS 14.0015X	Issue No. 2
Annex No. 1		

General product information:

The Kaiser Optical Systems, Inc. Raman Probes comprise 4 probe types:

The Pilot and WetHead Raman Probes are for Process Control and allow direct installation into reaction vessels or process streams.

The AirHead Probe has been designed to meet the 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.

The PhAT 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 Kaiser Optical Systems 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 + H ₂	IIC	
	T3	T4	T3	T4	T3	T4	T6
Temperature Class	<200	<135	<200	<135	<200	<135	<85
Temperature Class (°C)	<200	<135	<200	<135	<200	<135	<85
Power (mW) Pilot Series Probe	150	35	35	35	35	35	15
Power (mW) WetHead Series Probe	150	35	35	35	35	35	15
Power (mW) AirHead Series without sintered filter.	150	35	35	35	35	35	15
Power (mW) AirHead Series with sintered filter (20 µm).	150	35	125	35	100	35	15
Irradiance (mW/mm ²)	5/20*	5	5/15*	5	5/12*	5	5
Power (mW) PhAT Series Probe	152	38	38	38	38	38	15
Irradiance(mW/mm ²) PhAT Series Probe	20	20	5	5	5	5	5

The tabulated power levels refer to surface areas not exceeding 400mm².

*For irradiated areas greater than 30mm² where combustible materials may intercept the beam, the 5mW/mm² limit applies.



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Alternatively, when the probe window is submerged in liquid with safety interlock via level sensing or similar means, the probe may be marked:

Ex ia op sh IIA or IIB or IIC T6 Ga

Or, where the probe window is not in contact with a hazardous area:

Ex ia IIC T6 Gb

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 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:

$U_i = 10.8 \text{ V}$

$I_i = 9 \text{ mA}$

$P_i = 24 \text{ mW}$

$C_i = 0$

$L_i = 0$



Annex to IECEx Certificate of Conformity

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Annex No. 1		

Conditions of Certification

(a). Special Conditions of Use

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

(b). Conditions of Manufacture

- None

Drawing No.:	Sheets:	Title:	Revision:
2009483	1	Probe GA	X3
2007871-101	1	Jumper, Interlock	R2
2010986	1	Assembly, Probe Type ER1082, ATEX	X2
4000188	2	ATEX justification for Pilot probe type E temperature sensor	R3
2013340	1	Schedule Drawing, WetHead-Mini-Max	X3
2013339	1	Schedule Drawing, Gas Phase Probe (AirHead)	X1
2013259	1	Schedule Drawing, ATEX PhAT Probe	X4
2011965	1	Integrated Invictus Interlock System	X7
4002017	5	Laser Power control and safety interlock	X1
4002019	6	Safety statement, RXN Invictus Laser, IS Barrier, Interlock connector and probe system.	X1
4002252	2	ATEX Label, Probes Schematic	R2