

# EU-TYPE EXAMINATION CERTIFICATE

## Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

- EU-Type Examination Certificate Number:** ITS10ATEX17085X Issue 4
- Product:** Raman Probes
- Manufacturer:** KAISER OPTICAL SYSTEMS, INC.
- Address:** 371 Parkland Plaza  
Ann Arbor  
MI 48103, USA
- This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- Intertek Testing and Certification Limited, Notified Body number 0359 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council dated 26 February 2014, certifies that the product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II of the Directive.
- Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN IEC 60079-0:2018, EN 60079-11:2012 and EN 60079-28:2015 except in respect of those requirements referred to within item 14 of the Schedule.
- If the sign "X" is placed after the certificate number, it indicates that the product is subject to the special conditions of use specified in the Schedule to this certificate.
- This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
- The marking of the product shall include the following:



II 2/1 G Ex ia op is IIA or IIB or IIB+H2 or IIC T4 or T3 or T6 Ga  
-20°C ≤ Ta ≤ +60°C

\* for alternative markings, refer to schedule

**Certification Officer:** \_\_\_\_\_ **Date:** 21 April 2020  
P Moss

## SCHEDULE:

EU-Type Examination Certificate Number: ITS10ATEX17085X Issue 4

### 11. Description of Equipment or Protective System

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 RXN3 Hazardous Location Analyser, certificate number ITS10ATEX17079X or RXN2, RXN3 or RXN4 Analyser, certificate number ITS10ATEX17080X or similar analyzer incorporating the appropriate safety controls. 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	<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)	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) PhAT Series Probe	20	20	5	5	5	5	5

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

\*For irradiated areas greater than 30mm<sup>2</sup> where combustible materials may intercept the beam, the 5mW/mm<sup>2</sup> limit applies.

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

II 2/1 G, Ex ia op sh IIA or IIB or IIC T6 Ga

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

II 2 G, Ex ia IIC T6 Gb

## SCHEDULE:

EU-Type Examination Certificate Number: ITS10ATEX17085X Issue 4

The probe may incorporate an RTD temperature sensor. 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:

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

### 12. Report Number

Intertek Report: 103806740LHD-001 Issue 1 dated 17<sup>th</sup> April 2020.

### 13. Special 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 / 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 / Equipment Category.
- 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.

## SCHEDULE:

EU-Type Examination Certificate Number: ITS10ATEX17085X Issue 4

(b). Conditions of Manufacture

- None.

### 14. Essential Health and Safety Requirements (EHSRs)

The relevant Essential Health and Safety Requirements (EHSRs) have been identified and assessed in Intertek Report: 103806740LHD-001 Issue 0 dated 17<sup>th</sup> April 2020.

### 15. Drawings and Documents

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

16. Revisions:

September 2010  
Issue 1 Original certificate issue (10044753)

July 2013  
Issue 2 Introduction of the PhAT probe (G101150319) Update to interlock system

February 2015  
Issue 3 Update to standards & drawings (G101814019) New report number

April 2020  
Issue 4 Update to standards (G103806740)