UK Type Examination Certificate CML21UKEX2405X Issue 0

United Kingdom Conformity Assessment

1 Product or Protective System Intended for use in Potentially Explosive Atmospheres UKSI 2016:1107 (as amended) – Schedule 3A, Part 1

2 Equipment **Smart Transmitter Isolator Types KFD2-STC(V)5-Ex1.2O… and KFD2-STC(V)5-Ex2…**

3 Manufacturer **Pepperl+Fuchs SE**

4 Address **Lilienthalstrasse 200**
68307 Mannheim
Germany

5 The equipment is specified in the description of this certificate and the documents to which it refers.

6 Eurofins E&E CML Limited, Newport Business Park, New Port Road, Ellesmere Port, CH65 4LZ, United Kingdom, Approved Body Number 2503, in accordance with Regulation 43 of the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016, UKSI 2016:1107 (as amended), certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Schedule 1 of the Regulations.

The examination and test results are recorded in the confidential reports listed in Section 12.

7 If an 'X' suffix appears after the certificate number, it indicates that the equipment is subject to specific conditions of use (affecting correct installation or safe use). These are specified in Section 14.

8 This UK Type Examination certificate relates only to the design and construction of the specified equipment. Further requirements of the Regulations apply to the manufacturing process and supply of the product. These are not covered by this certificate.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the confidential report, has been demonstrated through compliance with the following documents:

EN IEC 60079-0:2018 EN 60079-11:2012

10 The equipment shall be marked with the following:

Ex I (M1)	Ex II (1) G	Ex II (1) D
[Ex ia Ma] I	[Ex ia Ga] IIC	[Ex ia Da] IIIC

Ta = -20ºC to +70ºC

Note: An upper ambient temperature within the range +40ºC to +70ºC may be marked

11 Description

The Smart Transmitter Isolator Type KFD2-STC(V)5-Ex1.2O... and KFD2-STC(V)5-Ex2... are Intrinsically Safe Associated Apparatus Transmitter Power Supplies that transfer monitoring signals from a hazardous area to a safe area and communication signals in both directions. The Safe Area connections are the Power Supply and Outputs. The Hazardous Area Connections (Input Circuits) are for Sink Input, Source Input or Three Wire Input.

The intrinsically safe input circuits are galvanically isolated from the non-Ex outputs by transformers. The voltage and current limitation for the intrinsically safe input circuits are achieved with Zener diodes and current limiting resistors. The circuits are located on a single printed circuit board (PCB).

The polymeric enclosure is suitable for mounting on a DIN rail. It provides an environmental rating of IP 20 and is required to be installed in an enclosure or area with a control of pollution access. Field wiring connections to the device are by colour coded pluggable connectors or powered from pluggable DIN rail connection.

Nomenclature

Smart Transmitter Isolator Type KFD2-STC(V)5-Ex2...
Smart Transmitter Isolator Type KFD2-STC(V)5-Ex1.2O...

KFD2-ST	Smart Transmitter
Followed by one of the options:	
C	Current source/sink
V	Voltage
Followed by one of the options:	
5-Ex1.2O	Single hazardous area input/Dual non-hazardous area output.
5-Ex2	Dual hazardous area input/Dual non-hazardous area output.
Followed by one of the options:	
-1	5 Volt – used with “V“
-2	10 Volt – used with “V“
.H	Higher field voltage
.NCL	No current limit
-Y1...n	Customised version - does not affect intrinsic safety
-…	Customised version - combination of numbers/letters does not affect intrinsic safety

Rating

SAFE Area Connections: KFD2-STC(V)5-Ex2.. & KFD2-STC(V)5-Ex1.20…:

Power Supply	
Connection(s):	Terminals 14, 15 and Power Rail 1,2
Operating Supply Voltage:	18 Vdc to 30 Vdc
Maximum Voltage (Um):	250 Vac

Output	
Connection(s):	Terminals 7, 8, 9, 10, 11, 12
Maximum Voltage (Um):	250 VAC

Sink transmitter input connection - KFD2-STC(V)5-Ex2.. & KFD2-STC(V)5-Ex1.20…

Hazardous Area Connections, Input Circuits:

Sink transmitter input connection	
Connection(s):	Terminals 1, 3 and/or 4, 6
Uo	26.2 V
Uq	27.25 V
Io	93 mA
Po	634 mW
Ci	5 nF
Li	0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals of either channel must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/Ω)
IIC	0.092	4.11	56.22
IIB	0.745	16.44	224.8
IIA	2.535	32.88	449.7
I	4.415	53.95	737.9

The entity parameters apply when one of the two conditions below is given:

- The total Li of the external circuit (excluding the cable) is < 1% of the Lo value or
- The total Ci of the external circuit (excluding the cable) is < 1% of the Co value.

The above parameters are reduced to 50% when both of the two conditions below are given:

- The total Li of the external circuit (excluding the cable) > 1% of the Lo and
- The total Ci of the external circuit (excluding the cable) > 1% of the Co.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for IIB and 600nF for IIC.

Source transmitter input connection - KFD2-STC(V)5-Ex2.. & KFD2-STC(V)5-Ex1.20…:

Hazardous Area Connections, Input Circuits:

Source transmitter input connection	
Connection(s):	Terminals 3, 2 and /or 6,5
Uo	2.0 V
Io	8.5 mA
Po	4.3 mW
Ui	30 V
Ii	115 mA
Pi	1000 mW
Ci	0
Li	0
Connection(s):	3 +ve wrt 2 and/or 6 +ve wrt 5
Uo	2.0 V
Io	8.5 mA
Po	4.3 mW
Connection(s):	2 +ve wrt 3 and/or 5 +ve wrt 6
Uo	1.0 V
Io	4.3 mA
Po	1.1 mW

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals of either channel must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/Ω)
IIC	100	492	8366
IIB	1000	1968	33464
IIA	1000	3936	66928
I	1000	6459	109803

The entity parameters apply when one of the two conditions below is given:

- The total Li of the external circuit (excluding the cable) is < 1% of the Lo value or
- The total Ci of the external circuit (excluding the cable) is < 1% of the Co value.

The above parameters are reduced to 50% when both of the two conditions below are given:

- The total Li of the external circuit (excluding the cable) > 1% of the Lo and
- The total Ci of the external circuit (excluding the cable) > 1% of the Co.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for IIB and 600nF for IIC.

Three wire transmitter input connection - KFD2-STC(V)5-Ex2.. & KFD2-STC(V)5-Ex1.20…:

Hazardous Area Connections, Input Circuits:

Three wire transmitter input connection	
Connection(s):	Terminals 1, 2, 3 and/or 4, 5, 6
Uo	26.2 V
Uq	27.25 V
Io	115 mA
Po	784 mW
Ci	5 nF
Li	0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals of either channel must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/Ω)
IIC	0.092	2.68	45.38
IIB	0.745	10.75	181.5
IIA	2.535	21.50	363.1
I	4.415	35.27	595.6

The entity parameters apply when one of the two conditions below is given:

- The total Li of the external circuit (excluding the cable) is < 1% of the Lo value or
- The total Ci of the external circuit (excluding the cable) is < 1% of the Co value.

The above parameters are reduced to 50% when both of the two conditions below are given:

- The total Li of the external circuit (excluding the cable) > 1% of the Lo and
- The total Ci of the external circuit (excluding the cable) > 1% of the Co.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for IIB and 600nF for IIC.

Sink transmitter input connection - KFD2-STC(V)5-Ex2.H... & KFD2-STC(V)5-Ex1.2O.H...:

Hazardous Area Connections, Input Circuits:

Sink transmitter input connection	
Connection(s):	Terminals 1, 3 and/or 4, 6
Uo	27.2 V
Io	93 mA
Po	633 mW
Ci	5 nF
Li	0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals of either channel must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/Ω)
IIC	0.084	4.11	56.22
IIB	0.685	16.44	224.8
IIA	2.295	32.88	449.7
I	4.045	53.95	737.9

The entity parameters apply when one of the two conditions below is given:

- The total Li of the external circuit (excluding the cable) is < 1% of the Lo value or
- The total Ci of the external circuit (excluding the cable) is < 1% of the Co value.

The above parameters are reduced to 50% when both of the two conditions below are given:

- The total Li of the external circuit (excluding the cable) > 1% of the Lo and
- The total Ci of the external circuit (excluding the cable) > 1% of the Co.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for IIB and 600nF for IIC.

Source transmitter input connection - KFD2-STC(V)5-Ex2.H... & KFD2-STC(V)5-Ex1.2O.H...:

Hazardous Area Connections, Input Circuits:

Source transmitter input connection	
Connection(s):	Terminals 3, 2 and/or 6, 5
Uo	2.0 V
Io	8.5 mA
Po	4.3 mW
Ui	30 V
Ii	115 mA
Pi	1000 mW
Ci	0
Li	0
Connection:	3 +ve wrt 2 and/or 6 +ve wrt 5
Uo	2.0 V
Io	8.5 mA
Po	4.3 mW
Connection:	2 +ve wrt 3 and/or 5+ve wrt 6
Uo	1.0 V
Io	4.3 mA
Po	1.1 mW

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals of either channel must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/Ω)
IIC	100	492	8366
IIB	1000	1968	33464
IIA	1000	3936	66928
I	1000	6459	109803

The entity parameters apply when one of the two conditions below is given:

- The total Li of the external circuit (excluding the cable) is < 1% of the Lo value or
- The total Ci of the external circuit (excluding the cable) is < 1% of the Co value.

The above parameters are reduced to 50% when both of the two conditions below are given:

- The total Li of the external circuit (excluding the cable) > 1% of the Lo and
- The total Ci of the external circuit (excluding the cable) > 1% of the Co.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for IIB and 600nF for IIC.

Three wire transmitter input connection - KFD2-STC(V)5-Ex2.H... & KFD2-STC(V)5-Ex1.2O.H...:

Hazardous Area Connections, Input Circuits:

Three wire transmitter input connection	
Connection(s):	Terminals 1, 2, 3 and/or 4, 5, 6
Uo	27.2 V
Io	115 mA
Po	782 mW
Ci	5 nF
Li	0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals of either channel must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/Ω)
IIC	0.084	2.68	45.46
IIB	0.685	10.75	181.8
IIA	2.295	21.50	363.7
I	4.045	35.27	596.7

The entity parameters apply when one of the two conditions below is given:

- The total Li of the external circuit (excluding the cable) is < 1% of the Lo value or
- The total Ci of the external circuit (excluding the cable) is < 1% of the Co value.

The above parameters are reduced to 50% when both of the two conditions below are given:

- The total Li of the external circuit (excluding the cable) > 1% of the Lo and
- The total Ci of the external circuit (excluding the cable) > 1% of the Co.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for IIB and 600nF for IIC.

12 Certificate history and evaluation reports

Issue	**Date**	**Associated report**	**Notes**
0	13 May 2021	R14112C/00	Issue of Prime Certificate

Note: Drawings that describe the equipment are listed or referred to in the Annex.

13 Conditions of Manufacture

The following conditions are required of the manufacturing process for compliance with the certification.

i. Where the product incorporates certified parts or safety critical components the manufacturer shall ensure that any changes to those parts or components do not affect the compliance of the certified product that is the subject of this certificate.

ii. All transformers shall be subjected to EN 60079-11 CL 11.2 Routine Tests for Infallible Transformers with an applied voltage of 1,500 V applied between the input and output windings. The test voltage shall be applied for a period of at least 60 s. Alternatively, the test may be carried out at 1,2 times the test voltage, but with reduced duration of at least 1 s. The applied voltage shall remain constant during the test. The current flowing during the test shall not increase above that which is expected from the design of the circuit and shall not exceed 5 mA r.m.s. at any time. During these tests, there shall be no breakdown of the insulation between windings or between any winding and the core.

14 Specific Conditions of Use

The following conditions relate to safe installation and/or use of the equipment.

i. The equipment shall be installed in an enclosure that provides a degree of protection not less than IP54 in accordance requirements of EN 60079-0 unless the equipment is intended to be afforded an equivalent degree of protection by location. In addition, the pollution level shall be limited to pollution degree 2 or better as defined in IEC 60664-1 (Pollution degree 2 can be achieved when the installation is in a controlled environment with suitably controlled condensation or airborne pollution).

ii. For some types of enclosure, additional certification will be required to permit the installation of the module within the enclosure. Reference should be made to the enclosure certificate. The installer shall ensure that the maximum ambient temperature of the module when installed is not exceeded.

Certificate Annex

Certificate Number	**CML 21UKEX2405X**
Equipment	**Smart Transmitter Isolator Types KFD2-STC(V)5-Ex1.2O… and KFD2-STC(V)5-Ex2…**
Manufacturer	**Pepperl+Fuchs SE**

The following documents describe the equipment defined in this certificate:

Issue 0

The drawings approved for the linked/attached ATEX certificate include all information required to show compliance, except for the marking of the UKCA symbol, Approved Body number, and the UKEX certificate number. In this scenario, include the following note and table:

For drawings describing the equipment, refer to attached certificate CML 17ATEX2031X Issue 3. In addition to the drawings listed on CML 17ATEX2031X Issue 3, the following drawings include the additional marking required for this UK Type Examination certification:

Drawing No	Sheets	Rev	Approved date	Title
16-1555CM-10	1 of 2	0	13 May 2021	Additional Marking Requirements for UKCA