1) **Ex EQUIPMENT TYPE EXAMINATION REPORT**

2) TE Report Number: **KLPL/Ex/24-096 Issue no.00** **Dated: 02.12.2024**

3) **Ex Equipment:** **Pulse Isolator**
Models: MTL4532 & MTL5532

4) **Manufacturer:** **MTL Instruments Private Limited,**
#3, Old Mahabalipuram Road, Shollinganallur, Chennai – 600119, INDIA.

5) This equipment and any acceptable variation thereto are specified in the schedule to this report and the documents therein referred to

6) Karandikar Laboratories Pvt. Ltd. reports that this equipment has been found to comply with requirements of the following standards relating to the design and construction of equipment for explosive gas/dust atmospheres as applicable.

7) This TE Report was issued as verification that a sample, was assessed, tested and found to comply with the IS / IEC standards listed below.
IS/IEC 60079-0: 2017 & IS/IEC 60079-11: 2023

8) The Examination and Test results are recorded in KLPL's confidential
Report No.: KLPL/Ex/MTL-24/007 **Dated: 02.12.2024**

9) The sign X if placed after the TE report number; it indicates that the equipment is subject to specific conditions of use specified in the schedule to this TE Report.

10) This Report does not indicate compliance with electrical safety and performance requirements other than those expressly included in the above listed standards.

11) The marking of the Equipment shall include the following:
Ex Code:
[Ex ia Ma] I (-20°C ≤ Ta ≤ +60°C)
[Ex ia Ga] IIC (-20°C ≤ Ta ≤ +60°C)
[Ex ia Da] IIIC (-20°C ≤ Ta ≤ +60°C)

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A. V. Karandikar

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SCHEDULE

12) Details of Type Examination Reports Issued: -

TE Report No.	Issue No.	Report No.	Date	Reason for Issue
KLPL/Ex/24-096	00	KLPL/Ex/MTL-24/007	02.12.2024	Original issue

13) Description of equipment

MTL4532 and MTL5532 Pulse Isolator

The MTL4532 and MTL5532 Pulse Isolator is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to a switch, proximity detector, current pulse transmitter or voltage pulse transmitter located in the hazardous area by limitation of voltage and current. Transformers, an opto-isolator and a relay provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL4532 and MTL5532 Pulse Isolator is designed for connection of a switch, proximity detector, current pulse transmitter or voltage pulse transmitter situated in the hazardous area. The apparatus repeats the pulse signals from the apparatus in the hazardous area onto outputs in the non-hazardous area. An alarm circuit provides a relay contact output in the non-hazardous area to indicate a failure.

The apparatus comprises isolating transformers, an opto-isolator, a relay, duplicated zener diodes chains and current limiting resistors to provide voltage and current limitation. The above, together with other electronic components are mounted on a printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. A jack socket is provided for the connection of a suitably certified data terminal for programming the apparatus.

The electronic circuitry is housed in a plastic enclosure, which provides a degree of protection of not less than IP20 in accordance with IS/IEC 60529: 2001.

14) Model Designation:

Model No.	Product	Rating
MTL4532	Pulse Isolator	Refer Point 17 below
MTL5532	Pulse Isolator	

15) Drawings & Documents

Document Number	No. of Pages	Rev. No.	Date	Drawing Title
CI4532-1 (I)	2	1	12.09	CIRCUIT DIAGRAM FOR MTL4532/MTL5532
CI4532-1 (I)	1	4	08.21	MTL4532 Certification Label Details
CI4532-1 (I)	1	1	05.09	MTL5532 Certification Label Details and DIN rail fitting
CI4532-1 (I)	1	1	12.09	PARTS LIST FOR MTL4532
CI4532-1 (I)	1	1	05.09	PCB DETAIL FOR TPL300

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CI4532-1 (I)	1	1	05.09	PCB DETAIL FOR TPL301
CI4532-1 (I)	1	1	12.09	MTL4532 TRACK LAYOUT
CI4532-1 (I)	1	2	01.13	MTL4532 COMPONENT ASSEMBLY
CI4500-3 (I)	1	1	12.10	MTL4500 and MTL5500- Alternate Zener Diode (Panjit)
CI4500-6 (I)	1	1	12.10	MTL4500 and MTL5500 Conformal Coating
CI4500-5 (I)	1	1	11.10	MTL5500- Alternative DIN rail mechanism
CI5500-100 (I)	1	3	1.13	New 5500 outline
CI4500-100 (I)	1	2	01.13	New 4500 Case
CI4500-7 (I)	1	2	01.11	MTL4500 Relay Encapsulant

Drawings listed above are finally accepted as accurately representing the product for which *this evaluation report has been prepared. These drawings provide necessary information as required by the above referred standards.*

16) Temperature Class:

Pulse Isolator, Models: MTL4532 & MTL5532 are an associated apparatus which will be placed in a non-Hazardous area and does not require a temperature class.

17) Electrical Rating:

Non-Hazardous Area Terminals 11 to 14

Um = 253V r.m.s.

The apparatus is designed to operate on the above terminals from a d.c. Supply voltage of up to 35V.

Hazardous Area Terminals 1 to 6 (forming part of the same intrinsically safe circuit)

Uo = 6.6 V, Io = 76 mA, Po = 0.13 W, Ci = 0, Li = 0

Hazardous Area Terminals 3 w.r.t. 1 (WITHOUT the Cold Junction Compensation (CJC) plug fitted)

Uo = 1.1 V, Io = 7 mA, Po = 2 mW, Ci = 0, Li = 0

Hazardous Area Terminals 3, 2 & 1 (with or without CJC plug fitted)

Uo = 6.6 V, Io = 10 mA, Po = 17 mW, Ci = 0, Li = 0

Programming / Configuration Port (Jack Socket)

Uo = 8 V, Io = 14.6 mA, Po = 26 mW, Ui=9.1 V, Ci = 0, Li = 0

Due to the fitting of current limiting resistors R1, R4, R5 (all 1 kΩ ± 1%), R2, R3 (both 160Ω ± 0.5%) and R6 (1.5 kΩ ± 1%), the capacitive components fitted on the hazardous area side of the circuit cannot be considered connected to the hazardous area terminals 1 to 6 even under two fault conditions. Similarly, due to the fitted of current limiting resistors R12, R13, R14 & R15 (all 1kΩ ± 1%), the capacitive components fitted on the hazardous area side of the circuit cannot be considered connected to the programming / configuration jack socket even under two fault conditions. Therefore, in both cases it is considered that Ci = 0.

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Inductors L1, L2, L3, L10 & L11 (all < 5µH) are connected to hazardous area terminals 1 to 6. It is considered the inductance is very small in comparison to the permitted inductance at 76 mA, therefore it is considered that Li = 0 for these terminals. No inductive components are fitted on the terminals of the programming / configuration jack socket, therefore L = 0 is defined for this socket.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected to hazardous area terminals 1 to 6 and the programming / configuration port must not exceed the following values:

TABLE 1

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/ohm)
Hazardous Area Terminals 1 to 6			
IIC	22	6.42	288
IIB*	500	25.6	1057
IIA	1000	53.0	2228
I	1000	77.2	3402
Programming I Configuration Port (Jack Socket)			
IIC	0.367	153	349
IIB*	2.15	591	1355
IIA	8.8	1000	1453
I	12.32	1000	1453

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Note:

1. The above load 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.
2. 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) is ≥ 1 % of the Lo, value and
   - the total Ci of the external circuit (excluding the cable) is ≥ 1 % of the Co value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1 µF for Groups IIB, IIA & I and 600nF for Group IIC.

18) **Specific conditions of use:** Nil

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19) **Routine test:**

- Routine test is to be carried out on each infallible switching transformer, it shall comply the dielectric test of Cl 10.3.1 IS/IEC 60079-11: 2023.
  - At 1500 Vac between the primary and secondary windings.
  - At 500 Vac between all the windings and the core or screen.

  During these tests, there shall be no breakdown of the insulation between windings.
- Apply two coats of HumiSeal® 1B73EPA Acrylic Conformal Coating after cleaning the surface. Visual inspection after cure time shall be conducted for
  - Cracks
  - Non-homogenous covering

END OF DOCUMENT

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