1) **Ex EQUIPMENT TYPE EXAMINATION REPORT**

2) TE Report Number: **KLPL/Ex/24-090 Issue no.00** **Dated: 30.11.2024**

3) **Ex Equipment:** **Switch / Proximity Detector Interface**
Model: MTL4511, MTL4514, MTL5514D, MTL5510, MTL4514B & MTL4514N

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-24/001 **Dated: 30.11.2024**

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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12) Details of Type Examination Reports Issued: -

TE Report No.	Issue No.	Report No.	Date	Reason for Issue
KLPL/Ex/24-090	00	KLPL/Ex/MTL-24/001	30.11.2024	Original issue

13) Description of equipment

MTL4511, MTL4514 & MTL4514B Switch / Proximity Detector Interface

The MTL4511, MTL4514 & MTL4514B Switch / Proximity Detector Interface are designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to up to two intrinsically safe circuits by limitation of voltage and current.

Relays and a transformer provide galvanic isolation between the hazardous and non-hazardous area circuitry.

Each channel of the interface monitors either a detector or switch located in the hazardous area and controls non-hazardous area loads via relays. Some models of the interface are fitted with independent phase reverse controls and Line Fault Detection (LFD) circuitry allow an alarm condition to be signalled for either state, set by switches on the side of the interface.

The apparatus comprises an isolating transformer, relays, zener diodes and current limiting resistors to provide voltage and current limitation on each channel. These, together with other electronic components are mounted on a single printed circuit board and housed in a plastic enclosure. Polarised plugs and sockets are provided for connection to the hazardous and non-hazardous area. LED indication is provided to indicate Power-on, state of the outputs and LFD status.

The below listed models are all built on a common printed circuit board. The differences between the models relates to the configuration of relays and non-hazardous area connections.

Model Range:

MTL4511	Single Channel Switch / Proximity Detector Interface
MTL4514	Single Channel Switch / Proximity Detector Interface with Line Fault Detection (LFD) Alarm
MTL4514B	Single Channel Switch / Proximity Detector Interface with Line Fault Detection (LFD) & Phase Reversal

MTL4514D Single Channel Switch / Proximity Detector Interface with Dual Output, Line Fault Detection & Phase Reversal

The MTL4514D Single Channel Switch / Proximity Detector Interface with Dual Output, Line Fault Detection & Phase Reversal is designed to restrict the transfer of energy from unspecified non-hazardous area equipment to an intrinsically safe circuit by limitation of voltage and current. Relays and a transformer provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The interface monitors either a detector or switch located in the hazardous area and controls two non-hazardous area loads via relays. The interface is also fitted with independent phase reversal controls and Line Fault Detection (LFD) circuitry allowing an alarm condition to be signalled for either state, set by switches on the side of the interface.

The equipment comprises an isolating transformer, relays, zener diodes and current limiting resistors to provide voltage and current limitation.
These, together with other electronic components are mounted on a single printed circuit board and housed in a plastic enclosure. Polarised plug and socket connections are provided for connection to the hazardous and non-hazardous area. LED indication is provided to indicate Power-on, state of the output and LFD status.

MTL4514N Switch / Proximity Detector Interface with Line Fault Detection alarm

The MTL4514N Switch / Proximity Detector Interface with Line Fault Detection alarm are designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to an intrinsically safe circuit by limitation of voltage and current. Relays and a transformer provide galvanic isolation between the hazardous and non-hazardous area circuitry.
The interface monitors either a detector or switch located in the hazardous area and control a non-hazardous area loads via relay. The interface is also fitted with independent phase reversal controls and Line Fault Detection (LFD) circuitry allowing an alarm condition to be signalled for either state, set by switches on the side of the interface. The interface has identification circuitry fitted on the non-hazardous area side of the circuit which allows it to be identified when fitted on specific backplanes.
The apparatus comprises an isolating transformer, relays, zener diodes and current limiting resistors to provide voltage and current limitation. These, together with other electronic components are mounted on a single printed circuit board and housed in a plastic enclosure. Polarised plug and socket connections are provided for connection to the hazardous and non-hazardous area. LED indication is provided to indicate Power-on, state of the output and LFD status.

MTL5510 Switch / Proximity Detector Interface

The MTL5510 Switch / Proximity Detector Interface is designed to restrict the transfer of energy from the unspecified non-hazardous area apparatus to four intrinsically safe circuits by limitation of voltage and current.
An isolating transformer and an opto-coupler provide galvanic isolation between the hazardous and non-hazardous
area circuitry. Each channel of the MTL5510 monitors either a detector or a switch in the hazardous area and controls a non-hazardous area load via a solid state output.
The apparatus comprises an isolating transformer, an opto-coupler, zener diodes and resistors to provide voltage and current limitation. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. LED indication is provided to indicate power-on, the status of each output and Line Fault Detection (LFD).

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.

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14) Model Designation:

Model No.	Product	Rating
MTL4511	Switch / Proximity Detector Interface	Refer Point 17 below
MTL4514	Switch / Proximity Detector Interface	
MTL5514D	Single Channel Switch / Proximity Detector Interface with Dual Output, Line Fault Detection & Phase Reversal	
MTL5510	Switch / Proximity Detector Interface	
MTL4514B	Single Channel Switch / Proximity Detector Interface with Line Fault Detection (LFD) & Phase Reversal	
MTL4514N	Switch / Proximity Detector Interface with Line Fault Detection Alarm	

15) Drawings & Documents

Document Number	No. of Pages	Rev. No.	Date	Drawing Title
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
CI4516-1 (I)	1	3	12.23	Parts list for MTL4516
CI4516-1 (I)	1	4	02.10	Circuit diagram for MTL4516
CI4516-1 (I)	1	2	05.07	MTL4516 Track Layout
CI4516-1 (I)	1	6	10.12	MTL4516 COMPONENT LAYOUT
CI4516-1 (I)	1	2	01.07	PCB DETAIL FOR TPL308
CI4516-1 (I)	1	6	07.16	MTL4516 Certification Label Details
CI4500-100 (I)	1	2	01.13	New 4500 Case
CI4500-7 (I)	1	2	01.11	MTL4500 Relay Encapsulant
CI4514-1-(I)	1	1	11.14	Circuit diagram for MTL4514N
CI4514N-2-(I)	2	1	11.14	Parts list for MTL4514N
CI4514N-3-(I)	1	1	11.14	MTL4514N Track Layout
CI4514N-4-(I)	1	1	11.14	MTL4514N COMPONENT LAYOUT
CI4514N-5-(I)	1	1	11.14	PCB DETAIL FOR TPL308
CI4514N-6-(I)	1	1	11.14	MTL4514N Certification Label Details
CI4500-5(I)	1	1	11.10	MTL5500 - Alternative DIN rail mechanism
CI4510-1 (I)	2	2	05.07	Circuit diagram for MTL4510/4513
CI4510-1 (I)	1	3	01.13	MTL4510 COMPONENT LAYOUT
CI4510-1 (I)	1	2	06.07	Parts list for MTL4510 and MTL4513
CI4510-1 (I)	1	2	05.07	MTL4510 Track Layout

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CI4510-1 (I)	1	2	01.07	PCB DETAIL FOR TPL308
CI5510-1(I)	1	4	02.23	MTL5510 Certification Label Details and DIN rail fittings
CI4514D-1(I)	1	1	10.13	MTL4514D Circuit diagram
CI4514D-2	2	1	11.13	MTL4514D Parts list
CI4514D-3-(I)	1	1	10.13	MTL4514D Track Layout
CI4514D-4-(I)	1	1	11.14	MTL4514D COMPONENT LAYOUT
CI4514D-5	1	1	10.13	PCB DETAIL FOR TPL308
CI5514D-1(I)	1	4	02.23	MTL5514D Certification Label Details

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:

Switch / Proximity Detector Interface, Model: MTL4511, MTL4514, MTL5514D, MTL5510, MTL4514B & MTL4514N are associated apparatus which will be placed in a non-Hazardous area and does not require a temperature class.

17) Electrical Rating:

Input / Output Parameters:

Non-Hazardous Area Terminals 7 to 14
Um = 253V r.m.s.
The circuit connected to non-hazardous area terminals 13 & 14 is designed to operate from a d.c. supply voltage of up to 35 V.
Non-hazardous area terminals pin 7 to 12 are connected to relay contacts which can switch up to 253 Vr.m.s., 2 A r.m.s. and 100 VA for model MTL4511, MTL4514, MTL4514B and MTL4514N.
Non-hazardous area terminals pin 7, 8, 10 & 11 are connected to relay contacts which can switch up to 253 Vr.m.s., 2 Ar.m.s. and 100 VA for model MTL4514D.

For Model MTL4511, MTL4514, MTL4514D, MTL4514B and MTL4514N:

Hazardous Area Terminals 1 w.r.t. 2/3 (Channel 1)
Uo = 10.5 V, Io = 14 mA, Po = 37 mW, Ci = 0, Li = 0

For Model MTL5510:

Hazardous Area Terminals 1 w.r.t. 2 (Channel 1)
Hazardous Area Terminals 3 w.r.t. 2 (Channel 2)
Hazardous Area Terminals 4 w.r.t. 5 (Channel 3)
Hazardous Area Terminals 6 w.r.t. 5 (Channel 4)
Uo = 10.5 V, Io = 14 mA, Po = 37 mW, Ci = 0, Li = 0

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

TABLE 1

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/ohm)
IIC	2.41	175	983
IIB**	16.8	680	1333
IIA	75.0	1000	1333
I	95.0	1000	1333

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

Notes:

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 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

18) Specific conditions of use: Nil

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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