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# Karandikar Laboratories



F 08 CE Rev. 02

## Ex EQUIPMENT TYPE EXAMINATION REPORT

- 1) TE Report Number: **KLPL/Ex/24-093** Issue no.00 Dated: **30.11.2024**
- 3) **Ex Equipment:** **Isolating Driver, 4/20mA for Smart I/P Converters**  
**Model: MTL4546S, MTL4546Y, MTL4545Y & MTL5549Y**
- 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-24/004** **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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*A.V. Karandikar*  
**Ajit Karandikar**  
**CEO**

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#### 12) Details of Type Examination Reports Issued: -

TE Report No.	Issue No.	Report No.	Date	Reason for Issue
KLPL/Ex/24-093	00	KLPL/Ex/MTL-24/004	30.11.2024	Original issue

#### 13) Description of equipment

##### **MTL4545Y Isolating Driver, 4/20mA for Smart I/P Converters & MTL4546S, MTL4546Y Signal Channel Isolating Driver, 4/20mA for Smart I/P Converters**

The MTL4545Y Isolating Driver, 4/20mA for Smart I/P Converters and MTL4546Y Signal Channel Isolating Driver, 4/20mA for Smart I/P Converters accepts a 4/20mA signal from a controller located in the non-hazardous area to drive a load in the hazardous area. It permits bi-directional transmission of a digital signal to and from an operator station or hand-held communicator. The equipment restricts the transfer of energy from unspecified non-hazardous area equipment to an intrinsically safe circuit by limitation of voltage and current. Three transformers provide galvanic isolation between the hazardous and non-hazardous area circuitry. The apparatus comprises a power transformer, two signal transformers, zener diodes and current limiting resistors to provide voltage and current limitation. The above, together with electronic components are mounted on a single printed circuit board and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for hazardous and non-hazardous area connections. A LED is fitted to provide power on indication.

##### **MTL5549Y 2 Channel Isolating Driver, 4/20mA for Smart I/P Converters**

The MTL5549Y 2 Channel Isolating Driver, 4/20mA for Smart I/P Converters accepts up to two separate 4/20mA signals from controllers located in the non-hazardous to drive loads in the hazardous area. It permits bi-directional transmission of digital signals to and from an operator station or hand-held communicator. The apparatus restricts the transfer of energy from unspecified non-hazardous area apparatus to intrinsically safe circuits by limitation of voltage and current. Three transformers on each channel provide galvanic isolation between the hazardous and non-hazardous area circuitry. Each channel of the apparatus comprises a power transformer, two current transformers, zener diodes and current limiting resistors to provide voltage and current limitation. The above, together with other electronic components are mounted on a printed circuit board and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections.

The degree of ingress protection of IP 20 as per IS/IEC 60529: 2001 is achieved by enclosure.

#### 14) Model Designation:

Model No.	Product	Rating
MTL4545Y	Isolating Driver, 4/20mA for Smart I/P Converters	Refer Point 17 below
MTL4546Y	Single Channel Isolating Driver, 4/20mA for Smart I/P Converters	
MTL5549Y	2 Channel Isolating Driver, 4/20mA for Smart I/P Converters	
MTL4546S	Single Channel Isolating Driver, 4/20mA for Smart I/P Converters	

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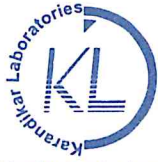


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#### 15) Drawings & Documents

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
CI4500-100 (I)	1	2	01.13	MTL 4500 Case
CI4546-1 (I)	1	6	10.12	CIRCUIT DIAGRAM FOR THE MTL4546
CI4546-1 (I)	1	6	10.12	MTL4546 COMPONENT LAYOUT
CI4546-1 (I)	1	5	01.13	MTL4546 Certification Label Details
CI4546-1 (I)	1	3	10.08	PARTS LIST FOR MTL4546
CI4546-1 (I)	1	3	06.07	MTL4546 TRACK LAYOUT
CI4546-1 (I)	1	2	01.07	PCB DETAIL FOR TPL300 and TPL302
CI4546-1 (I)	1	2	01.07	PCB DETAIL FOR TPL301
CI4545Y-1 (I)	1	1	08.14	CIRCUIT DIAGRAM FOR THE MTL4545Y
CI4545Y-2 (I)	2	1	08.14	MTL4545Y PARTS LIST
CI4545Y-3 (I)	1	1	08.14	MTL4545Y TRACK LAYOUT
CI4545Y-4 (I)	1	1	08.14	MTL4545Y COMPONENT LAYOUT
CI4545Y-5 (I)	1	1	08.14	PCB DETAIL FOR TPL300
CI4545Y-6 (I)	1	1	08.14	PCB DETAIL FOR TPL301
CI4545Y-7 (I)	1	2	07.16	MTL4545Y Certification Label Details
CI4549-1 (I)	2	4	07.08	CIRCUIT DIAGRAM FOR THE MTL4549
CI4549-1 (I)	1	6	01.13	MTL4549 COMPONENT LAYOUT
CI4549-1 (I)	1	4	07.16	MTL4549 Certification Label Details
CI4549-1 (I)	1	2	07.08	PARTS LIST FOR MTL4549
CI4549-1 (I)	1	3	11.07	MTL4549 TRACK LAYOUT
CI4549-1 (I)	1	2	01.07	PCB DETAIL FOR TPL300 and TPL302
CI4549-1 (I)	1	2	01.07	PCB DETAIL FOR TPL301

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:

Isolating Driver, 4/20mA for Smart I/P Converters Model: MTL4546S, MTL4546Y, MTL4545Y & MTL5549Y are an associated apparatus which will be placed in a non-Hazardous area and does not require a temperature class.

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### 17) Electrical Rating:

**Non-Hazardous Area Terminals 11 to 14 for MTL4546Y**

**Non-Hazardous Area Terminals 8, 9, 12, 13 & 14 for MTL4545Y**

**Non-Hazardous Area Terminals 8, 9, 11, 12, 13 & 14 for MTL5549Y**

Um = 253V r.m.s.

The circuit connected to non-hazardous area terminals are designed to operate from a d.c. supply voltage up to 35 V.

**Hazardous Area Terminals 2 w.r.t. 1 (Channel 1) and Terminals 5 w.r.t. 4 (Channel 2)**

Uo = 28 V, Io = 93 mA, Po = 0.65 W, Ci = 0, Li = 0

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 ( $\mu$ F)	INDUCTANCE (mH)	L/R RATIO ( $\mu$ H/ohm)
IIC	0.083	4.2	56
IIB**	0.65	12.6	210
IIA	2.15	33.6	444
I	3.76	53.7	668

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

Note:

- 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.
- 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  $\geq$  1 % of the Lo, value and
  - The total Ci of the external circuit (excluding the cable) is  $\geq$  1 % of the Co value.

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

**MTL4546S Single Channel Isolating Driver, 4/20mA for Smart I/P Converters**

Non-Hazardous Area Terminals 11, 12, 13 & 14

Um = 253V r.m.s.

The circuit connected to non-hazardous area terminals 11 to 14 is designed to operate from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1

Uo = 22 V, Io = 100 mA, Po = 0.55 W, Ci = 0, Li = 0

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: -







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TABLE 2

GROUP	CAPACITANCE ( $\mu$ F)	INDUCTANCE (mH)	L/R RATIO ( $\mu$ H/ohm)
IIC	0.083	4.2	56
IIB**	0.65	12.6	210
IIA	2.15	33.6	444
I	3.76	53.7	668

\*\* 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  $\geq 1\%$  of the Lo value and
    - the total Ci of the external circuit (excluding the cable) is  $\geq 1\%$  of the Co value.
- The reduced capacitance of the external circuit (including cable) shall not be greater than  $1\mu$ F for Groups IIB, IIA & I and  $600\text{nF}$  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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