1) **Ex EQUIPMENT TYPE EXAMINATION REPORT**

2) TE Report Number: **KLPL/Ex/23-011 Issue no.00** **Dated: 17.01.2023**

3) **Ex Equipment:** **MTL5541S, MTL5544D Repeater Power Supply, 4/20 mA**

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: 2011

8) The Examination and Test results are recorded in KLPL's confidential
Report No.: KLPL/Ex/MTL-23/006 **Dated: 17.01.2023**

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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SCHEDULE

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

TE Report No.	Issue No.	Report No.	Date	Reason for Issue
KLPL/Ex/23-011	00	KLPL/Ex/MTL-23/006	17.01.2023	Original issue

13) **Description of equipment**

The MTL5541S single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is designed to provide floating d.c. supplies for energising two 'Smart' 4/20mA Transmitters located in the hazardous area and repeat these currents in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC).

The MTL5541S single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, zener diode chains and resistors providing voltage and current limitation. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. LED indication is fitted to indicate power-on.

The MTL5544D Repeater Power Supply, 4/20mA for 2 or 3 Wire Transmitters with two outputs is designed to provide a floating d.c. supplies for energising a 2 or 3-Wire 4/20mA Transmitter located in the hazardous area and repeat the current on two channels in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC). The apparatus uses the same printed circuit board and enclosure as the MTL5541S but is populated with only one hazardous area transmitter connection and two non-hazardous area outputs fitted.

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
MTL5544D	Two Channel Repeater Power Supply	Refer Point 17 below
MTL5541S	single Channel Repeater Power Supply	

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15) Drawings & Documents

Drawing Title	Document Number	Rev. No.	Date MM.YY	No. of Pages
MTL4500 and MTL5500 Conformal Coating	CI4500-6 (I)	1	12.10	1 of 1
PARTS LIST FOR MTL4541S, MTL5541S, MTL4544S, MTL5544S, MTL4544D, MTL5544D	CI4541-3 (I)	3	09.15	1 of 8
CIRCUIT DIAGRAM FOR MTL4541S, MTL5541S, MTL4544S, MTL5544S, MTL4544D, MTL5544D, MTL4541T	CI4541-3 (I)	2	10.12	2 of 8
CIRCUIT DIAGRAM FOR MTL4541S, MTL5541S, MTL4544S, MTL5544S, MTL4544D, MTL5544D, MTL4541T	CI4541-3 (I)	2	10.12	3 of 8
TRACK LAYOUT FOR MTL4541S, MTL5541S, MTL4544S, MTL5544S, MTL4544D, MTL5544D	CI4541-3 (I)	1	06.09	4 of 8
COMPONENT LAYOUT FOR MTL4541S, MTL4541T, MTL5541S, MTL4544S, MTL5544S, MTL4544D, MTL5544D	CI4541-3 (I)	3	01.14	5 of 8
PCB detail for TPL300	CI4541-3 (I)	1	06.09	6 of 8
PCB detail for TPL301	CI4541-3 (I)	1	06.09	7 of 8
New 5500 outline	CI5500-100 (I)	3	01.13	1 of 1
MTL5544D SIDE LABEL	CI5544D-701	1	01.23	1 of 1
MTL5541S SIDE LABEL	CI5541S-701	1	01.23	1 of 1
PARTS LIST FOR MTL5541S	CI4541-3 (I)	1	12.22	1 to 5
PARTS LIST FOR MTL5544D	CI4544-3 (I)	1	12.22	1 to 5

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:

MTL5541S, MTL5544D Repeater Power Supply, 4/20 mA 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 11-12 & 13-14 (MODEL 5541S) OR

Non-Hazardous Area Terminals 8-9, 11-12 & 13-14 (MODEL 5544D) OR

Um = 253V r.m.s.

Safe-area output

Signal range for pin 8-9 or 11-12: 4 to 20mA, Under/over-range: 0 to 24mA

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SCHEDULE

Safe-area load resistance: @ 24mA: 0 to 360Ω OR @ 20mA: 0 to 450Ω

The apparatus is designed to operate on the above terminals from a d.c. Supply voltage of 20 TO 35 V. (terminals 13-14)

Hazardous Area Terminals 2 w.r.t. 1

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

Hazardous Area Terminals 3 w.r.t. 1

Uo = 1.1 V, Io = 53 mA, Po = 15 mW, Ui= 30 V, Ii= 121 mA Ci = 0, Li = 0

Hazardous Area Terminals 2 w.r.t. 3 (Channel 1)

Uo = 28 V, Io = 87 mA, Po = 0.61 mW, Ci = 0, Li = 0

Each channel must be considered as a separate intrinsically safe circuit.

The capacitance and either the inductance or inductance to resistance ratio (LIR) of the hazardous area load connected must not exceed the following values for either channel:

TABLE 1

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1			
IIC	0.083	4.2	56
IIB**	0.65	12.6	210
IIA	2.15	33.6	444
I	3.76	53.7	668
Hazardous Area Terminals 3 w.r.t. 1			
IIC	100	12.8	2438
IIB**	1000	47.8	8932
IIA	1000	104.7	18140
I	1000	156.2	28229
Hazardous Area Terminals 2 w.r.t. 3			
IIC	0.083	4.9	59
IIB**	0.65	20.0	222
IIA	2.15	40.9	469
I	3.76	59.1	710

**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 ≥ 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

19) **Routine test:**

Routine test is to be carried out on each infallible switching transformer, it shall comply the dielectric test of Cl 11.2 IS/IEC 60079-11: 2011

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.

END OF DOCUMENT

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