



IECEx Certificate of Conformity

Certificate No.:	IECEx BAS 23.0013	Page 2 of 4
Date of issue:	2024-02-08	Issue No: 2
Manufacturer:	Eaton Electric Limited Great Marlings Butterfield Luton Bedfordshire LU2 8DL United Kingdom	
Manufacturing locations:	Eaton Electric Limited Great Marlings Butterfield Luton Bedfordshire LU2 8DL United Kingdom	MTL Instruments PVT Limited No 3 Old Mahabalipuram Road, Sholinganallur, Chennai, 600 119 India
This certificate is iss IEC Standard list be found to comply with Rules, IECEx 02 and	ued as verification that a low and that the manufac the IECEx Quality syster d Operational Documents	cample(s), representative of production, was assessed and tested and found to comply with the urer's quality system, relating to the Ex products covered by this certificate, was assessed and n requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme as amended
STANDARDS : The equipment and a to comply with the fo	any acceptable variations Illowing standards	to it specified in the schedule of this certificate and the identified documents, was found
IEC 60079-0:2017 Edition:7.0	Explosive atmospheres	- Part 0: Equipment - General requirements
IEC 60079-11:2011 Edition:6.0	Explosive atmospheres	- Part 11: Equipment protection by intrinsic safety "i"
	This Certificate doe other th	s not indicate compliance with safety and performance requirements an those expressly included in the Standards listed above.
TEST & ASSESSME A sample(s) of the e	ENT REPORTS: quipment listed has succe	ssfully met the examination and test requirements as recorded in:
Test Reports:		
GB/BAS/ExTR23.00	19/00	B/SGS/ExTR23.0073/00 GB/SGS/ExTR24.0008/00
Quality Assessment	Reports:	
GB/BAS/QAR06.002	22/10	;B/BAS/QAR07.0017/10



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

This certificate covers the following types:

- MTL4541* / MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters.
 MTL4541A / MTL4541AS Single Channel & MTL4544A / MTL4544AS Two Channel Current Repeater.
- MTL4541S, MTL4541T, MTL4544S & MTL4544D Repeater Power Supplies, 4/20mA.
- MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters.
- MTL4541YA Single Channel Current Repeater, 4/20mA Passive Input for Smart Transmitters. •
- MTL5541 / MTL5541-T / MTL5544 Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters.
- MTL5541A / MTL5541AS Single Channel & MTL5544A / MTL5544AS Two Channel Current Repeater. •
- MTL5541S, MTL5541S-T, MTL5544S, MTL5544D & MTL5544D-L Repeater Power Supplies, 4/20mA.

See Certificate Annex for a description of the types of equipment and electrical parameters

SPECIFIC CONDITIONS OF USE: NO



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Schedule 1 – MTL4541* / MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

The MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is designed to provide a floating d.c. supply for energising two conventional 2 or 3-Wire 4/20mA transmitters or a 'smart' transmitter 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 the 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 MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire 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 plug and sockets are provided for the hazardous and non-hazardous area connections. All models are fitted with a power indication LED.

The MTL4541* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is a depopulated version of the MTL4544* and has only one channel populated. Both the MTL4541* and MTL4544* available in a number of model variants, denoted by the last digit in the model number. All model variants are built on a common PCB.

Model Range:

Model No.	
MTL4541	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4541B	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4541P	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4544	Dual Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4544B	Dual Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

Input / Output Parameters

MTL4541, MTL4541B, MTL4544 & MTL4544B Models Parameters

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

$$U_m = 253V$$

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

Hazardous Area Terminals 2 w.r.t. 1

Hazardous Area	Terminals 5 v	w.r.t 4 (MT	L4544 & I	MTL4544B on	ly)

U₀	=	28V	Ci	=	0
lo	=	93mA	Li	=	0
Po	=	0.65W			



Hazardous Area Terminals 3 w.r.t. 1

or

Hazardous Area Terminals 6 w.r.t 4 (MTL4544 & MTL4544B only)

U₀	=	1.1V	Ui	=	30V
lo	=	53mA	li	=	121mA
Po	=	15mW			
Ci	=	0			
Li	=	0			

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source.

Hazardous area terminals 2 and 5 must not be used when the source is connected to these terminals.

 $\begin{array}{rcl} \underline{Hazardous \ Area \ Terminals \ 2 \ w.r.t. \ 3} \\ \underline{or} \\ \underline{Hazardous \ Area \ Terminals \ 5 \ w.r.t \ 6 \ (MTL4544 \ \& \ MTL4544B \ only)} \\ U_{\circ} &=& 28V \\ \end{array}$

 $\begin{array}{rcl} U_{0} &=& 28V & & C_{i} &=& 0\\ I_{0} &=& 87mA & & L_{i} &=& 0\\ P_{0} &=& 0.61W & & \end{array}$

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 for either channel:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area T	erminals 2 w.r.t. 1 or 5	w.r.t 4		
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 T	erminals 3 w.r.t. 1 or 6	w.r.t 4		
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Area T	erminals 2 w.r.t. 3 or 5	w.r.t 6		
IIC	0.083	4.9		59
IIB*	0.65	20.0		222
IIA	2.15	40.9		469
I	3.76	59.1		710

Notes:

- 1) The above load parameters apply when one of the two conditions below is given:
 - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
 - the total C_i of the external circuit (excluding the cable) is < 1% of the C_{\circ} value.

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

- the total L_i of the external circuit (excluding the cable) is $\geq 1\%$ of the L_o value and

- the total C_i of the external circuit (excluding the cable) is $\geq 1\%$ of the C_\circ value.

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

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

MTL4541P Model Parameters

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

 $U_{m} = 253V$

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

Hazardous Area Terminals 2 w.r.t. 1

Uo	=	28V	Ci	=	0
lo	=	116.6mA	Li	=	0
Po	=	0.82W			

Hazardous Area Terminals 3 w.r.t. 1

U₀	=	1.1V	Ui	=	30V
lo	=	53mA	li	=	121mA
P₀	=	15mW			
Ci	=	0			
Li	=	0			

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source.

Hazardous area terminal 2 must not be used when the source is connected to these terminals.

Hazardous Area Terminals 2 w.r.t. 3

U₀	=	28V	Ci	=	0
lo	=	107mA	Li	=	0
P₀	=	0.75W			

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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:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)	
Hazardous Area Terminals 2 w.r.t. 1					
IIC	0.083	2.7		45	
IIB*	0.65	11.8		175	
IIA	2.15	23.5		370	
I	3.76	33.5		545	
Hazardous Area Terminals 3 w.r.t. 1					
IIC	100	12.8		2,438	
IIB*	1,000	47.8		8,932	
IIA	1,000	104.7		18,140	
I	1,000	156.2		28,229	
Hazardous Are	ea Terminals 2 w.r.t. 3				
IIC	0.083	3.2		50	
IIB*	0.65	13.7		190	
IIA	2.15	27.5		401	
I	3.76	39.3		596	

Notes:

- 1) The above load parameters apply when one of the two conditions below is given: - the total L_i of the external circuit (excluding the cable) is < 1% of the L_0 value or - the total C_i of the external circuit (excluding the cable) is < 1% of the C_0 value.
- 2) The above parameters are reduced to 50% when both of the two conditions below are given:
 the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L₀ value and
 - the total C_i of the external circuit (excluding the cable) is $\geq 1\%$ of the C_o value.

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

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

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Schedule 2 – MTL4541A / MTL4541AS Single Channel & MTL4544A / MTL4544AS Two Channel Current Repeater

The MTL4544A Two Channel Current Repeater is designed to repeat up to two 4-20mA current signals from separately powered 4/20mA transmitters located in the hazardous area to unspecified apparatus in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by the means of limitation of current and voltage. The apparatus also allows bidirectional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The MTL4544A Current Repeater comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, fuses, Zener diodes and resistors providing voltage and current limitation on each channel. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for hazardous and non-hazardous area connections. The apparatus is fitted with a Power-on LED indication.

The MTL4541A Single Channel Current Repeater is a depopulated version of the MTL4544A and has only one channel populated.

Minor changes to the non-hazardous are circuitry of both models of the apparatus form the MTL4541AS Single Channel and MTL4544AS Two Channel Current Repeater. These models use the same common PCB and enclosure and in terms of intrinsic safety are identical.

Input/Output Parameters

Non-Hazardous Area Terminals 8, 9, 11, 12, 13 & 14)

 $U_m = 253V r.m.s.$

The circuit connected to non-hazardous area terminals 8, 9, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

<u>Hazardous Area Terminals 2 w.r.t. 1 (Channel 1)</u> Or <u>Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL4544A / 4544AS models only)</u>

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

Although the apparatus does not itself comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when each hazardous area channel is connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

Each hazardous area channel is also considered suitable for the connection of an external intrinsically safe source with a $U_0 = 30V$ and $I_0 = 100mA$ having a source resistance of U_0/I_0 to be connected to hazardous area terminals 2 w.r.t. 1 - Channel 1 and 5 w.r.t. 4 – Channel 2.

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The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

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

Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined with Terminals 2 & 4 connected together – MTL4544A / 4544AS models only)

 $\begin{array}{rcl} U_{o} &=& 17.2 V \mbox{(Diode)} & & C_{i} &=& 0 \\ I_{o} &=& 0 & & L_{i} &=& 0 \\ P_{o} &=& 0 \end{array}$

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

The connection of channel 1 and 2 together is also considered suitable for the connection of an external intrinsically safe source with a $U_0 = 30V$ and $I_0 = 100$ mA having a source resistance of U_0/I_0 to be connected to hazardous area terminals 5 w.r.t. 1.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Load Parameters

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

GROUP	CAPACITANCE	INDUCTANCE C	DR L/R RATIO				
	(μF)	(mH)	(µH/ohm)				
Hazardous Area Terr	Hazardous Area Terminals 2 w.r.t. 1 (Channel 1) or 5 w.r.t. 4 (Channel 2 – MTL4544A/44AS						
models only)							
IIC	6.2	5.01	1,351				
IIB*	55	20.06	5,406				
IIA	1,000	40.12	10,813				
I	1,000	65.82	17,740				
Hazardous Area Terr	minals 5 w.r.t. 1 (Char	nels 1 & 2 combined – M	MTL4544A/44AS models				
only)							
IIC	0.36	5.01	675				
IIB*	2.11	20.06	2,703				
IIA	8.7	40.12	5,406				
	12.16	65.82	8,870				

*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 L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
 - the total $C_{\rm i}$ of the external circuit (excluding the cable) is < 1% of the $C_{\rm o}$ value.

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- 2) The above parameters are reduced to 50% when both of the two conditions below are given:
 - the total L_i of the external circuit (excluding the cable) is $\geq 1\%$ of the L_o value and the total C_i of the external circuit (excluding the cable) is $\geq 1\%$ of the C_o 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.

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Schedule 3 – MTL4541S, MTL4541T, MTL4544S & MTL4544D Repeater Power Supplies, 4/20mA

The MTL4544S Two Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is designed to provides 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 MTL4544S Two 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 MTL4541S Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is a depopulated version of the MTL4544S and has only one channel populated.

The MTL4544D 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 MTL4544S but is populated with only one hazardous area transmitter connection and two non-hazardous area outputs fitted.

The MTL4541T Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is similar to the MTL4541S but is fitted with different voltage and current limitation components and therefore has different output parameters.

Model Range

MTL4541S	Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters
MTL4541T	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4544S	Two Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters
MTL4544D	Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters with Two Outputs

Input / Output Parameters

MTL4541S, MTL4544S & MTL4544D Input / Output Parameters

Non-hazardous Area Terminals 8, 9, 11, 12, 13 & 14

 $U_m = 253V r.m.s.$

The apparatus is designed to operate on non-hazardous area terminals 8, 9, 11, 12, 13 & 14 from a d.c. supply voltage of up to 35V.

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



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Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL4544S model)

 $\begin{array}{rclcrcl} U_{o} &=& 28V & & C_{i} &=& 0 \\ I_{o} &=& 93mA & & L_{i} &=& 0 \\ P_{o} &=& 0.65W \end{array}$

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

<u>Or</u>

Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL4544S model)

Uo	=	1.1V	Ui	=	30V	Ci	=	0
lo	=	53mA	li	=	121mA	Li	=	0
Po	=	15mW						

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 3 w.r.t. 1 or terminals 6 w.r.t 4 (MTL4544S model only) are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

When an external intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source. Hazardous area terminals 2 and 5 must not be used when the source is connected.

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

<u>Or</u> <u>Hazardous Area Terminals 5 w.r.t. 6 (Channel 2 – MTL4544S model)</u>

 $P_{o} = 0.61W$

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

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

GROUP	CAPACITANCE	INDUCTANCE C	DR L/R RATIO
	(μF)	(mH)	(µH/ohm)
Hazardous Area	Ferminals 2 w.r.t. 1 or	5 w.r.t. 4 (MTL4544S on	ily)
IIC	0.083	4.2	56
IIB*	0.65	12.6	210
IIA	2.15	33.6	444
1	3.76	53.7	668
Hazardous Area	Ferminals 3 w.r.t. 1 or	6 w.r.t 4 (MTL4544S onl	y)
IIC	100	12.8	2,438
IIB*	1,000	47.8	8,932
IIA	1,000	104.7	18,140
1	1,000	156.2	28,229
Hazardous Area T	Ferminals 2 w.r.t. 3 or	5 w.r.t. 6 (MTL4544S on	ly)
IIC	0.083	4.9	59
IIB*	0.65	20.0	222
IIA	2.15	40.9	469
	3.76	59.1	710



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Notes:

- The above load parameters apply when one of the two conditions below is given:
 the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
 the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.
- \sim The choice percentation are reduced to 50% when both of the two conditions below are a
- 2) The above parameters are reduced to 50% when both of the two conditions below are given:
 - the total L_i of the external circuit (excluding the cable) is $\ge 1\%$ of the L_o value and - the total C_i of the external circuit (excluding the cable) is $\ge 1\%$ of the C_o value.

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

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

MTL4541T Input / Output Parameters

Non-hazardous Area Terminals 8, 9, 11, 13 & 14

 $U_m = 253V r.m.s.$

The apparatus is designed to operate on non-hazardous area terminals 8, 9, 11, 13 & 14 from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1

U₀	=	22V	Ci	=	0
lo	=	167mA	Li	=	0
Po	=	0.92W			

Hazardous Area Terminals 3 w.r.t. 1

U₀	=	1.0V	Ui	=	30V	Ci =	0
lo	=	53mA	li	=	121mA	L _i =	0
Po	=	14mW					

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 3 w.r.t. 1 are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

When an external intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source. Hazardous area terminal 2 must not be used when the source is connected.

Hazardous Area Terminals 2 w.r.t. 3

Uo	=	22V	Ci	=	0
lo	=	145mA	Li	=	0
P₀	=	0.80W			

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area	Terminals 2 w.r.t. 1			
IIC	0.165	0.91		39
IIB*	1.14	5.5		147
IIA	4.20	10.7		322
I I	6.00	16.4		517
Hazardous Area	Terminals 3 w.r.t. 1			
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I I	1,000	156.2		28,229
Hazardous Area	Ferminals 2 w.r.t. 3			
IIC	0.165	1.49		45
IIB*	1.14	7.5		174
IIA	4.20	14.9		381
I	6.00	22.5		575

Notes:

- The above load parameters apply when one of the two conditions below is given:
 the total L_i of the external circuit (excluding the cable) is < 1% of the L₀ value or
 the total C_i of the external circuit (excluding the cable) is < 1% of the C₀ value.
- 2) The above parameters are reduced to 50% when both of the two conditions below are given: - the total L_i of the external circuit (excluding the cable) is $\ge 1\%$ of the L_0 value and
 - the total C_i of the external circuit (excluding the cable) is $\ge 1\%$ of the C_0 value.

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

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

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Schedule 4 – MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

The MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is designed to provide a floating d.c. supply for energising a conventional 2 or 3-Wire 4/20mA Transmitter in the hazardous area and repeat these currents in the non-hazardous area, whilst restricting the transfer of energy from unspecified non-hazardous area equipment to the intrinsically safe circuits by means of limitation of current and voltage. The equipment also allows bi-directional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters comprises two 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 plug and sockets are provided for hazardous and non-hazardous area connections. A LED is fitted to provide power on indication.

Input / Output Parameters

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

$$U_{m} = 253V$$

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

Hazardous Area Terminals 2 w.r.t. 1

U₀	=	28V	Ci	=	0
lo	=	93mA	Li	=	0
P₀	=	0.65W			

Hazardous Area Terminals 3 w.r.t. 1

U₀	=	1.1V	(Ci	=	0		Ui	=	30V
lo	=	53mA	I	Li	=	0		li	=	121mA
Po	=	15mW								

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source.

Hazardous Area Terminal 2 must not be used when the source is connected to these terminals.

Hazardous Area Terminals 2 w.r.t. 3

U₀	=	28V	Ci	=	0
lo	=	87mA	Li	=	0
P₀	=	0.61W			



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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:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Are	ea 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 Are	ea Terminals 3 w.r.t. 1			
IIC	100	12.8		2,438
IIB**	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Are	ea Terminals 2 w.r.t. 3			
lic	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

Notes:

- 1) The above load parameters apply when one of the two conditions below is given: - the total L_i of the external circuit (excluding the cable) is < 1% of the L_0 value or
 - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.
- 2) The above parameters are reduced to 50% when both of the two conditions below are given: - the total L_i of the external circuit (excluding the cable) is $\ge 1\%$ of the L_0 value and
 - the total C_i of the external circuit (excluding the cable) is $\ge 1\%$ of the C₀ value.

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

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Schedule 5 – MTL4541YA Single Channel Current Repeater, 4/20mA Passive Input for Smart Transmitters

The MTL4541YA Single Channel Current Repeater, 4/20mA Passive Input for Smart Transmitters is designed to repeat a current signal from a separately powered 4/20mA transmitter located in the hazardous area to unspecified equipment location in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area equipment to the intrinsically safe equipment by means of voltage and current limitation. The equipment also allows bi-directional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The equipment comprises two isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, fuses, diodes, zener diodes 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 plug and sockets are provided for hazardous and non-hazardous area connections. The equipment is fitted with a power-on LED indication.

Input / Output Parameters

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

$$U_m = 253V$$

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

Hazardous Area Terminals 2 w.r.t. 1

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

Although the apparatus does not itself comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when the hazardous area terminals are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

The hazardous area terminals are also considered suitable for the connection of an external intrinsically safe source with a $U_0 = 30V$ and $I_0 = 100$ mA having a source resistance of U_0/I_0 connected to hazardous area terminals 2 w.r.t. 1. The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Load Parameters

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:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
IIC	6.2	5.01		1,351
IIB*	55	20.06		5,406
IIA	1,000	40.12		10,813
I	1,000	65.82		17,740

** 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 L_i of the external circuit (excluding the cable) is < 1% of the L_0 value or
 - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.
- 2) The above parameters are reduced to 50% when both of the two conditions below are given:
 - the total L_i of the external circuit (excluding the cable) is $\ge 1\%$ of the L_0 value and
 - the total C_i of the external circuit (excluding the cable) is $\geq 1\%$ of the C_o value.

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

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Schedule 6 – MTL5541 / MTL5541-T / MTL5544 Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

The MTL5544 Two Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is designed to provide a floating d.c. supply for energising two conventional 2 or 3-Wire 4/20mA transmitters or a 'smart' transmitter 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 the means of limitation of voltage and current. 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 MTL5544 Two Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire 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. A power indicator LED is fitted to the top of the equipment.

The MTL5541 Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is a depopulated version of the MTL5544 and has only one channel populated.

The MTL5541-T Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is of similar construction to the MTL5541 variants of the equipment with the same input and output parameters, but has an extended ambient temperature range of -20°C to +65°C.

Input / Output Parameters

Non-Hazardous Area Terminals 7 to 14 (10 to 14 on MTL5541 & MTL5541-T models)

 $U_{m} = 253V$

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

Hazardous Area Terminals 2 w.r.t. 1

or								
Haz	ardo	ous /	Area Termin	als 5 w	.r.t 4	(MT	L5544 model only)	
	U₀	=	28V		Ci	=	0	
	lo	=	93mA		Li	=	0	
	Po	=	0.65W					
Haz	ardo	ous /	Area Termin	als 3 w	.r.t. ′	1		
or						-		
Haz	ardo	ous /	Area Termin	als 6 w	.r.t 4	(MT	L5544 model only)	
	U。	=	1.1V		Ui	=	30V	
	l _o	=	53mA		li	=	121mA	

 $\begin{array}{rcl} U_{0} &=& 1.1V & & U_{i} &=& 30V \\ I_{0} &=& 53mA & & I_{i} &=& 121mA \\ P_{0} &=& 15mW & & \\ C_{i} &=& 0 & & \\ L_{i} &=& 0 & & \end{array}$

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source. Issue No. 1

Hazardous area terminals 2 and 5 must not be used when the source is connected to these terminals. <u>Hazardous Area Terminals 2 w.r.t. 3</u>

or Hazardous Area Terminals 5 w.r.t 6 (MTL5544 model only)

 $\begin{array}{rcl} U_{o} &=& 28V & & C_{i} &=& 0 \\ I_{o} &=& 87mA & & L_{i} &=& 0 \\ P_{o} &=& 0.61W \end{array}$

On the MTL5544 each channel must be considered as a separate intrinsically safe circuit.

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

GROUP	CAPACITANCE (µF)	INDUCTANCE O (mH)		L/R RATIO (µH/ohm)
Hazardous Are	ea Terminals 2 w.r.t. 1 or	⁻ 5 w.r.t. 4		
IIC	0.083	4.2		56
IIB*	0.65	12.6		210
IIA	2.15	33.6		444
	3.76	53.7		668

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Are	ea Terminals 3 w.r.t. 1 or	⁻ 6 w.r.t. 4		
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	0 104.7		18,140
1	1,000	156.2		28,229
Hazardous Are	ea Terminals 2 w.r.t. 3 or	⁻ 5 w.r.t. 6		
IIC	0.083	4.9		59
IIB*	0.65	20.0		222
IIA	IIA 2.15 4			469
	3.76	59.1		710

* 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 L_i of the external circuit (excluding the cable) is < 1% of the L_0 value or

- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.
- 2) The above parameters are reduced to 50% when both of the two conditions below are given: - the total L_i of the external circuit (excluding the cable) is $\ge 1\%$ of the L_0 value and
 - the total C_i of the external circuit (excluding the cable) is $\geq 1\%$ of the C_o value.

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

The values of L_0 and C_0 determined by this method shall not be exceeded by the sum of all the L_i plus cable inductances in the circuit and the sum of all of the C_i plus cable capacitances respectively.

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Schedule 7 – MTL5541A / MTL5541AS Single Channel & MTL5544A / MTL5544AS Two Channel Current Repeater

The MTL5544A Two Channel Current Repeater is designed to repeat up to two 4-20mA current signals from separately powered 4/20mA transmitters located in the hazardous area to unspecified apparatus in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by the means of limitation of current and voltage. The apparatus also allows bidirectional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The MTL5544A Current Repeater comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, fuses, zener diodes and resistors providing voltage and current limitation on each channel. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for hazardous and non-hazardous area connections. The apparatus is fitted with a Power-on LED indication.

The MTL5541A Single Channel Current Repeater is a depopulated version of the MTL5544A and has only one channel populated.

Minor changes to the non-hazardous are circuitry of both models of the apparatus form the MTL5541AS Single Channel and MTL5544AS Two Channel Current Repeater. These models use the same common PCB and enclosure and in terms of intrinsic safety are identical.

Input/Output Parameters

Non-Hazardous Area Terminals 8, 9, 11, 12, 13 & 14)

 $U_m = 253V r.m.s.$

The circuit connected to non-hazardous area terminals 8, 9, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

<u>Hazardous Area Terminals 2 w.r.t. 1 (Channel 1)</u> Or <u>Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL5544A / 5544AS models only)</u>

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

Although the apparatus does not itself comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when each hazardous area channel is connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

Each hazardous area channel is also considered suitable for the connection of an external intrinsically safe source with a $U_0 = 30V$ and $I_0 = 100mA$ having a source resistance of U_0/I_0 to be connected to hazardous area terminals 2 w.r.t. 1 - Channel 1 and 5 w.r.t. 4 – Channel 2.

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The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

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

Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined with Terminals 2 & 4 connected together – MTL5544A / 5544AS models only)

 $U_o = 17.2V (Diode)$ $C_i = 0$ $I_o = 0$ $L_i = 0$

 $l_{o} = 0$ $P_{o} = 0$

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

The connection of channel 1 and 2 together is also considered suitable for the connection of an external intrinsically safe source with a $U_0 = 30V$ and $I_0 = 100$ mA having a source resistance of U_0/I_0 to be connected to hazardous area terminals 5 w.r.t. 1.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Load Parameters

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

GROUP	CAPACITANCE	INDUCTANCE C	DR L/R RATIO
	(µF)	(mH)	(µH/ohm)
Hazardous Area Termin	als 2 w.r.t. 1 (Channel 1)) or 5 w.r.t. 4 (Channel 2 –	MTL5544A/44AS models only)
IIC	6.2	5.01	1,351
IIB*	55	20.06	5,406
IIA	1,000	40.12	10,813
1	1,000	65.82	17,740
Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined – MTL5544A/44AS models only)			4A/44AS models only)
IIC	0.36	5.01	675
IIB*	2.11	20.06	2,703
IIA	8.7	40.12	5,406
	12.16	65.82	8,870

*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 L_i of the external circuit (excluding the cable) is < 1% of the L_0 value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.
- 2) The above parameters are reduced to 50% when both of the two conditions below are given:
 - the total L_i of the external circuit (excluding the cable) is $\ge 1\%$ of the L_0 value and
 - the total C_i of the external circuit (excluding the cable) is $\geq 1\%$ of the C₀ value.

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

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Schedule 8 – MTL5541S, MTL5541S-T, MTL5544S, MTL5544D & MTL5544D-L Repeater Power Supplies, 4/20mA

The MTL5544S Two 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 MTL5544S Two 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 MTL5541S Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is a depopulated version of the MTL5544S and has only one channel populated.

The MTL5541S-T Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is of a similar construction to the MTL5541S variant of the equipment with the same input and output parameters, but has an extended ambient temperature range of -20°C to +65°C.

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 MTL5544S but is populated with only one hazardous area transmitter connection and two non-hazardous area outputs fitted.

The MTL5544D-L Repeater Power Supply, 4/20mA for 2 or 3 Wire Transmitters is of a similar construction to the MTL5544D variant of the equipment with the same input and output parameters, but has an extended ambient temperature range of -40°C to +60°C.

Input/Output Parameters

Non-hazardous Area Terminals 8, 9, 11, 12, 13 & 14

 $U_m = 253V r.m.s.$

The apparatus is designed to operate on non-hazardous area terminals 8, 9, 11, 12, 13 & 14 from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1 (Channel 1)Or
Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL5544S model) $U_o = 28V$ $C_i = 0$ $I_o = 93mA$ $L_i = 0$



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

Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL5544S model)

Uo	=	1.1V	Ui	=	30V	Ci	=	0
lo	=	53mA	li	=	121mA	Li	=	0
Po	=	15mW						

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 3 w.r.t. 1 or terminals 6 w.r.t 4 (MTL5544S model only) are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

When an external intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source. Hazardous area terminals 2 and 5 must not be used when the source is connected.

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

<u>Or</u> <u>Hazardous Area Terminals 5 w.r.t. 6 (Channel 2 – MTL5544S model)</u>

U₀	=	28V	Ci	=	0	
lo	=	87mA	Li	=	0	
P₀	=	0.61W				

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

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

GROUP	CAPACITANCE	INDUCTANCE C	DR L/R RATIO	
	(μF)	(mH)	(µH/ohm)	
Hazardous Area	Ferminals 2 w.r.t. 1 or	5 w.r.t. 4 (MTL5544S on	ly)	
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	Ferminals 3 w.r.t. 1 or	6 w.r.t 4 (MTL5544S onl	y)	
IIC	100	12.8	2,438	
IIB*	1,000	47.8	8,932	
IIA	1,000	104.7	18,140	
I	1,000	156.2	28,229	
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t. 6 (MTL5544S only)				
IIC	0.083	4.9	59	
IIB*	0.65	20.0	222	
IIA	2.15	40.9	469	
	3.76	59.1	710	

Notes:

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1) The above load parameters apply when one of the two conditions below is given: - the total L_i of the external circuit (excluding the cable) is < 1% of the L_0 value or

- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

- 2) The above parameters are reduced to 50% when both of the two conditions below are given:
 - the total L_i of the external circuit (excluding the cable) is \geq 1% of the L_o value and
 - the total C_i of the external circuit (excluding the cable) is $\ge 1\%$ of the C_o value.

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

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