IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

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Certificate No.:	**IECEx BAS 23.0015**	Page 1 of 3	Certificate history:
Status:	**Current**	Issue No: 0	
Date of Issue:	2023-05-05		
Applicant:	**Eaton Electric Limited** Great Marlings Butterfield Luton Bedfordshire LU2 8DL **United Kingdom**		
Equipment:	**MTL4500 & MTL5500 Series Galvanic Isolators – Miscellaneous modules**		
Optional accessory:			
Type of Protection:	**Intrinsic Safety**		
Marking:	**[Ex ia Ga] IIC** **[Ex ia Da] IIIC** **[Ex ia Ma] I** **-20°C ≤ Ta ≤ +60°C**		

Approved for issue on behalf of the IECEx Certification Body: **Mr R S Sinclair**

Position: **Technical Manager**

Signature: (for printed version)

Date: (for printed version) 5/5/2023

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Rockhead Business Park
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Buxton, Derbyshire, SK17 9RZ
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IECEx Certificate of Conformity

Certificate No.: **IECEx BAS 23.0015**

Date of issue: 2023-05-05

Issue No: 0

Manufacturer: **Eaton Electric Limited**
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MTL Instruments PVT Limited
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This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

GB/BAS/ExTR23.0021/00

Quality Assessment Reports:

GB/BAS/QAR06.0022/10 GB/BAS/QAR07.0017/10

IECEx Certificate of Conformity

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

This certificate covers the following types:

- MTL4573 & MTL4573Y Temperature Converter.
- MTL4575 Temperature Converter.
- MTL4576 Two Channel & MTL4575B Single Channel Temperature Converter.
- MTL4581 Millivolt / Thermocouple Isolator.
- MTL4582B Resistance Isolator.
- MTL4531 Single Channel & MTL4533 Two Channel Vibration Transducer Interfaces.
- MTL4532 Pulse Isolator.
- MTL4561 Two Channel Fire / Smoke Detector Interface.
- MTL5573 Temperature Converter.
- MTL5575 Temperature Converter.
- MTL5576 Two Channel & MTL5575B Single Channel Temperature Converter.
- MTL5581 Millivolt / Thermocouple Isolator.
- MTL5582 Resistance Isolator.
- MTL5582B Resistance Isolator.
- MTL5531 Single Channel & MTL5533 Two Channel Vibration Transducer Interfaces.
- MTL5532 Pulse Isolator.
- MTL5561 Two Channel Fire / Smoke Detector Interface.
- MTL5553 Foundation Fieldbus Isolator / Power Supply.

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

SPECIFIC CONDITIONS OF USE: NO

Annex:

IECEx BAS 23.0015 Annex.pdf

Schedule 1 – MTL4573 & MTL4573Y Temperature Converter

The MTL4573 & MTL4573Y Temperature Converters are designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to either thermocouples or RTD's located in the hazardous area by limitation of voltage and current. A transformer and opto-isolator provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL4573 & MTL4573Y Temperature Converters are designed for connection to thermocouples or two, three or four wire RTD's situated in the hazardous area. The apparatus converts the low level d.c. signal from the sensor mounted in the hazardous area into a 4/20mA current for driving a load in the non-hazardous area. An optional cold junction compensation (CJC) plug can be fitted to the hazardous area connections which alters the internal connections and affects the output parameters.

The apparatus comprises an isolating transformer, an opto-isolator, duplicated zener diode 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 equipment.

The MTL4573Y Temperature Converter differs from the MTL4573 with regard to the configuration of the non-hazardous area circuitry. In terms of intrinsic safety, both are identical.

Input/Output Parameters

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

U_m = 253V r.m.s.

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

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

U_o = 6.6V C_i = 0
I_o = 76mA L_i = 0
P_o = 0.13W

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

U_o = 1.1V C_i = 0
I_o = 7mA L_i = 0
P_o = 2mW

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

U_o = 6.6V C_i = 0
I_o = 10mA L_i = 0
P_o = 17mW

Programming / Configuration Port (Jack Socket)

U_o = 8V U_i = 9.1V
I_o = 14.6mA
P_o = 26mW
C_i = 0
L_i = 0

The capacitance and either the inductance or the 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:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 1 to 6				
IIC	22	6.42		288
IIB*	500	25.6		1,057
IIA	1,000	53.0		2,228
I	1,000	77.2		3,402
Programming / Configuration Port (Jack Socket)				
IIC	0.367	153		349
IIB*	2.15	591		1,355
IIA	8.8	1,000		1,453
I	12.32	1,000		1,453

* 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_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 ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 2 – MTL4575 Temperature Converter

The MTL4575 Temperature Converter is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to either thermocouples or RTD's located in the hazardous area by limitation of voltage and current. A transformer and opto-isolator provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL4575 Temperature converter is designed for connection to thermocouples or two, three or four wire RTD's situated in the hazardous area. The apparatus converts the low level d.c. signal from the sensor mounted in the hazardous area into a 4/20mA current for driving a load in the non-hazardous area. An optional cold junction compensation plug can be fitted to the hazardous area connections, which alters the internal connections and affects the output parameters.

The apparatus comprises an isolating transformer, an opto-isolator, duplicated zener diode 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.

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.

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

U_o = 6.6V C_i = 0
I_o = 76mA L_i = 0
P_o = 0.13W

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

U_o = 1.1V C_i = 0
I_o = 7mA L_i = 0
P_o = 2mW

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

U_o = 6.6V C_i = 0
I_o = 10mA L_i = 0
P_o = 17mW

Programming / Configuration Port (Jack Socket)

U_o = 8V U_i = 9.1V
I_o = 14.6mA
P_o = 26mW
C_i = 0
L_i = 0

The capacitance and either the inductance or the 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:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 1 to 6				
IIC	22	6.42		288
IIB*	500	25.6		1,057
IIA	1,000	53.0		2,228
I	1,000	77.2		3,402
Programming / Configuration Port (Jack Socket)				
IIC	0.367	153		349
IIB*	2.15	591		1,355
IIA	8.8	1,000		1,453
I	12.32	1,000		1,453

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 3 – MTL4576 Two Channel & MTL4575B Single Channel Temperature Converter

The MTL4576 Two Channel Temperature Converter is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to either up to two thermocouples or RTD's located in the hazardous area by limitation of voltage and current. A transformer and opto-isolators provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL4576 Two Channel Temperature Converter is designed for connection of thermocouples or two, three or four wire RTD's situated in the hazardous area. The apparatus converts the low level d.c. signal from the sensor mounted in the hazardous area into a 4/20mA current for driving a load in the non-hazardous area. The apparatus comprises an isolating transformer, opto-isolators, 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 MTL4575B Single Channel Temperature Converter comprises the same circuitry and enclosure as the MTL4576, the only difference being is it only has one channel for the connection of thermocouples or two, three or four wire RTD's situated in the hazardous area. In terms of intrinsic safety, both the MTL4576 & MTL4575B 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.

Hazardous Area Terminals 1, 2, 3 & 4 (forming part of the same intrinsically safe circuit)

U_o = 6.6V C_i = 0
I_o = 42mA L_i = 0
P_o = 69.3mW

Hazardous Area Terminals 1, 2 & 3 (Channel 1)
or
Hazardous Area Terminals 4, 5 & 6 (Channel 2 – MTL4576 model only)

U_o = 6.6V C_i = 0
I_o = 28mA L_i = 0
P_o = 46.2mW

Hazardous Area Terminals 3 w.r.t. 1 (Channel 1)
or
Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL4576 model only)

U_o = 1.2V U_i = 5V
I_o = 4mA C_i = 0
P_o = 1.2mW L_i = 0

Programming / Configuration Port (Jack Socket)

U_o = 6.68V U_i = 9.1V
I_o = 12mA C_i = 0
P_o = 17.7mW L_i = 0

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous area terminals 1, 2, 3 & 4 (forming part of the same intrinsically safe circuit)			
IIC	22.0	20.1	513
IIB*	500	80.6	2,052
IIA	1,000	161.2	4,104
I	1,000	264.5	6,363
Hazardous area terminals 1, 2 & 3 (Channel 1) or terminals 4, 5 & 6 (Channel 2 – MTL4576 only)			
IIC	11.0	22.6	384
IIB*	250	90.7	1,539
IIA	500	181.4	2,121
I	500	297.6	2,121
Hazardous area terminals 3 w.r.t. 1 (channel 1) or terminals 6 w.r.t. 4 (Channel 2 – MTL4576 only)			
IIC	50	500	1,666
IIB*	500	500	1,666
IIA	500	500	1,666
I	500	500	1,666
Programming / Configuration Port (Jack Socket)			
IIC	0.478	79.4	448
IIB*	2.88	317.9	1,412
IIA	11.6	635.8	1,412
I	15.8	1,000	1,412

* 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_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 ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 4 – MTL4581 Millivolt / Thermocouple Isolator

The MTL4581 Millivolt / Thermocouple Isolator are designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to a low-level d.c. signal from a voltage source or thermocouple located in the hazardous area by limitation of voltage and current. Two transformers provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL4581 Millivolt / Thermocouple Isolator are designed for connection to a low level d.c. signal from a voltage source of thermocouple situated in the hazardous area. The equipment isolates and passes the signal to the receiving equipment located in the non-hazardous area.

The apparatus comprises two isolating transformers, duplicated zener diodes and current limiting 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 a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections.

Input/Output Parameters

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

U_m = 253V r.m.s.

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

Hazardous Area Terminals 1 & 2

U_o	=	1.1V	U_i	=	28V	C_i	=	0
I_o	=	53mA	I_i	=	120mA	L_i	=	0.5mH
P_o	=	15mW						

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 1 & 2 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.

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
IIC	100	12.3		2,438
IIB*	1,000	47.3		8,932
IIA	1,000	104.2		18,140
I	1,000	155.7		28,229

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 5 – MTL4582B Resistance Isolator

The MTL4582B Resistance Isolator is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to a Resistance Temperature Device (RTD) or other resistance located in the hazardous area by limitation of voltage and current. A transformer and opto-isolator provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL4582B Resistance Isolator is designed for the connection to a 2-wire, 3-wire or 4-wire RTD or other resistance situated in the hazardous area. The equipment repeats the resistance on the non-hazardous area output terminals for connection to a monitoring system.

The apparatus comprises an isolating transformer, opto-isolator, duplicated zener diodes and current limiting 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 a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. A jack socket is provided for connection of a suitably certified data terminal for programming the equipment. An LED is fitted to provide power on indication.

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.

Hazardous Area Terminals 1, 3, 4 & 5

U_o = 6.51V C_i = 0
I_o = 10mA L_i = 0
P_o = 16.1mW

Hazardous Area Terminals 1, 3 & 4

U_o = 6.51V C_i = 0
I_o = 6mA L_i = 0
P_o = 9.2mW

Hazardous Area Terminals 3 w.r.t. 1

U_o = 1.2V U_i = 5V
I_o = 4mA C_i = 0
P_o = 1.2mW L_i = 0

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.

Programming / Configuration Port (Jack Socket)

U_o = 6.68V U_i = 9.1V
I_o = 12mA C_i = 0
P_o = 17.7mW L_i = 0

Load Parameters

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous area terminals 1, 3, 4 & 5			
IIC	22.0	355.5	1,536
IIB*	500	1,000	1,536
IIA	1,000	1,000	1,536
I	1,000	1,000	1,536
Hazardous area terminals 1, 3 & 4			
IIC	22.0	987.6	921
IIB*	500	1,000	921
IIA	1,000	1,000	921
I	1,000	1,000	921
Hazardous area terminals 3 w.r.t. 1			
IIC	100	1,000	3,333
IIB*	1,000	1,000	3,333
IIA	1,000	1,000	3,333
I	1,000	1,000	3,333
Programming / Configuration Port (Jack Socket)			
IIC	0.478	79.4	448
IIB*	2.88	317.9	1,412
IIA	11.6	635.8	1,412
I	15.8	1,000	1,412

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 6 – MTL4531 Single Channel & MTL4533 Two Channel Vibration Transducer Interfaces

The MTL4533 Two Channel Vibration Transducer Interface is designed to restrict the transfer of energy from unspecified apparatus in the nonhazardous area to up to two intrinsically safe vibration transducers by limitation of voltage and current. Two transformers and two opto-isolators provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The apparatus comprises two isolating transformer, two opto-isolators and detection circuits with zener diode and resistor combinations 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 MTL4531 Single Channel Vibration Transducer Interface is a depopulated version of the MTL4533 with only one channel populated.

Input/Output Parameters

Non-Hazardous Area Terminals 7, 8, 11, 12, 13 & 14)

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 7, 8, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 3 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL4533 model only)

U_o	=	26.6V	C_i	=	0
I_o	=	86mA	L_i	=	0
P_o	=	0.66W			

Hazardous Area Terminals 3 w.r.t. 2 (Channel 1)
Or
Hazardous Area Terminals 6 w.r.t. 5 (Channel 2 – MTL4533 model only)

U_o	=	1.1V	U_i	=	28V
I_o	=	0.11mA	C_i	=	0
P_o	=	0.03mW	L_i	=	0

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 channel must be considered as a separate intrinsically safe circuit.

Load Parameters

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 3 w.r.t. 1 or Terminals 6 w.r.t. 4 (MTL4533 only)			
IIC	0.094	4.02	56
IIB*	0.73	16.09	227
IIA	2.42	32.19	455
I	4.27	52.81	746
Hazardous Area Terminals 3 w.r.t. 2 or Terminals 6 w.r.t. 5 (MTL4533 only)			
IIC	100	1,000	1,000
IIB*	1,000	1,000	1,000
IIA	1,000	1,000	1,000
I	1,000	1,000	1,000

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 7 – MTL4532 Pulse Isolator

The MTL4532 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 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 nonhazardous 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.

Input / Output Parameters

Non-Hazardous Area Terminals 7 to 14

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 7, 8, 9, 10, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Non-hazardous area terminals 11 & 12 are connected to relay contacts which can switch up to 250V r.m.s. or 5A r.m.s. or 100VA.

Hazardous Area Terminals 2 w.r.t. 1, Hazardous Area Terminals 6 w.r.t. 1 or Hazardous Area Terminals 6 w.r.t. 3

U_o = 10.5V C_i = 0
I_o = 14mA L_i = 0
P_o = 37mW

Hazardous Area Terminals 3 w.r.t. 1

U_o = 1.1V U_i = 30V C_i = 0
I_o = 53mA I_i = 100mA L_i = 0
P_o = 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 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, 4, 5 and 6 must not be used when the source is connected.

Hazardous Area Terminals 5 w.r.t. 1

U_o = 10.5V C_i = 0
I_o = 1.1mA L_i = 0
P_o = 2.9mW

Hazardous Area Terminals 4 w.r.t. 3

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

Hazardous Area Terminals 4 & 3 w.r.t. 1

U_o = 28V C_i = 0
I_o = 93mA at 28V L_i = 0
I_o = 146mA at 2.9V
P_o = 0.65W

Hazardous Area Terminals 5 & 4 w.r.t. 1

U_o = 28V C_i = 0
I_o = 93mA at 28V L_i = 0
I_o = 94mA at 27.5V
P_o = 0.65W

Programming / Configuration Port (Jack Socket)

U_o = 8V P_o = 27mW C_i = 0
I_o = 15mA U_i = 9.1V L_i = 0

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the 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, Hazardous Area Terminals 6 w.r.t. 1 or Hazardous Area Terminals 6 w.r.t. 3			
IIC	2.41	181.4	967
IIB*	16.8	725.6	1,333
IIA	75.0	1,000	1,333
I	95.0	1,000	1,333
Hazardous Area Terminals 3 w.r.t. 1			
IIC	100	12.6	2,439
IIB*	1,000	50.6	9,757
IIA	1,000	101.2	19,515
I	1,000	166.1	32,018
Hazardous Area Terminals 5 w.r.t. 1			
IIC	2.41	1,000	12,313
IIB*	16.8	1,000	49,254

IIA	75.0	1,000	98,508
I	95.0	1,000	161,616
Hazardous Area Terminals 4 w.r.t. 3			
IIC	0.083	4.2	55
IIB*	0.65	12.6	210
IIA	2.15	33.6	444
I	3.76	53.7	668
Hazardous Area Terminals 4 & 3 w.r.t. 1			
IIC	0.083	1.66	55
IIB*	0.65	6.67	210
IIA	2.15	13.3	444
I	3.76	21.8	668
Hazardous Area Terminals 5 & 4 w.r.t. 1			
IIC	0.083	4.02	55
IIB*	0.65	16.0	210
IIA	2.15	32.1	444
I	3.76	52.8	668
Programming / Configuration Port (Jack Socket)			
IIC	0.367	60.7	360
IIB*	2.15	243.0	1,441
IIA	8.8	486.1	1,484
I	12.32	797.5	1,484

*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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 8 – MTL4561 Two Channel Fire / Smoke Detector Interface

The MTL4561 Two Channel Fire / Smoke Detector Interface is designed to provide two separate loop-powered interface channels for the connection of fire and smoke detectors located in the hazardous area to unspecified apparatus in the nonhazardous area whilst restricting the transfer of energy from unspecified non-hazardous area apparatus to the intrinsically safe circuits by limitation of voltage and current.

The MTL4561 Two Channel Fire / Smoke Detector Interface comprises two 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 and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and nonhazardous area connections.

Input/Output Parameters

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

U_m = 253V r.m.s.

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

Hazardous Area Terminals 2 & 3 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 5 & 6 w.r.t. 4 (Channel 2)

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

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 to either channel of the apparatus must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/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 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.

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

Schedule 9 – MTL5573 Temperature Converter

The MTL5573 Temperature Converter is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to either thermocouples or RTD's located in the hazardous area by limitation of voltage and current. A transformer and opto-isolator provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL5573 Temperature Converter is designed for connection to thermocouples or two, three or four wire RTD's situated in the hazardous area. The apparatus converts the low level d.c. signal from the sensor mounted in the hazardous area into a 4/20mA current for driving a load in the non-hazardous area. An optional cold junction compensation (CJC) plug can be fitted to the hazardous area connections which alters the internal connections and affects the output parameters.

The apparatus comprise an isolating transformer, an opto-isolator, duplicated zener diode 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 equipment.

Input/Output Parameters

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

U_m = 253V r.m.s.

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

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

U_o = 6.6V C_i = 0
I_o = 76mA L_i = 0
P_o = 0.13W

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

U_o = 1.1V C_i = 0
I_o = 7mA L_i = 0
P_o = 2mW

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

U_o = 6.6V C_i = 0
I_o = 10mA L_i = 0
P_o = 17mW

Programming / Configuration Port (Jack Socket)

U_o = 8V U_i = 9.1V
I_o = 14.6mA
P_o = 26mW
C_i = 0
L_i = 0

The capacitance and either the inductance or the 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:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 1 to 6				
IIC	22	6.42		288
IIB*	500	25.6		1,057
IIA	1,000	53.0		2,228
I	1,000	77.2		3,402
Programming / Configuration Port (Jack Socket)				
IIC	0.367	153		349
IIB*	2.15	591		1,355
IIA	8.8	1,000		1,453
I	12.32	1,000		1,453

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 10 – MTL5575 Temperature Converter

The MTL5575 Temperature Converter is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to either thermocouples or RTD's located in the hazardous area by limitation of voltage and current. A transformer and opto-isolators provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL5575 Temperature converter is designed for connection to thermocouples or two, three or four wire RTD's situated in the hazardous area. The apparatus converts the low level d.c. signal from the sensor mounted in the hazardous area into a 4/20mA current for driving a load in the non-hazardous area. An optional cold junction compensation plug can be fitted to the hazardous area connections, which alters the internal connections and affects the output parameters.

The apparatus comprises an isolating transformer, opto-isolators, duplicated zener diode 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.

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.

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

U_o = 7.2V C_i = 0
I_o = 76mA L_i = 0
P_o = 0.14W

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

U_o = 1.1V C_i = 0
I_o = 7mA L_i = 0
P_o = 2mW

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

U_o = 7.2V C_i = 0
I_o = 10mA L_i = 0
P_o = 18mW

Programming / Configuration Port (Jack Socket)

U_o = 8V U_i = 9.1V
I_o = 14.6mA
P_o = 26mW
C_i = 0
L_i = 0

The capacitance and either the inductance or the 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: -

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 1 to 6			
IIC	13.5	6.42	263
IIB*	240	25.6	969
IIA	1,000	53.0	2,042
I	1,000	77.2	3,119
Programming / Configuration Port (Jack Socket)			
IIC	0.367	153	349
IIB*	2.15	591	1,355
IIA	8.8	1,000	1,453
I	12.32	1,000	1,453

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 11 – MTL5576 Two Channel & MTL5575B Single Channel Temperature Converter

The MTL5576 Two Channel Temperature Converter is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to either up to two thermocouples or RTD's located in the hazardous area by limitation of voltage and current. A transformer and opto-isolators provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL5576 Two Channel Temperature Converter is designed for connection of thermocouples or two, three or four wire RTD's situated in the hazardous area. The apparatus converts the low level d.c. signal from the sensor mounted in the hazardous area into a 4/20mA current for driving a load in the non-hazardous area.

The apparatus comprises an isolating transformer, opto-isolators, 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 MTL5575B Single Channel Temperature Converter comprises the same circuitry and enclosure as the MTL5576, the only difference being is it only has one channel for the connection of thermocouples or two, three or four wire RTD's situated in the hazardous area. In terms of intrinsic safety, both the MTL5576 & MTL5575B 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.

Hazardous Area Terminals 1, 2, 3 & 4 (forming part of the same intrinsically safe circuit)

U_o = 6.6V C_i = 0
I_o = 42mA L_i = 0
P_o = 69.3mW

Hazardous Area Terminals 1, 2 & 3 (Channel 1)
or
Hazardous Area Terminals 4, 5 & 6 (Channel 2 – MTL5576 model only)

U_o = 6.6V C_i = 0
I_o = 28mA L_i = 0
P_o = 46.2mW

Hazardous Area Terminals 3 w.r.t. 1 (Channel 1)
or
Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL5576 model only)

U_o = 1.2V U_i = 5V
I_o = 4mA C_i = 0
P_o = 1.2mW L_i = 0

Programming / Configuration Port (Jack Socket)

U_o = 6.68V U_i = 9.1V
I_o = 12mA C_i = 0
P_o = 17.7mW L_i = 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:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH) OR	L/R RATIO (µH/ohm)
Hazardous area terminals 1, 2, 3 & 4 (forming part of the same intrinsically safe circuit)			
IIC	22.0	20.1	513
IIB*	500	80.6	2,052
IIA	1,000	161.2	4,104
I	1,000	264.5	6,363
Hazardous area terminals 1, 2 & 3 (Channel 1) or terminals 4, 5 & 6 (Channel 2 – MTL5576 only)			
IIC	11.0	22.6	384
IIB*	250	90.7	1,539
IIA	500	181.4	2,121
I	500	297.6	2,121
Hazardous area terminals 3 w.r.t. 1 (channel 1) or terminals 6 w.r.t. 4 (Channel 2 – MTL5576 only)			
IIC	50	500	1,666
IIB*	500	500	1,666
IIA	500	500	1,666
I	500	500	1,666
Programming / Configuration Port (Jack Socket)			
IIC	0.478	79.4	448
IIB*	2.88	317.9	1,412
IIA	11.6	635.8	1,412
I	15.8	1,000	1,412

* 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_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 ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 12 – MTL5581 Millivolt / Thermocouple Isolator

The MTL5581 Millivolt / Thermocouple Isolator are designed to restrict the transfer of energy from unspecified non-hazardous area equipment to a low-level d.c. signal from a voltage source or thermocouple located in the hazardous area by limitation of voltage and current. Two transformers provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL5581 Millivolt / Thermocouple Isolator are designed for connection to a low level d.c. signal from a voltage source of thermocouple situated in the hazardous area.

The apparatus isolates and passes the signal to the receiving equipment located in the non-hazardous area. The apparatus comprises two isolating transformers, duplicated zener diodes and current limiting 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 a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections.

Input/Output Parameters

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

U_m = 253V r.m.s.

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

Hazardous Area Terminals 1 & 2

U_o	=	1.1V	U_i	=	28V	C_i	=	0
I_o	=	53mA	I_i	=	120mA	L_i	=	0.5mH
P_o	=	15mW						

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 1 & 2 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.

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
IIC	100	12.3		2,438
IIB*	1,000	47.3		8,932
IIA	1,000	104.2		18,140
I	1,000	155.7		28,229

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 13 – MTL5582 Resistance Isolator

The MTL5582 Resistance Isolator is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to a Resistance Temperature Device (RTD) or other resistance located in the hazardous area by limitation of voltage and current. A transformer and opto-isolator provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL5582 Resistance Isolator is designed for connection to a 2-wire, 3-wire or 4-wire RTD or other resistance situated in the hazardous area. The equipment repeats the resistance on the non-hazardous area output terminals for connection to a monitoring system.

The apparatus comprises an isolating transformer, opto-isolator, duplicated zener diodes and current limiting 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 a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. A jack socket is provided for connection of a suitably certified data terminal for programming the equipment.

Input/Output Parameters

Non-Hazardous Area Terminals 9, 10, 11, 12, 13 & 14

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 9, 10, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 1, 3, 4 & 5

U_o	=	6.6V	C_i	=	0
I_o	=	42mA	L_i	=	0
P_o	=	69.3mW			

Hazardous Area Terminals 1, 3 & 4

U_o	=	6.6V	C_i	=	0
I_o	=	28mA	L_i	=	0
P_o	=	46.2mW			

Hazardous Area Terminals 3 w.r.t. 1

U_o	=	1.2V	U_i	=	5V
I_o	=	4mA	C_i	=	0
P_o	=	1.2mW	L_i	=	0

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.

Programming / Configuration Port (Jack Socket)

U_o	=	6.68V	U_i	=	9.1V
I_o	=	12mA	C_i	=	0
P_o	=	17.7mW	L_i	=	0

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous area terminals 1, 3, 4 & 5				
IIC	22.0	20.1		513
IIB*	500	80.6		2,052
IIA	1,000	161.2		4,104
I	1,000	264.5		6,363
Hazardous area terminals 1, 3 & 4				
IIC	22.0	45.3		769
IIB*	500	181.4		3,078
IIA	1,000	362.8		4,242
I	1,000	595.2		4,242
Hazardous area terminals 3 w.r.t. 1				
IIC	100	1,000		3,333
IIB*	1,000	1,000		3,333
IIA	1,000	1,000		3,333
I	1,000	1,000		3,333
Programming / Configuration Port (Jack Socket)				
IIC	0.478	79.4		448
IIB*	2.88	317.9		1,412
IIA	11.6	635.8		1,412
I	15.8	1,000		1,412

*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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 14 – MTL5582B Resistance Isolator

The MTL5582B Resistance Isolator is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to a Resistance Temperature Device (RTD) or other resistance located in the hazardous area by limitation of voltage and current. A transformer and opto-isolator provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL5582B Resistance Isolator is designed for the connection to a 2-wire, 3-wire or 4-wire RTD or other resistance situated in the hazardous area. The equipment repeats the resistance on the non-hazardous area output terminals for connection to a monitoring system.

The apparatus comprises an isolating transformer, opto-isolator, duplicated zener diodes and current limiting 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 a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. A jack socket is provided for connection of a suitably certified data terminal for programming the equipment. An LED is fitted to provide power on indication.

Input / Output Parameters

Non-Hazardous Area Terminals 9, 10, 11, 12, 13 & 14

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 9, 10, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 1, 3, 4 & 5

U_o	=	6.51V	C_i	=	0
I_o	=	10mA	L_i	=	0
P_o	=	16.1mW			

Hazardous Area Terminals 1, 3 & 4

U_o	=	6.51V	C_i	=	0
I_o	=	6mA	L_i	=	0
P_o	=	9.2mW			

Hazardous Area Terminals 3 w.r.t. 1

U_o	=	1.2V	U_i	=	5V
I_o	=	4mA	C_i	=	0
P_o	=	1.2mW	L_i	=	0

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.

Programming / Configuration Port (Jack Socket)

U_o = 6.68V U_i = 9.1V
I_o = 12mA C_i = 0
P_o = 17.7mW L_i = 0

Load Parameters

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous area terminals 1, 3, 4 & 5			
IIC	22.0	355.5	1,536
IIB*	500	1,000	1,536
IIA	1,000	1,000	1,536
I	1,000	1,000	1,536
Hazardous area terminals 1, 3 & 4			
IIC	22.0	987.6	921
IIB*	500	1,000	921
IIA	1,000	1,000	921
I	1,000	1,000	921
Hazardous area terminals 3 w.r.t. 1			
IIC	100	1,000	3,333
IIB*	1,000	1,000	3,333
IIA	1,000	1,000	3,333
I	1,000	1,000	3,333
Programming / Configuration Port (Jack Socket)			
IIC	0.478	79.4	448
IIB*	2.88	317.9	1,412
IIA	11.6	635.8	1,412
I	15.8	1,000	1,412

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 15 – MTL5531 Single Channel & MTL5533 Two Channel Vibration Transducer Interfaces

The MTL5533 Two Channel Vibration Transducer Interface is designed to restrict the transfer of energy from unspecified apparatus in the nonhazardous area to up to two intrinsically safe vibration transducers by limitation of voltage and current. Two transformers and two opto-isolators provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The apparatus comprises two isolating transformer, two opto-isolators and detection circuits with zener diode and resistor combinations 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 MTL5531 Single Channel Vibration Transducer Interface is a depopulated version of the MTL5533 with only one channel populated.

Input/Output Parameters

Non-Hazardous Area Terminals 7, 8, 11, 12, 13 & 14)

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 7, 8, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 3 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL5533 model only)

U_o = 26.6V C_i = 0
I_o = 86mA L_i = 0
P_o = 0.66W

Hazardous Area Terminals 3 w.r.t. 2 (Channel 1)
Or
Hazardous Area Terminals 6 w.r.t. 5 (Channel 2 – MTL5533 model only)

U_o = 1.1V U_i = 28V
I_o = 0.11mA C_i = 0
P_o = 0.03mW L_i = 0

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 channel must be considered as a separate intrinsically safe circuit.

Load Parameters

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

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 3 w.r.t. 1 or Terminals 6 w.r.t. 4 (MTL5533 only)			
IIC	0.094	4.02	56
IIB*	0.73	16.09	227
IIA	2.42	32.19	455
I	4.27	52.81	746
Hazardous Area Terminals 3 w.r.t. 2 or Terminals 6 w.r.t. 5 (MTL5533 only)			
IIC	100	1,000	1,000
IIB*	1,000	1,000	1,000
IIA	1,000	1,000	1,000
I	1,000	1,000	1,000

* 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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 16 – MTL5532 Pulse Isolator

The 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 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 nonhazardous 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.

Input / Output Parameters

Non-Hazardous Area Terminals 7 to 14

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 7, 8, 9, 10, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Non-hazardous area terminals 11 & 12 are connected to relay contacts which can switch up to 250V r.m.s. or 5A r.m.s. or 100VA.

Hazardous Area Terminals 2 w.r.t. 1, Hazardous Area Terminals 6 w.r.t. 1 or Hazardous Area Terminals 6 w.r.t. 3

U_o = 10.5V C_i = 0
I_o = 14mA L_i = 0
P_o = 37mW

Hazardous Area Terminals 3 w.r.t. 1

U_o = 1.1V U_i = 30V C_i = 0
I_o = 53mA I_i = 100mA L_i = 0
P_o = 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 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, 4, 5 and 6 must not be used when the source is connected.

Hazardous Area Terminals 5 w.r.t. 1

U_o = 10.5V C_i = 0
I_o = 1.1mA L_i = 0
P_o = 2.9mW

Hazardous Area Terminals 4 w.r.t. 3

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

Hazardous Area Terminals 4 & 3 w.r.t. 1

U_o = 28V C_i = 0
I_o = 93mA at 28V L_i = 0
I_o = 146mA at 2.9V
P_o = 0.65W

Hazardous Area Terminals 5 & 4 w.r.t. 1

U_o = 28V C_i = 0
I_o = 93mA at 28V L_i = 0
I_o = 94mA at 27.5V
P_o = 0.65W

Programming / Configuration Port (Jack Socket)

U_o = 8V P_o = 27mW C_i = 0
I_o = 15mA U_i = 9.1V L_i = 0

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the 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, Hazardous Area Terminals 6 w.r.t. 1 or Hazardous Area Terminals 6 w.r.t. 3			
IIC	2.41	181.4	967
IIB*	16.8	725.6	1,333
IIA	75.0	1,000	1,333
I	95.0	1,000	1,333
Hazardous Area Terminals 3 w.r.t. 1			
IIC	100	12.6	2,439
IIB*	1,000	50.6	9,757
IIA	1,000	101.2	19,515
I	1,000	166.1	32,018
Hazardous Area Terminals 5 w.r.t. 1			
IIC	2.41	1,000	12,313
IIB*	16.8	1,000	49,254

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
IIA	75.0	1,000	98,508
I	95.0	1,000	161,616
Hazardous Area Terminals 4 w.r.t. 3			
IIC	0.083	4.2	55
IIB*	0.65	12.6	210
IIA	2.15	33.6	444
I	3.76	53.7	668
Hazardous Area Terminals 4 & 3 w.r.t. 1			
IIC	0.083	1.66	55
IIB*	0.65	6.67	210
IIA	2.15	13.3	444
I	3.76	21.8	668
Hazardous Area Terminals 5 & 4 w.r.t. 1			
IIC	0.083	4.02	55
IIB*	0.65	16.0	210
IIA	2.15	32.1	444
I	3.76	52.8	668
Programming / Configuration Port (Jack Socket)			
IIC	0.367	60.7	360
IIB*	2.15	243.0	1,441
IIA	8.8	486.1	1,484
I	12.32	797.5	1,484

*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_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 ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

Schedule 17 – MTL5561 Two Channel Fire / Smoke Detector Interface

The MTL5561 Two Channel Fire / Smoke Detector Interface is designed to provide two separate loop-powered interface channels for the connection of fire and smoke detectors located in the hazardous area to unspecified apparatus in the non-hazardous area whilst restricting the transfer of energy from unspecified non-hazardous area apparatus to the intrinsically safe circuits by limitation of voltage and current.

The MTL5561 Two Channel Fire / Smoke Detector Interface comprises two 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 and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and nonhazardous area connections.

Input/Output Parameters

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

U_m = 253V r.m.s.

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

Hazardous Area Terminals 2 & 3 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 5 & 6 w.r.t. 4 (Channel 2)

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

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 to either channel of the apparatus must not exceed the following values:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/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 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.

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

Schedule 18 – MTL5553 Foundation Fieldbus Isolator / Power Supply

The MTL5553 Foundation Fieldbus Isolator / Power Supply is designed to restrict the transfer of energy from unspecified non-hazardous area apparatus to Fieldbus equipment located in the hazardous area by limitation of voltage and current. Two transformers and an opto-isolator provide galvanic isolation between the hazardous and non-hazardous area circuitry.

The MTL5553 Foundation Fieldbus Isolator / Power Supply is designed for the connection to Fieldbus devices situated in the hazardous area. The apparatus provides power and communication to the Fieldbus devices through the signal conductors for connection to a Fieldbus Network located in the non-hazardous area. Terminals are also provided on the hazardous area side of the equipment to permit the connection of a suitably certified Fieldbus Communicator to permit diagnostics of the Fieldbus network.

The apparatus comprises two isolating transformers, an opto-isolator, duplicated zener diodes and current limiting 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 a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. An LED is fitted to provide power on indication.

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.

Hazardous Area Terminals 2/5 w.r.t. 1/4

U_o = 22V C_i = 0
I_o = 216mA L_i = 0
P_o = 1.2W

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the load connected to the hazardous area terminals 2/5 w.r.t. 1/4 must not exceed the following values: -

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
IIC	0.165	0.26	29
IIB*	1.14	0.79	119
IIA	4.2	2.12	239
I	6.0	9.54	392

*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_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 ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o 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.

The values of Lo and Co determined by this method shall not be exceeded by the sum of all of the Li plus cable inductances in the circuit and the sum of all of the Ci plus cable capacitances respectively.