



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx BAS 05.0019 issue No.:4

Status: **Current**

Date of Issue: 2017-01-19 Page 1 of 4

Certificate history:
Issue No. 4 (2017-1-19)
Issue No. 3 (2016-10-12)
Issue No. 2 (2010-11-3)
Issue No. 1 (2009-5-6)
Issue No. 0 (2006-5-19)

Applicant: **Eaton Electric Limited**
Great Marlings
Butterfield
Luton
Bedfordshire
LU2 8DL
United Kingdom

Equipment: **MTL700 Series Shunt Zener Diode Safety Barriers**
Optional accessory:

Type of Protection: **Intrinsic Safety**

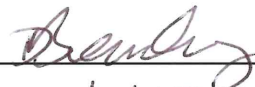
Marking: **[Ex ia Ga] IIB
[Ex ia Ga] IIC
[Ex ia Da] IIIC
(-20°C ≤ Ta ≤ 60°C)**

Approved for issue on behalf of the IECEx Certification Body:

R S Sinclair 

Position: Technical Manager

Signature:
(for printed version)



19/1/17

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the [Official IECEx Website](http://www.iecex.com).

Certificate issued by:

SGS Baseefa Limited
Rockhead Business Park
Staden Lane
Buxton, Derbyshire, SK17 9RZ
United Kingdom





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Manufacturer: **Eaton Electric Limited**
Great Marlings
Butterfield
Luton
Bedfordshire
LU2 8DL
United Kingdom

Additional Manufacturing location(s):

MTL Instruments PVT Ltd
No 3 Old Mahabalipuram
Road
Sholinganallur
Chennai
India

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 electrical apparatus 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 : 2011 Explosive atmospheres - Part 0: General requirements
Edition: 6.0

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

*This Certificate **does not** indicate compliance with electrical 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

IECEX ATR:
UK/BAS/04/0919
GB/BAS/ExTR10.0207/00
GB/BAS/ExTR16.0276/00

File Reference:
04/0919
09/0080
16/0371



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Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The MTL700 Series Shunt Zener Diode Barriers are designed to restrict the transfer of energy, from unspecified safe area equipment to intrinsically safe circuits, by limitation of voltage and current. The range consists of single and dual channel barriers covering polarised (positive and negative), non-polarised, non-polarised star-connected barriers and diode return barriers.

The barriers consist of electronic components on a single printed circuit board encapsulated within a moulded plastic enclosure which incorporates two pairs of screw terminals. The barrier is connected to earth via duplicated earth mounting studs for connection to an earthed bus bar. Alternatively the earth connection may be made via a spring mounted foot suitable for mounting on a DIN Rail.

The barriers are asymmetrical and have a blue label defining the hazardous area terminals.

The following barriers are coded [Ex ia Ga] IIC & [Ex ia Da] IIIC ($-20^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}$):

MTL706-, MTL707+, MTL708+, MTL710+/-, MTL710ac, MTL710P+, MTL715+/-, MTL715P+, MTL722+/-, MTL722P+, MTL728+/-, MTL728ac, MTL728P+, MTL751ac, MTL755ac, MTL758+/-, MTL760ac*, MTL761ac, MTL761Pac, MTL764+/-, MTL764ac, MTL765ac*, MTL766ac, MTL766Pac, MTL767+/-, MTL768+/-, MTL772ac*, MTL778ac*, MTL779+/-, MTL786+/-, MTL787+/- MTL787SP+, MTL787S+, MTL788+/-, MTL788R+/-, MTL791+&- , MTL796+/-

The following barriers are coded [Ex ia Ga] IIB & [Ex ia Da] IIIC ($-20^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}$):

MTL707P+, MTL729P+

SPECIFIC CONDITIONS OF USE: NO



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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Variation 4.1

To permit the correction of a model number on the Certificate Annex (now Issue 2) not affecting the previous assessment of the equipment.

ExTR: N/A

File Reference: 16/0371

MTL700 Series Shunt Zener Diode Safety Barriers

For all versions of the MTL700 Shunt Zener Barriers: -

Input Parameters

Single Channel - Terminal 1 wrt 2 (including earth stud)

Dual Channel - Terminal 1 & 2 wrt to earth stud

$U_m = 253V$

Output Parameters

Single Channel 1 - Terminal 3 wrt 4 (including earth stud)

Dual Channel 1 - Terminal 3 wrt to earth stud

$U_o =$ See a or a1 below

$I_o =$ See a or a1 below

$P_o =$ See a or a1 below

Dual Channel 2 - Terminal 4 wrt to earth stud

$U_o =$ See a2 below

$I_o =$ See a2 below

$P_o =$ See a2 below

Output Parameters for Group IIC Barriers

Type	Description	DC/AC		U_o (V)	R_{min} (Ω)	I_o (mA)	P_o (W)
MTL706	-28V, 300R	-	a	-28	300	93	0.65
MTL707	28V, 300R	+	a1	28	300	93	0.65
	Diode		a2	28	† (see note 4)		
			b	28	300	93	0.65
MTL708	28V, 300R	+	a	28	300	93	0.65
MTL710	10V, 50R	+/-/ac	a	10	50	200	0.50
MTL710P	10V, 33R	+/-	a	10	33.3	300	0.75
MTL715	15V, 100R	+/-	a	15	100	150	0.56
MTL715P	15V, 50R	+	a	15	51.5	291	1.09
MTL722	22V, 150R	+/-	a	22	150	147	0.81
MTL722P	22V, 150R	+	a	22	102.9	214	1.18
MTL728	28V, 300R	+/-/ac	a	28	300	93	0.65
MTL728P	28V, 237R	+	a	28	234.6	119	0.83
MTL751	1V, 10R	ac	a1	1	10	100	0.025
	1V, 10R		a2	1	10	100	0.025
			b	1	5	200	0.050
MTL755	3V, 10R	ac	a1	3	10	300	0.225
	3V, 10R		a2	3	10	300	0.225
			b	3	5	600	0.45
			c	6	20	300	0.45
MTL758	7.5V, 10R	+/-	a1	7.5	10	750	1.40
	7.5V, 10R		a2	7.5	10	750	1.40
			b	7.5	5	1,500	2.80

Type	Description	DC/AC		U _o (V)	R _{min} (Ω)	I _o (mA)	P _o (W)
MTL760	10V, 50R	ac*	a1	10	50	200	0.5
	10V, 50R		a2	10	50	200	0.5
			b	10	25	400	1.00
MTL761	9V, 90R	ac	a1	9	90	100	0.225
	9V, 90R		a2	9	90	100	0.225
			b	9	45	200	0.45
			c	18	180	100	0.45
MTL761P	9V, 350R	ac	a1	9	351.5	26	0.058
	9V, 350R		a2	9	351.5	26	0.058
			b	9	175.5	52	0.115
			c	18	702.9	26	0.115
MTL764	12V, 1K	+/-	a1	12	1,000	12	0.036
	12V, 1K		a2	12	1,000	12	0.036
			b	12	500	24	0.072
MTL764	12V, 1K	ac	a1	12	1,000	12	0.036
	12V, 1K		a2	12	1,000	12	0.036
			b	12	500	24	0.072
			c	24	2,000	12	0.072
MTL765	15V, 100R	ac*	a1	15	100	150	0.56
	15V, 100R		a2	15	100	150	0.56
			b	15	50	300	1.125
MTL766	12V, 150R	ac	a1	12	150	80	0.24
	12V, 150R		a2	12	150	80	0.24
			b	12	75	160	0.48
			c	24	300	80	0.48
MTL766P	12V, 75R	ac	a1	12	76.4	157	0.471
	12V, 75R		a2	12	76.4	157	0.471
			b	12	38.2	314	0.942
			c	24	152.9	157	0.942
MTL767	15V, 100R	+/-	a1	15	100	150	0.56
	15V, 100R		a2	15	100	150	0.56
			b	15	50	300	1.125
MTL768	22V, 150R	+/-	a1	22	150	147	0.81
	22V, 150R		a2	22	150	147	0.81
			b	Not permitted ‡ (see note 3)			
MTL772	28V, 300R	ac*	a1	22	300	74	0.404
			a2	22	300	74	0.404
			b	22	150	147	0.808
MTL778	28V, 600R	ac*	a1	28	600	47	0.327
	28V, 600R		a2	28	600	47	0.327
			b	28	300	93	0.654
MTL779	28V, 300R	+/-	a1	28	300	93	0.65
	28V, 300R		a2	28	300	93	0.65
			b	Not permitted ‡ (see note 3)			
MTL786	28V (Diode)	+/-	a1	28	† (see note 4)		
	28V (Diode)		a2	28	† (see note 4)		
MTL787	28V, 300R	+/-	a1	28	300	93	0.65
	28V (Diode)		a2	28	† (see note 4)		
			b	28	300	93	0.65

Type	Description	DC/AC		U _o (V)	R _{min} (Ω)	I _o (mA)	P _o (W)
MTL787SP	28V, 237R	+/- (PB)	a1	28	234.6	119	0.835
	28V (Diode)		a2	28	† (see note 4)		
			b	28	234.6	119	0.835
MTL787S	28V, 300R	+	a1	28	300	93	0.65
	28V (Diode)		a2	28	† (see note 4)		
			b	28	300	93	0.65
MTL788	28V, 300R	+/-	a1	28	300	93	0.65
	10V, 50R		a2	10	50	200	0.5
			b	28	42.85	294@12.6V	0.92
MTL788R	28V, 300R	+/-	a1	28	300	93	0.65
	10V, 50R		a2	10	50	200	0.5
			b	28	42.85	294@12.6V	0.92
MTL791	+11V, 51R	positive	a1	11	51.48	214	0.59
	-11V, 51R	negative	b2	11	51.48	214	0.59
			c	22	102.9	214	1.18
MTL796	26V, 300R	+/-	a1	26	300	87	0.56
	20V, 390R		a2	20	390	51	0.26
			b	26	169.56	138@23.4V	0.81

Reference to data in the standard shows that with the maximum output current and voltage as defined in the above table, such a value has a factor of safety of at least 1.5 for Group IIC.

Output Parameters for Group IIB Barriers

Type	Description	DC/AC		U _o (V)	R _{min} (Ω)	I _o (mA)	P _o (W)
MTL707P	28V, 164R	+	a1	28	164.6	170	1.19
	15V (Diode)		a2	15	†	-	-
			b	28	164.6	170	1.19
MTL729P	28V, 164R	+	a	28	164.6	170	1.19

Reference to data in the standard shows that with the maximum output current and voltage as defined in the above table, such a value has a factor of safety of at least 1.5 for Group IIB.

Notes for both Group IIC & IIB Barriers:

- +/- - Shunt zener diode barriers may be of positive or negative polarity dependant on the configuration of the zener diodes. The certification label will detail the exact type.

ac - non-polarised barriers

ac* - non-polarised star connected

Diode - diode return barrier
- Circuit configuration for output parameters

a - Single channel

a1 - First channel of a dual channel barrier

b - Both channels of a dual channel barrier connected in parallel, with respect to earth.

c - Both channels of a dual channel barrier interconnected, with no earth return.

- The intrinsically safe terminals of two channels of the MTL768 and the MTL779 dual barriers must not be interconnected in Group IIC atmospheres. It is acceptable for these barriers channels to be interconnected in Group IIB/IIA atmospheres.
- The hazardous area terminals of each of the barrier outputs marked † must be considered at the voltage U_0 . This is considered as the theoretical maximum to which a capacitive load across the hazardous area terminals could become charged by leakage through the series blocking diodes. This voltage does not contribute to the output current.

Load Parameters

The capacitance or either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals must not exceed the following values.

Load Parameters for Group IIC Barriers:

Type	ac/dc		FOS				IIB**			IIA		
			IIC	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL706	+	a	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
MTL707	+	a1	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
		b	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
MTL708	+	a	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
MTL710	+/-/ac	a	25	3	0.91	74	20	2.72	310	100	7.25	627
MTL710P	+	a	16	3	0.38	44	20	1.13	217	100	3.01	433
MTL715	+/-	a	9	0.58	1.45	66	3.55	7.22	263	14	14	544
MTL715P	+	a	4.64	0.58	0.33	28	3.55	0.99	140	14	2.64	280
MTL722	+/-	a	2.29	0.165	1.45	45	1.14	7.22	180	4.2	14	373
MTL722P	+	a	1.57	0.165	0.3	32	1.14	0.9	133	4.2	2.41	268
MTL728	+/-/ac	a	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
MTL728P	+	a	1.51	0.083	2.51	44	0.65	7.53	168	2.15	20.0	354
MTL751	ac	a1	50	100	3.72	1,464	1,000	15	5,540	1,000	31	11,690
		a2	50	100	3.72	1,464	1,000	15	5,540	1,000	31	11,690
		b	25	100	0.96	558	1,000	2.87	2,326	1,000	7.65	4,702
		c	50	100	3.72	732	1,000	15	2,770	1,000	31	5,845
MTL755	ac	a1	16	100	0.46	145	1,000	1.37	722	1,000	3.66	1,442
		a2	16	100	0.46	145	1,000	1.37	722	1,000	3.66	1,442
		b	8	100	0.13	69	1,000	0.39	206	1,000	1.03	548
		c	16	40	0.41	73	1,000	1.23	361	1,000	3.28	721
MTL758	+/-	a1	6.7	11.1	0.07	26	174	0.20	77	1,000	0.54	206
		a2	6.7	11.1	0.07	26	174	0.20	77	1,000	0.54	206
		b	3.3	11.1	0.02	10	174	0.05	30	1,000	0.14	81
MTL760	ac*	a1	25	3.0	0.91	74	20	2.72	310	100	7.25	627
		a2	25	3.0	0.91	74	20	2.72	310	100	7.25	627
		b	12	3.0	0.20	27	20	0.60	82	100	1.61	218
MTL761	ac	a1	50	4.9	3.72	163	40	15	616	500	31	1,299
		a2	50	4.9	3.72	163	40	15	616	500	31	1,299
		b	25	4.9	0.91	62	40	2.72	258	500	7.2	522
		c	6.6	0.31	3.72	81	1.78	15	308	7.6	31	649
MTL761P	ac	a1	200	4.9	56	613	40	208	2,382	500	419	2,778
		a2	200	4.9	56	613	40	208	2,382	500	419	2,778
		b	100	4.9	14	236	40	55	870	500	116	1,747
		c	26	0.31	56	306	1.78	208	1,191	7.6	419	1,389

Type	ac/dc		FOS	IIC			IIB**			IIA		
			IIC	C (μ F)	L (mH)	L/R (μ H/ Ω)	C (μ F)	L (mH)	L/R (μ H/ Ω)	C (μ F)	L (mH)	L/R (μ H/ Ω)
MTL764	+/-	a1	416	1.41	240	1,000	9	932	1,000	36	1,000	1,000
		a2	416	1.41	240	1,000	9	932	1,000	36	1,000	1,000
		b	208	1.41	61	360	9	226	1,398	36	452	1,500
MTL764	ac	a1	416	1.41	240	1,000	9	932	1,000	36	1,000	1,000
		a2	416	1.41	240	1,000	9	932	1,000	36	1,000	1,000
		b	208	1.41	61	360	9	226	1,398	36	452	1,500
	c	21	0.125	240	500	0.93	932	500	3.35	1,000	500	
MTL765	ac*	a1	9	0.58	1.45	66	3.55	7.22	263	14	14	544
		a2	9	0.58	1.45	66	3.55	7.22	263	14	14	544
		b	4.5	0.58	0.32	22	3.55	0.95	108	14	2.54	216
MTL766	ac	a1	62	1.41	5.8	151	9	23	556	36	48	1,174
		a2	62	1.41	5.8	151	9	23	556	36	48	1,174
		b	31	1.41	1.47	58	9	4.4	234	36	11	481
	c	3.26	0.125	5.8	75	0.93	23	278	3.35	48	587	
MTL766P	ac	a1	31	1.41	1.47	78	9	4.4	313	36	11	664
		a2	31	1.41	1.47	78	9	4.4	313	36	11	664
		b	15	1.41	0.34	29	9	1.02	87	36	2.71	231
	c	1.67	0.125	1.15	39	0.93	3.44	156	3.35	9.1	322	
MTL767	+/-	a1	9	0.58	1.45	66	3.55	7.22	263	14	14	544
		a2	9	0.58	1.45	66	3.55	7.22	263	14	14	544
		b	4.5	0.58	0.32	22	3.55	0.95	108	14	2.54	216
MTL768	+/-	a1	2.29	0.165	1.45	45	1.14	7.22	180	4.2	14	373
		a2	2.29	0.165	1.45	45	1.14	7.22	180	4.2	14	373
		b	Not Permitted									
MTL772	ac*	a1	4.5	0.165	6.77	89	1.14	26	325	4.2	55	683
		a2	4.5	0.165	6.77	89	1.14	26	325	4.2	55	683
		b	2.29	0.165	1.45	34	1.14	7.22	135	4.2	14	280
MTL778	ac*	a1	3.83	0.083	16	107	0.65	62	398	2.15	130	789
		a2	3.83	0.083	16	107	0.65	62	398	2.15	130	789
		b	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
MTL779	+/-	a1	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
		a2	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
		b	Not Permitted									
MTL786	+/-	a1	-	0.083	-	-	0.65	-	-	2.15	-	-
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
		b	-	0.083	-	-	0.65	-	-	2.15	-	-
MTL787	+/-	a1	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
		b	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
MTL787SP	+	a1	1.51	0.083	2.51	44	0.65	7.53	168	2.15	20.0	354
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
		b	1.51	0.083	2.51	44	0.65	7.53	168	2.15	20.0	354
MTL787S	+	a1	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
		b	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
MTL788	+/-	a1	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
		a2	25	3.0	0.91	74	20	2.72	310	100	7.25	627
		b	12	0.083	0.33	25	0.65	0.99	124	2.15	2.64	253
MTL788R	+/-	a1	1.94	0.083	4.2	55	0.65	12.6	210	2.15	33.6	444
		a2	25	3.0	0.91	74	20	2.72	310	100	7.25	627
		b	12	0.083	0.33	25	0.65	0.99	124	2.15	2.64	253
MTL791	+ & -	a1	23	1.97	0.71	63	13.8	2.13	266	60	5.68	536
		a2	23	1.97	0.71	63	13.8	2.13	266	60	5.68	536
		c	1.57	0.165	0.53	32	1.14	1.59	133	4.2	4.25	268

Type	ac/dc		FOS	IIC			IIB**			IIA		
			IIC	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL796	+/-	a1	2.47	0.1	4.91	64	0.77	20	239	2.60	40	505
		a2	8.9	0.22	13	136	1.41	51	501	5.50	108	1,014
		b	2.01	0.1	1.94	34	0.77	8.5	136	2.60	16	282

** 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 \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 1µF for Groups IIB & IIA and 600nF for Group IIC.

Load Parameters for Group IIB Barriers:

Type	ac/dc		FOS	IIB**			IIA		
			IIB	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL707P	+	a1	2.64	0.65	5.65	127	2.15	11.34	260
		a2	-	3.55	-	-	14.0	-	-
		b	2.64	0.65	5.65	127	2.15	11.34	260
MTL729P	+	a	2.64	0.65	5.65	127	2.15	11.34	260

** 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 \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 1µF for Groups IIB & IIA.