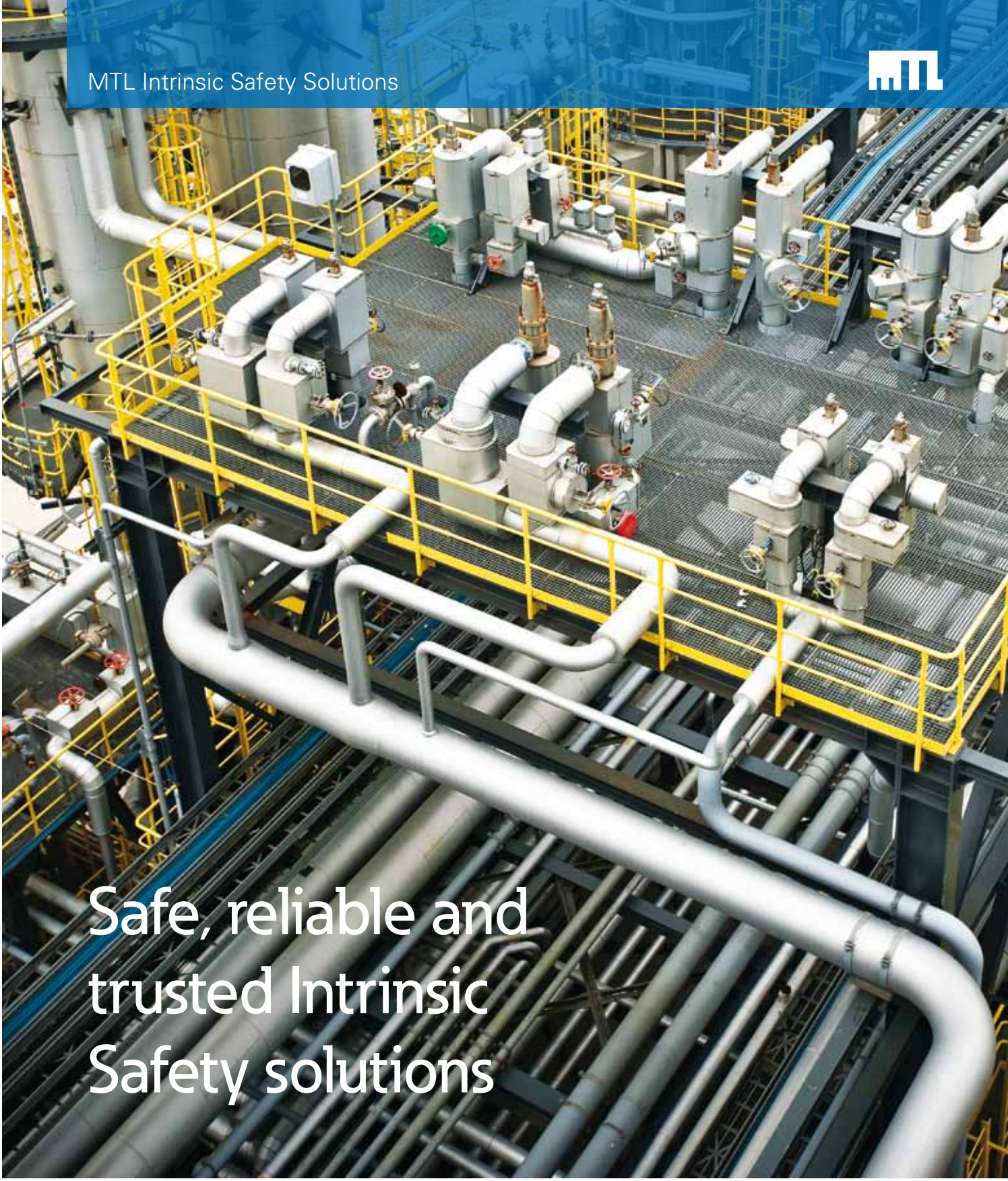
MTL Intrinsic Safety Solutions



Safe, reliable and trusted Intrinsic Safety solutions

Crouse-Hinds
by EATON

The safety you rely on

Delivering world-class reliability and safety in high consequence harsh and hazardous environments

Crouse-Hinds
by EATON

MTL is a part of Eaton's Crouse-Hinds business and remains a brand that stands for safety in the harshest of environments. Whilst we began with the MTL100 series zener barrier, MTL alongside Crouse-Hinds, has grown into the premier name for a comprehensive portfolio of solutions for high-consequence harsh and hazardous environments.

As we continue to evolve, so does our brand. Our products are now united with Eaton's leading range of reliable, efficient and safe electrical power management solutions. MTL has a new look alongside Crouse-Hinds by Eaton, but the products and technology you trust remain unchanged.

More protection. More technology. Expect more.

Only Eaton's Crouse-Hinds Business can deliver...

- Protection and safety of people and assets around the world with unsurpassed reliability and quality in every product we offer
- Industry leading innovation and product efficiency
- Product solutions designed and certified for global specifications
- Best-in-class, global sales, and customer service teams that provide local support
- Over forty years of industry knowledge and expertise

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Safe, reliable protection of intrinsically safe apparatus in hazardous areas

www.mtl-inst.com
mtlenquiry@eaton.com

MTL Intrinsic Safety Solutions

MTL is a world leader in products designed for use in hazardous areas

OVER 40 Ex YEARS OF EXPERIENCE

MTL, part of Eaton's Crouse-Hinds business, is a leader in reliability, efficiency and safety with the development and supply of system infrastructure products and protection equipment.

MTL brings a wealth of knowledge and expertise alongside an enviable reputation as a leading global provider of Intrinsic Safety explosion protection devices and systems for use in process control applications.

Our product portfolio consists of high quality solutions, from industry renowned (IS) barriers and isolators including integrated IS, through to sophisticated process control products, all designed for the harsh environments often encountered in the process industry.

The intrinsic safety technique is the only technique that permits live maintenance within the hazardous-area without the need to obtain 'gas clearance' certificates. This is particularly important for instrumentation, since fault finding on de-energised equipment is difficult. The installation and maintenance requirements for intrinsically safe apparatus are well documented, and consistent regardless of the level of protection.

Intrinsic safety uses conventional instrumentation and cables, thus reducing costs and is the natural choice for all low voltage instrumentation. Solutions exist which are compatible with all gases and area classifications. This technique prevents explosions rather than containing them, which must be preferable, and the 'live maintenance' facility enables conventional instrument practice to be used.

The major advantage of intrinsic safety is that it provides a solution for all the problems of hazardous area's and is the only technique which meets this criterion. The IS technique is accepted throughout the world, in addition to explosion protection with gasses, these techniques have now been expanded to include prevention of explosions in dust atmospheres.

Crouse-Hinds by EATON

Intrinsic Safety Interfacing

MTL provides two simple means of connecting instrument loops into hazardous areas of process plant using zener barriers or isolators.

- **Intrinsically safe isolating interfaces for every application.**

MTL isolating interfaces are alternatives to shunt-diode safety barriers for protecting electrical circuits in hazardous areas. They need no high-integrity earth and provide extra features such as signal amplification and relay functions. The isolation of hazardous- and safe-area circuits allows each to be earthed at any convenient point, simplifying installation and avoiding earth-loop problems. MTL offers the best choice in DIN-rail and backplane mounting isolators to meet the requirements of modern control interfacing systems. The DIN-rail mounting isolator ranges provide a wide choice of functions with high accuracy and reliability, while the backplane mounting products are established as the leading IS system interface with solutions for all the major DCS companies. The MTL4500 Series is the latest generation of backplane mounting products, building upon the heritage of MTL4000 and introducing many key application benefits. The MTL5500 Series launches a new industry standard for DIN rail mounting products, ideally suited to a wide variety of interface tasks for process instrumentation, complemented by the well proven MTL5000 Series.

Intrinsic safety	International	IECEx	IEC 60079-0 IEC 60079-11 IEC 61241-11
	Europe	ATEX (SGS Baseefa)	EN60079-0 EN60079-11 EN61241-11
	N.America	FM FM (Canada) CSA	FM3600, 3610, 3810 C22.2 No.157
Zone2, Div2 mount	International	IECEx	IEC 60079-15
	Europe	ATEX Cat3	EN60079-15
	N.America	FM FM (Canada) CSA	FM3611 CAN/CSA E60079-15 C22.2 No.213
Functional safety		SGS Baseefa SIRA MTL	IEC 61508 IEC 61511

In most applications MTL4500 modules can directly replace MTL4000 models but check with MTL if you have any concerns. Similarly, MTL5500 supplants MTL5000 Series as the DIN rail interface family of choice. With this mounting arrangement, it is practical for models from both families to be used alongside each other during the transition phase from the old range to the new.

Visit the MTL web site, **www.mtl-inst.com**, where you will find the latest version of any of the material given here together with relevant certification details and application information.

- **Zener Barriers - industry standards for more than 40 years.**

Our range of shunt-diode safety barriers are the simplest type of IS interface for protecting electrical circuits in hazardous areas. The compact and inexpensive units are mounted and earthed in one operation, ensuring the safest possible installation with ultra-high reliability.

Functional Safety Management

MTL is the first supplier of process instrumentation to be certified as a Functional Safety Management (FSM) company.

What it means to you

"IEC 61508 Part 1:2010 Clause 6, mandates that everyone involved in the safety systems lifecycle demonstrates Functional Safety Management"

Ask for evidence of 'Functional Safety Management'

The IEC 61508 group of standards require that your suppliers and sub-contractors demonstrate 'Functional Safety Management'. Certification of 'Functional Safety Management' or other appropriate proof is the first thing a purchaser should ask for.

The important document to refer to is the Safety Manual

The IEC 61508 group of standards does not require certification for components. It does require proof of dependability and suitability for the application. A certificate alone is not proof of dependability and suitability for the application; the Safety Manual gives the designer of the safety loop the reliability data needed to correctly design the loop.

Don't just believe an 'expert' is proof of 'Functional Safety Management'

The presence of a certified expert is not proof of 'Functional Safety Management'. 'Functional Safety Management' covers everybody involved, not just the expert, not just the technician, but everyone involved with the safety system.

The Safety Integrity Level applies to the whole loop – not just a component

A claim that a component is 'SIL2' (or any other SIL number) does not mean that it makes your safety loop 'SIL2'. The SIL rating applies to the whole loop and not just to the individual components in the loop. MTL provides the data that enables loop operation to be assessed, including the systematic capability and not just hardware failure rates.

Look for the right level of competence from your partner

The commitment of MTL to Functional Safety Management ensures you are working with a company that understands and implements the requirements of the second edition of the standards, IEC 61508 : 2010. MTL supply products and documents fully compliant with the current edition of the international standards.

For more information on Functional Safety Management please visit **www.mtl-inst.com/fsm**

MTL's FSM product range

MTL continues to expand its Functional Safety offering with a range of products already assessed as suitable for use in or with safety loops. These include:

Wiring Components

MTL700 and MTL7700 series of DIN-rail mounted zener-diode barriers

Signal Conditioning and Interface Components

MTL4500 series and MTL5500 series intrinsically safe isolators

Signal Surge Protection

TPxx series (field mounted) and Sxx series (DIN-rail mounted) surge protection

Asset Management Instrumentation

MTL4850 HART® SIL 3 multiplexer for use with safety systems

Alarm Annunciator Equipment

SIL725 safety annunciator

Certificate No. CASS 00015/01

MTL was the first supplier of process instrumentation to be certified as a Functional Safety Management (FSM) company

Intrinsic Safety Isolators

MTL offers the best choice in DIN-rail and backplane mounting isolators to meet the requirements of modern systems.The DIN-rail mounting isolator ranges provide a wide choice of functions with high accuracy and reliability, while the backplane mounting products are established as the leading IS system interface with solutions for all the major DCS and Safety System companies.

High efficiency isolating interfaces with system vendors in mind

MTL4500/MTL5500 Series

Intrinsic safety (IS) isolators for hazardous area interfacing

- **3-port isolation as standard**
- **Highest module/channel packing densities**
- **Low power dissipation**
- **Quick install and release mechanism**
- **Multi-channel I/O modules**
- **Broken line and earth-fault protection**
- **Compatible with preceding MTL isolator series for pluggable replacements**
- **Various models assessed for use in Functional Safety applicatons**

MTL's latest generation of IS interfaces utilises an innovative "One-Core" technology to ensure the highest quality and availability while maintaining maximum flexibility at lowest cost. Incorporating advanced circuit design, a common set of components and innovative isolating transformer construction, they achieve a significant reduction in power consumption while increasing channel packing densities. The compact, 16mm wide design reduces weight and gives exceptionally high packing density. They build on the proven success of the MTL2000, 3000, 4000 and 5000 Series to bring the benefits of new developments in galvanic isolation without compromising the reliability of the designs from which they have evolved.

The backplane mounting MTL4500 Series is designed with system vendors in mind for "project-focussed" applications such as Distributed Control System (DCS), Emergency Shutdown Systems (ESD) and Fire and Gas monitoring (F&G).

The reduced power consumption and high efficiency enable high signal density to be achieved together with improved freedom in cabinet layout and design. Easy integration with the input/output assemblies of control or safety instrumentation systems not only simplifies project engineering but also reduces installation and maintenance costs.

A multiway connector to the backplane provides safe-area and power supply connections, while hazardous-area connections plug into the front of the module, simplifing installation and maintenance and reducing time, cost, and the risk of errors.

The DIN-rail mounting MTL5500 Series meets the needs of the IS interface market for "application focussed" projects, ranging from single instrument loops, through to fully equipped cabinets, across all industries where hazardous areas exist.

The MTL5500 clips quickly onto DIN rail, so it is compatible with the industry-standard mounting system. Wiring is simplified by plug-in safe- and hazardous-area connectors, and a power plug which accepts a power bus; it all leads to quicker insertion, fewer wiring errors and trouble-free, tidier installations.

Line fault detection (LFD) facilities are provided across the range of I/O functions; on the switch/proximity detectors, the MTL4523/5523 solenoid/alarm drivers and the isolating drivers. Analogue input units such as the MTL4541/5541 provide line fault detection by repeating o/c or s/c currents to the safe-area control system.

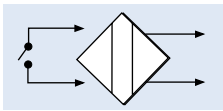
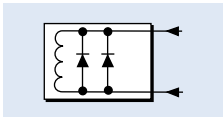
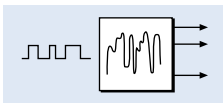
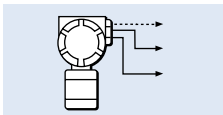
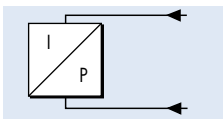
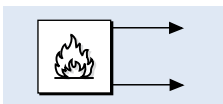
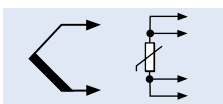
Status LEDs, configuration switches and ports are located on the top or side of individual modules, as appropriate, for easy access.

Both new series have been designed for compatiblity with earlier models. The MTL4500 series provides plug-replacements for earlier MTL4000 series units, while the MTL5500 models can easily replace MTL5000 series units. Each offer the latest in modern technology and efficiency without compromise.

In addition to their use in IS circuits, specific models within the MTL4500 and MTL5500 series have been assessed and approved for use in Functional Safety applications. These have been verified under the certified Functional Safety Management (FSM) programme implemented by MTL.

EPS45/5500 Rev10 200913

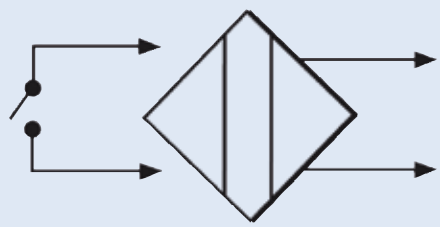
Isolator Function Selector

MTL4500 (Backplane)		MTL5500 (DIN-rail)	FSM	Channels	Function
Digital Input					
MTL4501-SR		MTL5501-SR	√	1	fail-safe solid-state output + LFD alarm
MTL4504		–	√	1	switch/prox input, phase reversal + LFD
MTL4510		MTL5510		4	switch/prox input, solid-state output
MTL4510B		MTL5510B		4	multi-function switch/prox input, solid-state output
MTL4511		MTL5511	√	1	switch/prox input, c/o relay output
MTL4513		MTL5513		2	switch/prox input, solid-state output
MTL4514/B		MTL5514	√	1	switch/prox input, relay + LFD
MTL4514D		MTL5514D	√	1	switch/prox input, dual output relay
MTL4516		–	√	2	switch/prox input, relay + LFD outputs
MTL4516C		MTL5516C	√	2	switch/prox input, c/o relay + LFD outputs
MTL4517		MTL5517	√	2	switch/prox input, relay + LFD outputs
Digital Output					
MTL4521		MTL5521	√	1	loop powered solenoid driver
MTL4521L		–	√	1	loop powered solenoid driver, IIC
–		MTL5522	√	1	loop powered solenoid driver, IIB
MTL4523		MTL5523	√	1	solenoid driver with LFD
MTL4523L		–	√	1	loop powered solenoid driver with LFD
MTL4523R		–	√	1	solenoid driver with reverse LFD
MTL4523V		MTL5523V	√	1	solenoid driver with LFD, IIC
MTL4524		MTL5524	√	1	switch operated solenoid driver
MTL4524S		–	√	1	switch operated solenoid driver, 24V override
MTL4525		MTL5525	√	1	switch operated solenoid driver, low power
MTL4526		MTL5526		2	switch operated relay
Pulse & Vibration					
MTL4531		MTL5531	√	1	vibration probe interface
MTL4532		MTL5532		1	pulse isolator, digital or analogue output
–		MTL5533		2	vibration probe interface
Analogue Input					
MTL4541		MTL5541	√	1	2/3 wire transmitter repeater
MTL4541A		MTL5541A		1	transmitter repeater, passive input
MTL4541AS		MTL5541AS		1	transmitter repeater, passive input, current sink
MTL4541S		MTL5541S	√	1	2/3 wire transmitter repeater, current sink
MTL4544		MTL5544	√	2	2/3 wire transmitter repeater
MTL4544A		MTL5544A		2	transmitter repeater, passive input
MTL4544AS		MTL5544AS		2	transmitter repeater, passive input, current sink
MTL4544S		MTL5544S	√	2	2/3 wire transmitter repeater, current sink
MTL4544D		MTL5544D	√	1	2/3 wire transmitter repeater, dual output
Analogue Output					
MTL4546		MTL5546	√	1	4-20mA smart isolating driver + LFD
MTL4546Y		MTL5546Y	√	1	4-20mA smart isolating driver + oc LFD
MTL4549		MTL5549	√	2	4-20mA smart isolating driver + LFD
MTL4549Y		MTL5549Y	√	2	4-20mA smart isolating driver + oc LFD
Fire & Smoke					
MTL4561		MTL5561	√	2	loop-powered, for fire and smoke detectors
Temperature Input					
MTL4573		MTL5573		1	temperature converter, THC or RTD
MTL4575		MTL5575		1	temperature converter, THC or RTD
MTL4576-RTD		MTL5576-RTD		2	temperature converter, RTD
MTL4576-THC		MTL5576-THC		2	temperature converter, THC
MTL4581		MTL5581		1	mV/mV isolator
–		MTL5582	√	1	RTD/RTD isolator
General					
MTL4599		MTL5599		–	dummy module
MTL4599N		–		–	general purpose feed-through module

EPS45/5500 Rev10 041113

Isolator Applications

DIGITAL INPUT - SWITCHES / PROXIMITY DETECTORS				
Backplane Device	DIN-rail Device	No. of channels	Output to safe area	Important features
MTL4501-SR	MTL5501-SR	1	24V logic	Safety related, SIL3
MTL4504		1	Relays 1 x SPDT 1 x SPDT	Switch/prox input, phase reversal + LFD
MTL4510	MTL5510	4	4 x solid state	Can switch +ve or -ve polarity signals
MTL4510B	MTL5510B	4	4 x solid state	Multi-function selectable
MTL4511	MTL5511	1	Relay 1 x SPDT	Switch/proximity detector repeater
MTL4513	MTL5513	2	2 x solid state	Can switch +ve or -ve polarity signals
MTL4514/B	MTL5514	1	Relays 1 x SPDT 1 x SPDT	Switch/proximity detector repeater Independent LFD output
MTL4514D	MTL55214D	1	Relays 2 x SP	Switch/proximity input Dual output relay
MTL4516/C	MTL5516C	2	Relays 2 x SPDT	Switch/proximity detector repeater
MTL4517	MTL5517	2	Relays 2 x SPST 1 x SPST	Switch/proximity detector repeater Independent LFD output



MTL4501-SR – MTL5501-SR

FAIL-SAFE SWITCH/PROXIMITY-DETECTOR INTERFACE

with LFD

With the MTLx501-SR, a fail-safe switch/proximity detector located in the hazardous area can control an isolated fail-safe electronic output. The MTLx501-SR also provides relay alarm contacts to signal line-fault conditions. The MTLx501-SR is for use with approved fail-safe sensors in loops that require operation up to SIL3 according to the functional safety standard IEC 61508.

SPECIFICATION

See also common specification

Number of channels
One

Location of switches
Zone 0, IIC, T6 hazardous area
Div. 1, Group A hazardous location

Location of proximity detector
Zone 0, IIC, T4–6, hazardous location
Div 1, Group A, hazardous location

Voltage applied to sensor
8.6V dc max from 1kΩ

Input/output characteristics

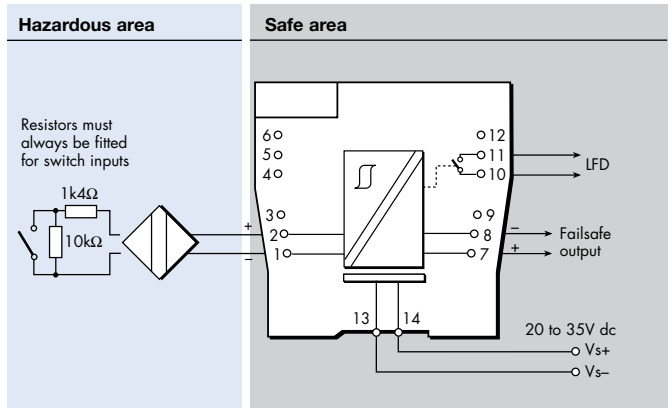
Input value in sensor circuits	Fail–safe output	Operation	LFD contacts
2.9mA < Is < 3.9mA	ON	Normal	CLOSED
Is < 1.9mA & Is > 5.1mA	OFF	Normal	CLOSED
Is < 50µA	OFF	Broken line	OPEN
Rs < 100Ω	OFF	Shorted line	OPEN

Note: Is = sensor current

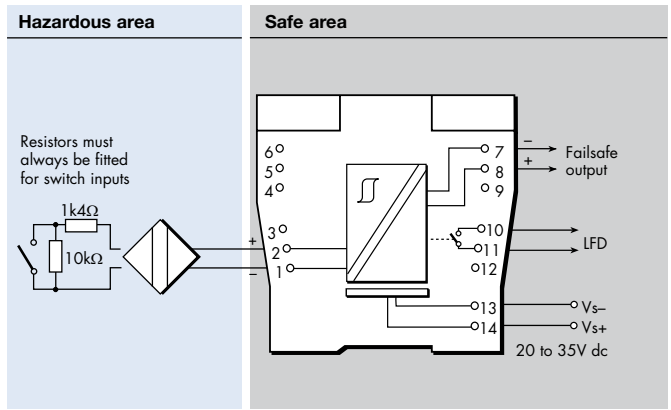
Fail-safe electronic output
Output on: 24V nominal
Output off: 0V dc, max < 5V dc
Load: 750Ω to 10kΩ
Maximum on-state current: 25mA (at 750Ω)
Short-circuit current: 30mA

Line fault detection (LFD)
LFD relay output: contacts open when line fault detected
Switch characteristics: 0.3A 110V ac/dc; 1A 35V dc; 30W/33VA

MTL4501-SR



MTL5501-SR



LED indicators
Green: power indication
Yellow: channel status, on when fail-safe output energised
Red: LFD indication, flashing when line fault detected

Power requirements, Vs

@ Supply voltage	750Ω load	typ. load
20V dc	100mA	70mA
24V dc	90mA	60mA
35V dc	65mA	45mA

Power dissipation within unit

@ Supply voltage	750Ω load	typ. load
20V dc	1232mW	1160mW
24V dc	1392mW	1200mW
35V dc	1507mW	1335mW

Safety description
U_o = ±9.7V, I_o = 30mA, P_o = 0.07W, C_i = 0nF, L_i = 0mH
U_m = 253V

Safety integrity level (SIL)
Highest level in single in-line subsystem - SIL3 (in accordance with IEC61508-2)
See data on MTL web site and refer to the safety manual.

EPSx501SR Rev4 200913

MTL4504
SWITCH/ PROXIMITY DETECTOR INTERFACE
1-channel with LFD and phase reversal

The MTL4504 enables a safe–area load to be controlled, through a relay, by a proximity detector or switch located in a hazardous area. Line faults are signalled through a separate relay and indicated on the top of the module. MTBF information for the LFD relay is available from MTL to allow the failure rate for the LFD relay to be calculated when used in the critical path with the output relay for safety critical applications. Switches are provided to select phase reversal and to enable the line fault detection.

SPECIFICATION

See also common specification

Number of channels
One

Location of switch
Zone 0, IIC, T6 hazardous area
Div.1, Group A, hazardous location

Location of proximity detector
Zone 0, IIC, T4–6 hazardous area, if suitably certified
Div.1, Group A, hazardous location

Hazardous–area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)

Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%

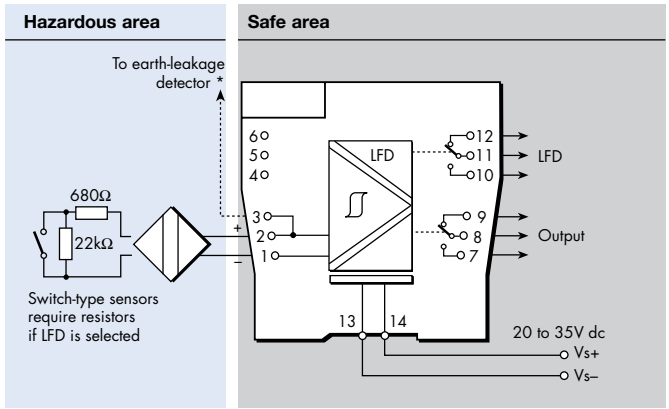
Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal

Line fault detection (LFD) (when selected)
User-selectable via switches on the side of the unit. Line faults are indicated by an LED. Line fault relay is de-energised and channel output relay de-energised if input line-fault detected
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch

Safe-area output
Channel: Single pole relay with changeover contacts
LFD: Single pole relay with changeover contacts
Note: reactive loads must be adequately suppressed

Relay characteristics
Response time: 10ms maximum
Contact rating: 10W, 0.5A, 35V dc

MTL4504



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: channel status, on when output energised
Red: LFD indication, on when line fault detected

Maximum current consumption
25mA at 24V dc

Power dissipation within unit
0.6W at 24V

Safety description
U_o=10.5V I_o=14mA P_o=37mW U_m= 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

MTL4510 – MTL5510
SWITCH/ PROXIMITY DETECTOR INTERFACE
4-channel, digital input

The MTLx510 enables four solid-state outputs in the safe area to be controlled by up to four switches or proximity detectors located in a hazardous area. Each pair of output transistors shares a common terminal and can switch +ve or –ve polarity signals. A range of module configurations is available (see Table 1) through the use of selector switches. When proximity detector modes are selected, LFD is enabled and the output switches to OFF if a line fault is detected.

SPECIFICATION

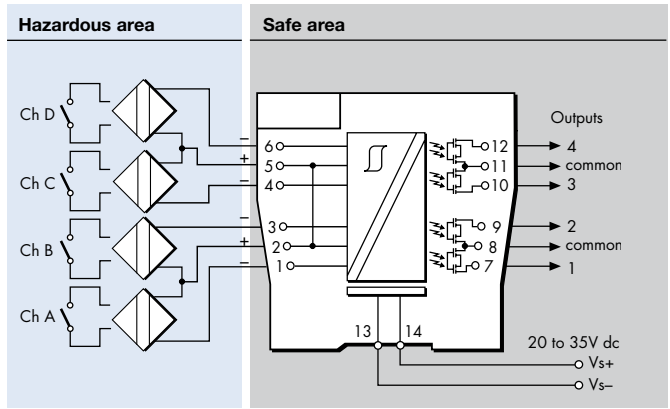
See also common specification

Number of channels
4, configured by switches
Location of switches
Zone 0, IIC, T6 hazardous area
Div 1, Group A hazardous location
Location of proximity detectors
Zone 0, IIC, T4-6 hazardous area if suitably certified
Div 1, Group A, hazardous location
Hazardous-area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)
Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%
Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal
Line fault detection (LFD) (when selected)
User-selectable via switches on the side of the unit.
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch
Safe-area outputs
Floating solid-state outputs compatible with logic circuits

Operating frequency:	dc to 500Hz
Max. off-state voltage:	± 35V
Max. off-state leakage current:	± 50µA
Max. on-state resistance:	25Ω
Max. on-state current:	± 50mA

LED indicators
Green: power indication
Yellow: four: on when output active
Red: LFD indication + faulty channel's yellow LED flashes
Maximum current consumption
40mA at 24V (with all output channels energised)
Power dissipation within unit
0.96W at 24V, with 10mA loads
Safety description (each channel)
U_o=10.5V I_o=14mA P_o=37mW U_m = 253V rms or dc

MTL4510



MTL5510

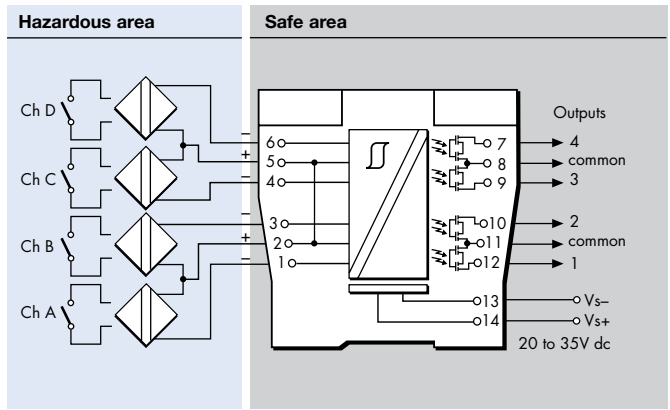


Table 1 - Mode options

MODE	o/p 1	o/p 2	o/p 3	o/p 4	i/p type
0	chA	chB	chC	chD	switch
1	chA rev.	chB	chC	chD	
2	chA	chB rev.	chC	chD	
3	chA	chB	chC rev.	chD	
4	chA	chB	chC	chD rev.	
5	chA rev.	chB	chC rev.	chD	
6	chA	chB rev.	chC	chD rev.	
7	chA rev.	chB rev.	chC rev.	chD rev.	
8	chA	chB	chC	chD	prox. detector + LFD
9	chA rev.	chB	chC	chD	
10	chA	chB rev.	chC	chD	
11	chA	chB	chC rev.	chD	
12	chA	chB	chC	chD rev.	
13	chA rev.	chB	chC rev.	chD	
14	chA	chB rev.	chC	chD rev.	
15	chA rev.	chB rev.	chC rev.	chD rev.	

See Instruction Manual INM4500 or INM5500 for further mode information.

EPSx510 Rev3 041113

MTL4510B – MTL5510B
SWITCH/ PROXIMITY DETECTOR INTERFACE
4-channel, multi-function, digital input

The MTL4510B enables four solid-state outputs in the safe area to be controlled by up to four switches or proximity detectors located in a hazardous area. Each pair of output transistors shares a common terminal and can switch +ve or –ve polarity signals. A range of module configurations is available (see Table 1) through the use of selector switches. These include start/stop operations and pulse output modes.

SPECIFICATION

See also common specification

Number of channels
4, configured by switches

Location of switches
Zone 0, IIC, T6 hazardous area
Div 1, Group A hazardous location

Location of proximity detectors
Zone 0, IIC, T4-6 hazardous area if suitably certified
Div 1, Group A, hazardous location

Hazardous-area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)

Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%

Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal

Line fault detection (LFD) (when selected)
User-selectable via switches on the side of the unit.
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch

Safe-area outputs
Floating solid-state outputs compatible with logic circuits

Operating frequency:	dc to 500Hz
Max. off-state voltage:	± 35V
Max. off-state leakage current:	± 50µA
Max. on-state resistance:	25Ω
Max. on-state current:	± 50mA

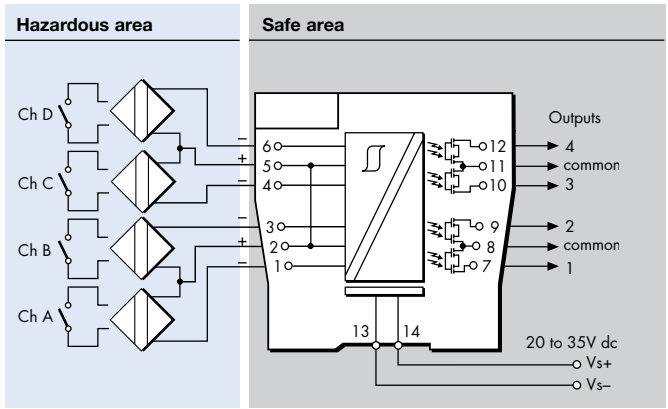
LED indicators
Green: power indication
Yellow: four: on when output active
Red: LFD indication + faulty channel's yellow LED flashes

Maximum current consumption
40mA at 24V (with all output channels energised)

Power dissipation within unit
0.96W at 24V, with 10mA loads

Safety description (each channel)
U_o=10.5V I_o=14mA P_o=37mW U_m = 253V rms or dc

MTL4510B



MTL5510B

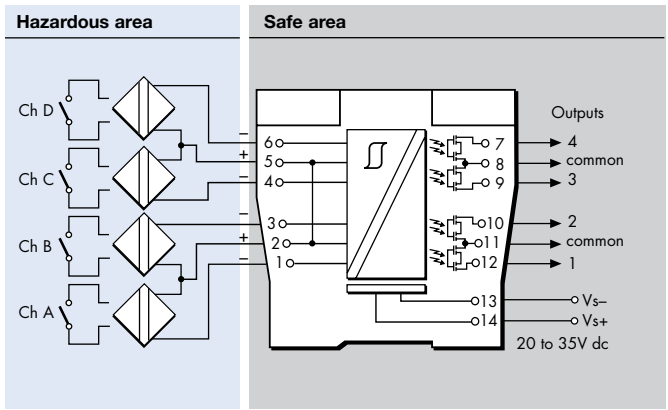


Table 1 - Mode options

MODE	Function	Equivalent*
0	4-ch switch input,	MTLx510
1	2-ch each channel one input, two outputs	MTL4016
2	As mode 1 but with phase of one output reversed	MTL4016
3	2-ch, 2-pole changeover output	
4	1-ch with line fault output	MTLx014
5	As mode 4 with changeover outputs	
6	1-ch with start-stop latch	MTL2210B
7	4-ch switch input,	MTLx510
8	4-ch switch input,	MTLx510
9	2-ch with line fault output	MTLx017
10	As mode 9 with LFD changeover	
11	As mode 10 with phase reversed	
12	3-ch with normally-open LFD output	
13	3-ch with normally-closed LFD output	
14	2-ch monostable, pulse stretcher	
15	4-ch switch input	MTLx510

** Note: that terminal connections may not be the same on these models, and x can mean either '4' or '5'.*
See Instruction Manual INM4500 or INM5500 for further mode information.

MTL4511 – MTL5511
SWITCH/ PROXIMITY DETECTOR INTERFACE
1-channel, with line fault detection

The MTLx511 enables a safe-area load to be controlled by a switch or proximity detector located in a hazardous-area. When selected, open or short circuit conditions in the field wiring are detected by the line-fault-detect (LFD) facility and also indicated on the top of the module. Phase reversal for the channel is selected by a switch on the side of the module and output is provided by changeover relay contacts.

SPECIFICATION

See also common specification

Number of channels
One

Location of switches
Zone 0, IIC, T6 hazardous area
Div. 1, Group A hazardous location

Location of proximity detector
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location

Hazardous-area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)

Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%

Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200μA (650Ω) nominal

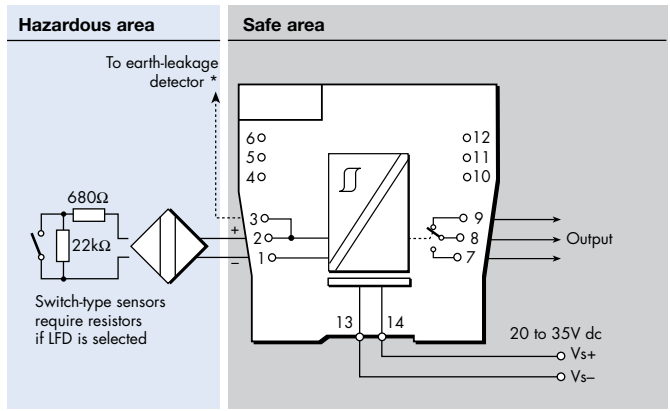
Line fault detection (LFD) (when selected)
User-selectable via switches on the side of the unit. A line fault is indicated by an LED. The channel output relay is de-energised if an input line fault is detected.
Open-circuit alarm on if I_{in} < 50μA
Open-circuit alarm off if I_{in} > 250μA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch

Safe-area output
Single pole relay with changeover contacts
Note: reactive loads must be adequately suppressed

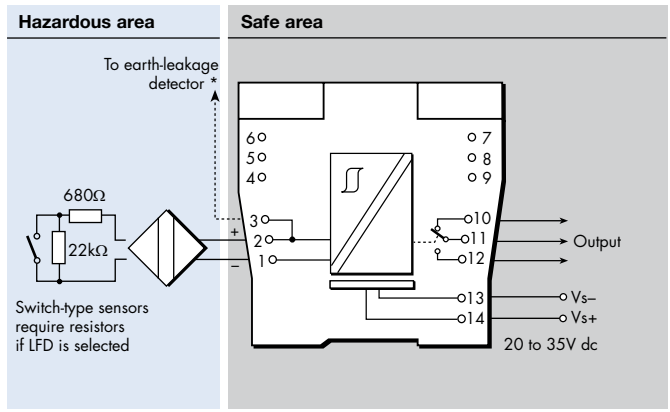
Relay characteristics

	MTL4511	MTL5511
Response time:	10ms maximum	10ms maximum
Contact rating (Safe Area):	10W, 0.5A, 35V dc	250V ac, 2A, cosØ >0.7, 40V dc, 2A, resistive load
Contact rating (Zone 2):	10W, 0.5A, 35V dc	35V, 2A, 100VA.

MTL4511



MTL5511



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: channel status, on when output energised
Red: LFD indication, on when line fault detected

Maximum current consumption
25mA at 24V

Power dissipation within unit
0.6W at 24V

Safety description (each channel)
U_o=10.5V I_o=14mA P_o=37mW U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx511 Rev4 200913

MTL4513 – MTL5513
SWITCH/ PROXIMITY DETECTOR INTERFACE
2-channel, line fault detection, phase reversal

The MTLx513 enables two solid-state outputs in the safe area to be controlled by two switches or proximity detectors located in the hazardous area. The Ch1/Ch2 output transistors share a common terminal and can switch +ve or -ve polarity signals. Independent output phase reversal and line fault detection are enabled via switches for each output. LFD indication is provided on the top of the module.

SPECIFICATION

See also common specification

Number of channels
Two

Location of switches
Zone 0, IIC, T6 hazardous area
Div. 1, Group A hazardous location

Location of proximity detectors
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location

Hazardous-area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)

Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%

Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal

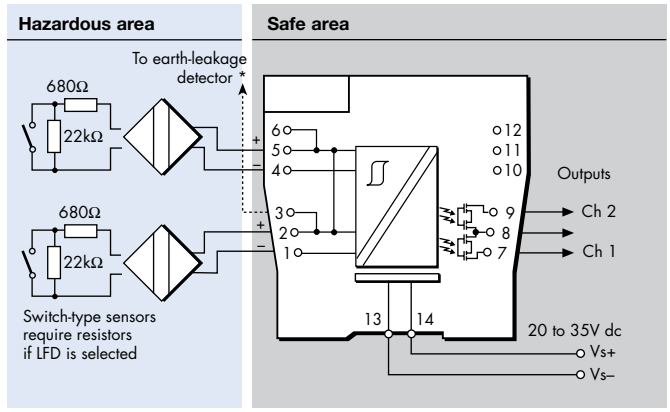
Line fault detection (LFD) (when selected)
User-selectable for each channel via switches on the side of the unit. Line faults are indicated by an LED for each channel.
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch

Phase reversal
Independent for each channel, user-selectable

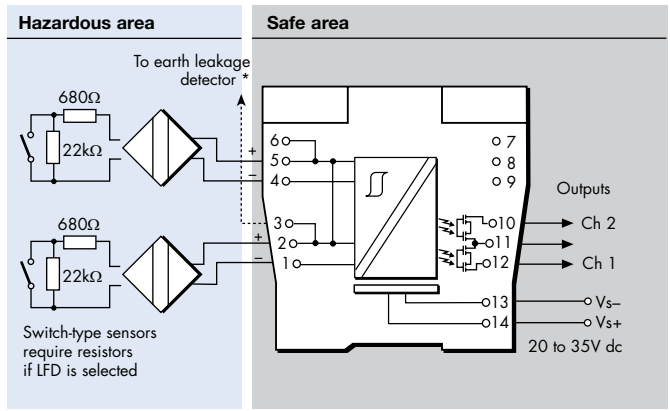
Safe-area outputs
Floating solid-state outputs compatible with logic circuits

Operating frequency:	dc to 500Hz
Max. off-state voltage:	± 35V
Max. off-state leakage current:	± 50µA
Max. on-state resistance:	25Ω
Max. on-state current:	± 50mA

MTL4513



MTL5513



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: two: channel status, on when output active
Red: two: LFD indication, on when line fault detected

Maximum current consumption
30mA at 24V

Power dissipation within unit
0.65W typical at 24V, with 10mA loads
0.78W max. with 50mA loads

Safety description (each channel)
U_o=10.5V I_o=14mA P_o=37mW U_m= 253V rms or dc

MTL4514/B – MTL5514
SWITCH/ PROXIMITY DETECTOR INTERFACE
1-channel, line fault detection, phase reversal

The MTLx514 enables a safe–area load to be controlled, through a relay, by a proximity detector or switch located in a hazardous area. Line faults are signalled through a separate relay and indicated on the top of the module. Switches are provided to select phase reversal and to enable the line fault detection.

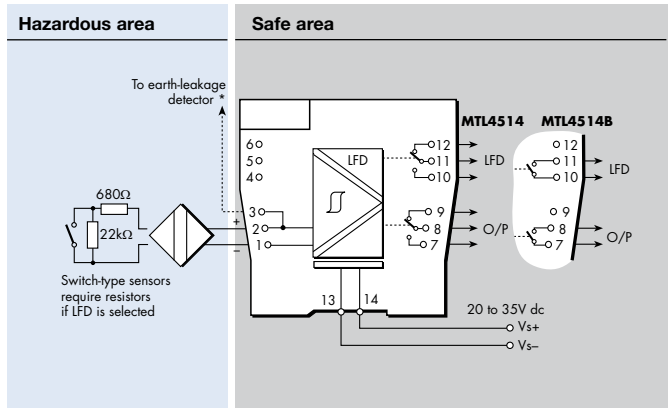
SPECIFICATION

See also common specification

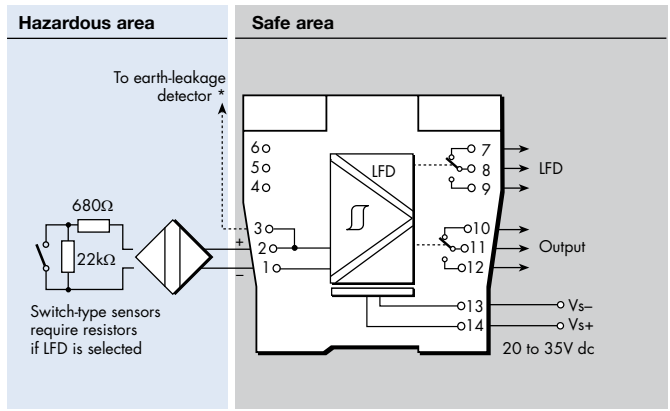
Number of channels
One
Location of switch
Zone 0, IIC, T6 hazardous area
Div.1, Group A, hazardous location
Location of proximity detector
Zone 0, IIC, T4–6 hazardous area, if suitably certified
Div.1, Group A, hazardous location
Hazardous–area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)
Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%
Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal
Line fault detection (LFD) (when selected)
User-selectable via switches on the side of the unit. Line faults are indicated by an LED. Line fault relay is energised and channel output relay de-energised if input line-fault detected
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch
Safe-area output
MTL4514 & MTL5514
Channel: Single pole relay with changeover contacts
LFD: Single pole relay with changeover contacts
MTL4514B
Channel: Single pole relay
LFD: Single pole relay
Note: reactive loads must be adequately suppressed
Relay characteristics

	MTL4514/B	MTL5514
Response time:	10ms maximum	10ms maximum
Contact rating (Safe Area):	10W, 0.5A, 35V dc	250V ac, 2A, cosØ >0.7, 40V dc, 2A, resistive load
Contact rating (Zone 2):	10W, 0.5A, 35V dc	35V, 2A, 100VA.

MTL4514/B



MTL5514



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: channel status, on when output energised
Red: LFD indication, on when line fault detected
Maximum current consumption
25mA at 24V dc
Power dissipation within unit
0.6W at 24V
Safety description
U_o=10.5V I_o=14mA P_o=37mW U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx514 Rev5 220814

MTL4514D – MTL5514D
SWITCH/ PROXIMITY DETECTOR INTERFACE
1-channel, dual output, LFD, phase reversal

The MTLx514D enables two safe–area loads to be controlled, through relays, by a proximity detector or switch located in a hazardous area. When selected, open or short circuit conditions in the field wiring are detected by the line fault detect (LFD) facility and indicated on the top of the module. Switches are provided to select phase reversal and to enable the line fault detection.

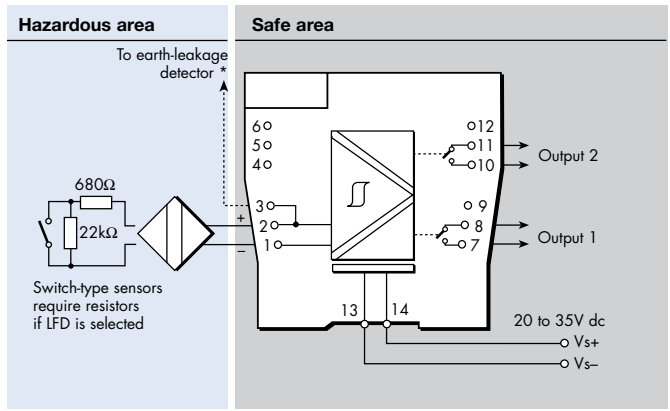
SPECIFICATION

See also common specification

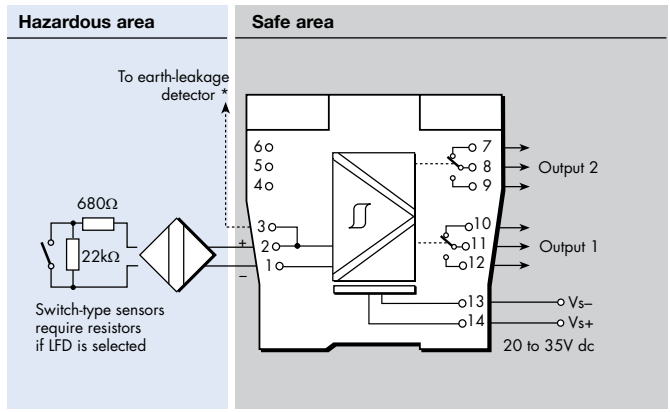
Number of channels
One
Location of switch
Zone 0, IIC, T6 hazardous area
Div.1, Group A, hazardous location
Location of proximity detector
Zone 0, IIC, T4–6 hazardous area, if suitably certified
Div.1, Group A, hazardous location
Hazardous–area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)
Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%
Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal
Line fault detection (LFD) (when selected)
User-selectable via switches on the side of the unit. Line faults are indicated by an LED. The channel output relays are de-energised if an input line-fault is detected
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch
Safe-area output
MTL4514D: two, single pole relays with normally-open contacts
MTL5514D: two, single pole relays with changeover contacts
Note: reactive loads must be adequately suppressed
Relay characteristics

	MTL4514D	MTL5514D
Response time:	10ms maximum	10ms maximum
Contact rating (Safe Area):	10W, 0.5A, 35V dc	250V ac, 2A, cosØ >0.7, 40V dc, 2A, resistive load
Contact rating (Zone 2):	10W, 0.5A, 35V dc	35V, 2A, 100VA.

MTL4514D



MTL5514D



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: channel status, on when output energised
Red: LFD indication, on when line fault detected
Maximum current consumption
29mA at 24V dc
Power dissipation within unit
0.7W at 24V
Safety description (Certification pending)
U_o=10.5V I_o=14mA P_o=37mW U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx514D 251013

MTL4516/C – MTL5516C
SWITCH/ PROXIMITY DETECTOR INTERFACE
2-channel, with line fault detection

The MTLx516/C enable two safe-area loads to be controlled by a switch or proximity detector located in a hazardous-area. When selected, open or short circuit conditions in the field wiring are detected by the line-fault-detect (LFD) facility and also indicated on the top of the module. Phase reversal for each channel is selected by a switch on the side of the module and output is provided by changeover relay contacts.

SPECIFICATION

See also common specification

Number of channels
Two

Location of switches
Zone 0, IIC, T6 hazardous area
Div. 1, Group A hazardous location

Location of proximity detector
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location

Hazardous-area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)

Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%

Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal

Line fault detection (LFD) (when selected)
User-selectable via switches on the side of the unit. Line faults are indicated by an LED for each channel. The channel output relay is de-energised if an input line fault is detected.
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch

Safe-area output
Two single-pole relays with changeover contacts
Note: reactive loads must be adequately suppressed

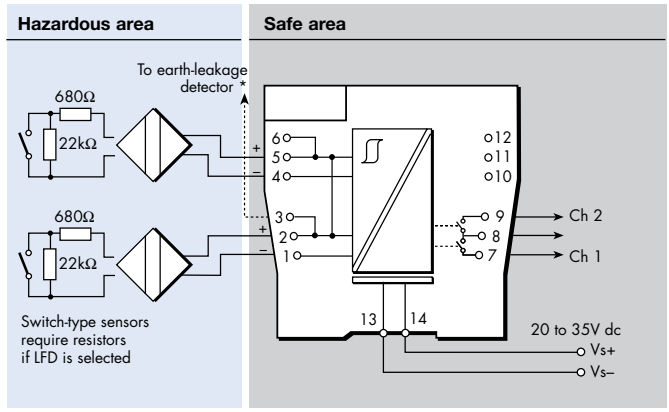
Relay characteristics

	MTL4516/C	MTL5516C
Response time:	10ms maximum	10ms maximum
Contact rating (Safe Area):	10W, 0.5A, 35V dc	250V ac, 2A, cosØ >0.7, 40V dc, 2A, resistive load
Contact rating (Zone 2):	10W, 0.5A, 35V dc	35V, 2A, 100VA.

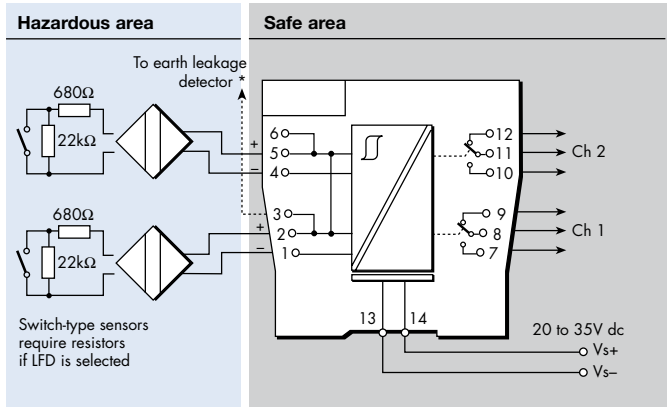
Maximum current consumption
35mA at 24V

Power dissipation within unit
0.84W at 24V

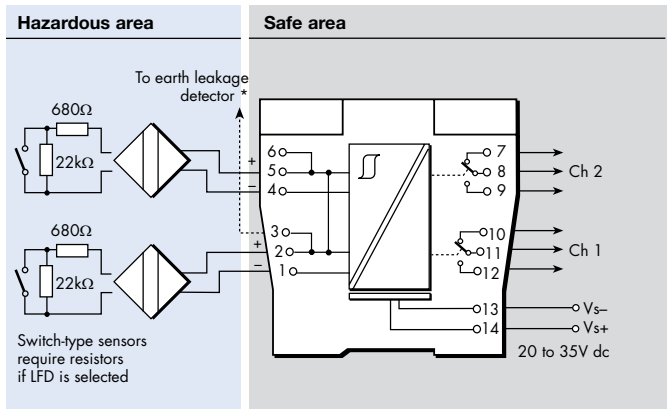
MTL4516



MTL4516C



MTL5516C



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: two: channel status, on when output energised
Red: two: LFD indication, on when line fault detected

Safety description (each channel)
U_o=10.5V I_o=14mA P_o=37mW U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx516/C Rev4 200913

MTL4517 – MTL5517
SWITCH/ PROXIMITY DETECTOR INTERFACE
2-channel, line fault detection, phase reversal

The MTLx517 enables two safe-area loads to be controlled, through a relay, by proximity detectors or switches located in a hazardous area. Line faults are signalled through a separate relay and indicated on the top of the module. Switches are provided to select phase reversal and to enable the line fault detection.

SPECIFICATION

See also common specification

Number of channels
Two

Location of switch
Zone 0, IIC, T6 hazardous area
Div.1, Group A, hazardous location

Location of proximity detector
Zone 0, IIC, T4–6 hazardous area, if suitably certified
Div.1, Group A, hazardous location

Hazardous-area inputs
Inputs conforming to BS EN60947–5–6:2001 standards for proximity detectors (NAMUR)

Voltage applied to sensor
7 to 9V dc from 1kΩ ±10%

Input/output characteristics
Normal phase
Outputs closed if input > 2.1mA (< 2kΩ in input circuit)
Outputs open if input < 1.2mA (> 10kΩ in input circuit)
Hysteresis: 200µA (650Ω) nominal

Line fault detection (LFD) (when selected)
User selectable by switches on the side of the module.
Line faults are indicated by the LED for each channel.
Line fault relay is energised and channel output relay de-energised if input line-fault detected
Open-circuit alarm on if I_{in} < 50µA
Open-circuit alarm off if I_{in} > 250µA
Short-circuit alarm on if R_{in} < 100Ω
Short-circuit alarm off if R_{in} > 360Ω
Note: Resistors must be fitted when using the LFD facility with a contact input
500Ω to 1kΩ in series with switch
20kΩ to 25kΩ in parallel with switch

Safe-area output
Channel: Two single-pole relays with normally open contacts
LFD: Single pole relay with changeover contacts
Note: reactive loads must be adequately suppressed

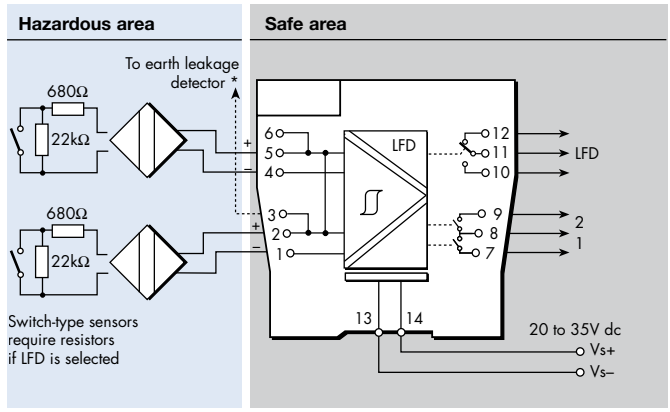
Relay characteristics

	MTL4517	MTL5517
Response time:	10ms maximum	10ms maximum
Contact rating (Safe Area):	10W, 0.5A, 35V dc	250V ac, 2A, cosØ >0.7, 40V dc, 2A, resistive load
Contact rating (Zone 2):	10W, 0.5A, 35V dc	35V, 2A, 100VA.

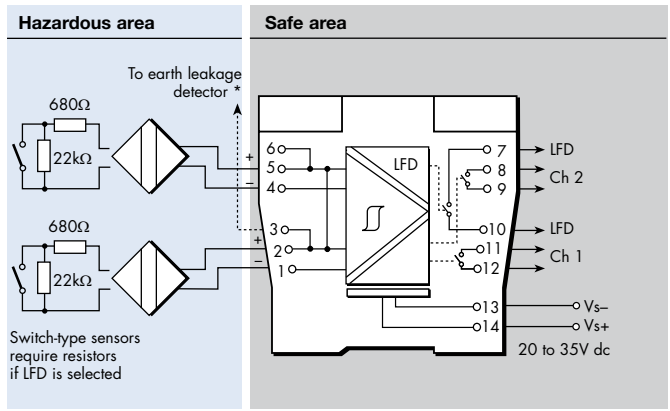
Maximum current consumption
35mA at 24V

Power dissipation within unit
0.84W at 24V

MTL4517



MTL5517



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: two: channel status, on when output energised
Red: two: LFD indication, on when line fault detected

Safety description (each channel)
U_o=10.5V I_o=14mA P_o=37mW U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx517 Rev4 200913

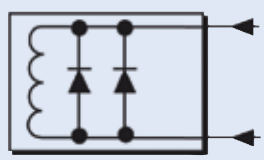
Isolator Applications

DIGITAL OUTPUT - ALARMS, LED's, SOLENOID VALVES ETC

Backplane Device	DIN-rail Device	No. of channels	Output to hazardous area	Important features
MTL4521/L	MTL5521	1	12.8V<Vo<24V Imax = 48mA	IIC gas groups, loop powered
	MTL5522	1	9.9V<Vo<21.4V Imax = 70mA	IIB gas groups, loop powered
MTL4523/R	MTL5523	1	12.8V<Vo<24V Imax = 48mA	Independent LFD output
MTL4523L		1	12.8V<Vo<24V Imax = 48mA	Loop powered, independent LFD output
MTL4523V/VL	MTL5523V/VL	1	12.8V<Vo<24V Imax = 48mA	Solenoid/alarm driver with line fault dectection
MTL4524	MTL5524	1	12.8V<Vo<24V Imax = 48mA	Safety override feature, separately powered
MTL4524S		1	12.8V<Vo<24V Imax = 48mA	Safety override feature, separately powered
MTL4525	MTL5525	1	7V<Vo<24V Imax = 48mA	Override, low power output

DIGITAL OUTPUT - SWITCH OUTPUT TO HAZARDOUS AREA

Backplane Device	DIN-rail Device	No. of channels	Output to hazardous area	Important features
MTL4526	MTL5526	1 2	RELAYS 1xDPDT 2xSPDT	Safe-area switch input, dual outputs Dual safe-area switch inputs



MTL4521/L – MTL5521
SOLENOID/ ALARM DRIVER
loop-powered, IIC

The MTLx521 and the MTL4521L are loop-powered modules which enable a device located in the hazardous area to be controlled from the safe area. They can all drive a certified intrinsically safe low-power load, as well as non-energy-storing simple apparatus such as an LED.

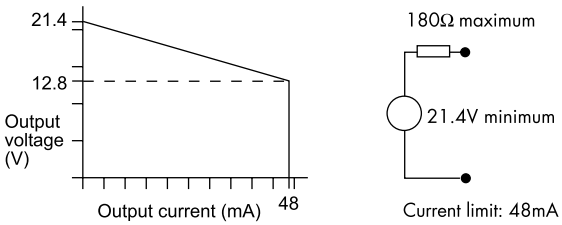
SPECIFICATION

See also common specification

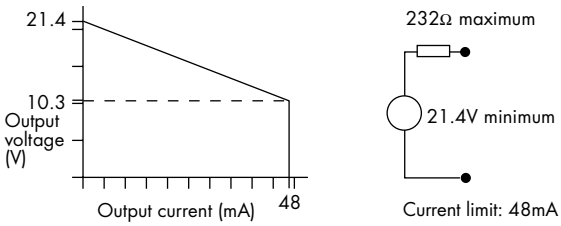
Number of channels
One

Location of load
Zone 0, IIC, T4–-6 hazardous area if suitably certified
Div. 1, Group A hazardous location

Minimum output voltage (MTLx521) **Equivalent output circuit**



Minimum output voltage (MTL4521L) **Equivalent output circuit**



Input voltage
20 to 35V dc

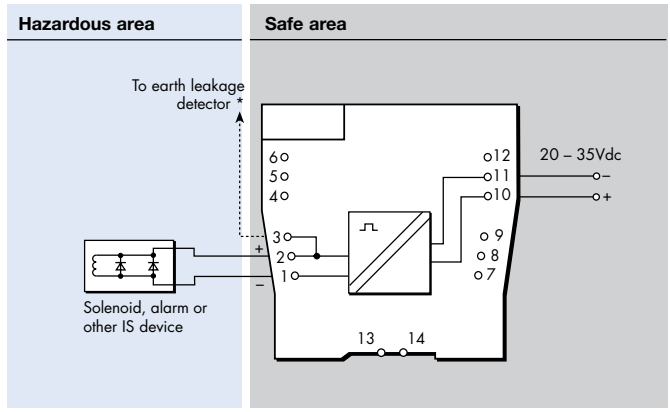
Hazardous-area output (MTLx521)
Minimum output voltage: 12.8V at 48mA
Maximum output voltage: 24V from 180Ω
Current limit: 48mA

Hazardous-area output (MTL4521L)
Minimum output voltage: 10.3V at 48mA
Maximum output voltage: 24V from 232Ω
Current limit: 48mA

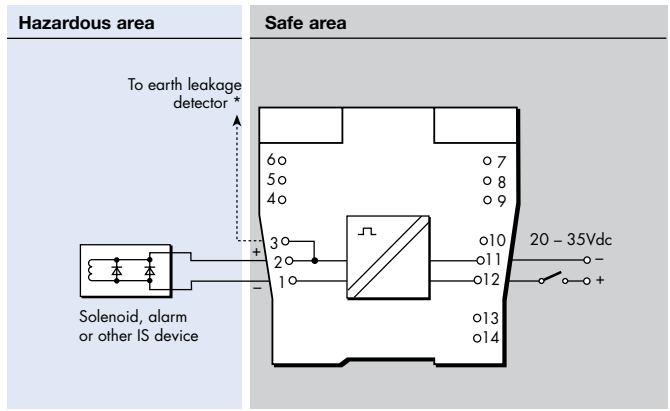
Output ripple
< 0.5% of maximum output, peak to peak

Response time
Output within 10% of final value within 100ms

MTL4521 / MTL4521L



MTL5521



* Signal plug HAZ1-3 is required for access to this function

LED indicator
Yellow: output status, on when output active

Maximum current consumption
90mA at 24V

Power dissipation within unit
1.4W at 24V

Safety description (MTLx521)
U_o=25V I_o=147mA P_o=0.92W U_m = 253V rms or dc

Safety description (MTL4521L)
U_o= 25V I_o= 108mA P_o= 0.68W U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx521 Rev4 200913

MTL5522
SOLENOID/ALARM DRIVER
loop-powered, IIB

The MTL5522 is a loop-powered module which enables a device located in the hazardous area to be controlled from the safe area. The MTL5522 can drive a certified intrinsically safe low-power load, as well as non-energy-storing simple apparatus such as an LED. The unit's input/output isolation allows the control switch to be connected into either side of the 24V dc supply circuit.

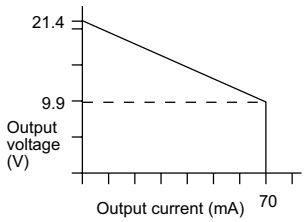
SPECIFICATION

See also common specification

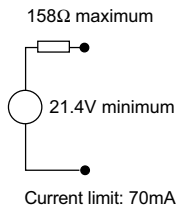
Number of channels
One

Location of load
Zone 0, IIB, T4–6 hazardous area if suitably certified
Div. 1, Group C hazardous location

Minimum output voltage



Equivalent output circuit



Input voltage
20 to 35V dc

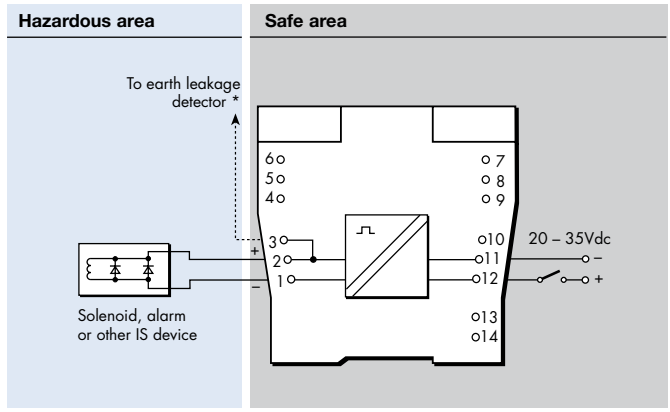
Hazardous-area output

Minimum output voltage:	9.9V at 70mA
Maximum output voltage:	24V from 158Ω
Current limit:	70mA

Output ripple
< 0.5% of maximum output, peak to peak

Response time
Output within 10% of final value within 100ms

MTL5522



* Signal plug HAZ1-3 is required for access to this function

LED indicator
Yellow: output status, on when output active

Maximum current consumption
125mA (typ.) at 24V

Power dissipation within unit
1.4W at 24V

Safety description
U_o=25V I_o=166mA P_o=1.04W U_m= 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx522 Rev4 200913

MTL4523/R – MTL5523

SOLENOID/ALARM DRIVER

with line fault detection, IIC

With the MTLx523 interface, an on/off device in a hazardous area can be controlled by a volt-free contact or logic signal in the safe area. It is suitable for driving loads such as solenoids. Line fault detection (LFD), which operates irrespective of the output state, is signalled by a safe-area solid-state switch which de-energises MTLx523, or energises MTL4523R, if a field line is open or short–circuited. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 3.

SPECIFICATION

See also common specification

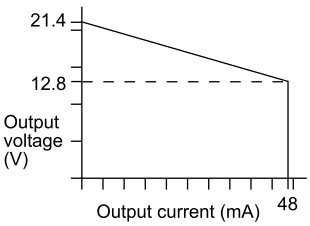
Number of channels

One

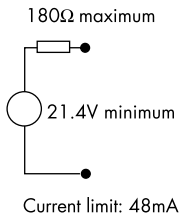
Location of load

Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A, hazardous location

Minimum output voltage



Equivalent output circuit



Hazardous-area output

Minimum output voltage:	12.8V at 48mA
Maximum output voltage:	24V from 180Ω
Maximum off-state output voltage:	4V from 180Ω
Current limit:	48mA

Output ripple

< 0.5% of maximum output, peak to peak

Control input

Suitable for switch contacts, an open collector transistor or logic drive.
(Internal contact wetting voltage 12V @ 0.2mA contact closed. Not suitable for voltage control via series diode.)
Output turns on if input switch closed, transistor on or < 1.4V applied across control input
Output turns off if input switch open, transistor off or > 4.5V applied across control input

Response time

Output within 10% of final value within 100ms

Line fault detection (LFD)

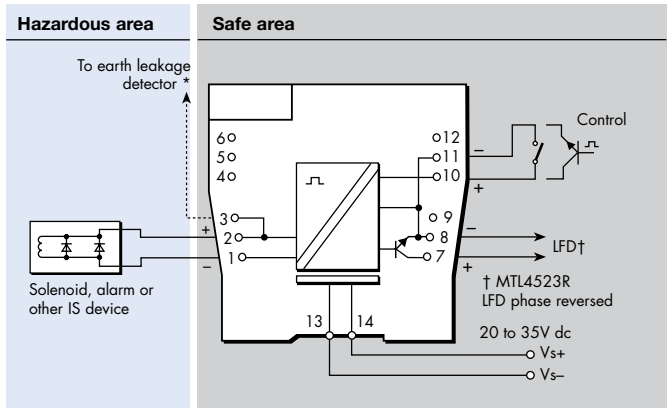
Open or short circuit in field cabling *de-energises** solid state line-fault signal.
LFD transistor is switched *on**, provided that the field circuit impedance is > 55Ω and < 4kΩ.

** These conditions are reversed for the MTL4523R. This is to permit parallel connection of alarms between modules to provide a group alarm output.*

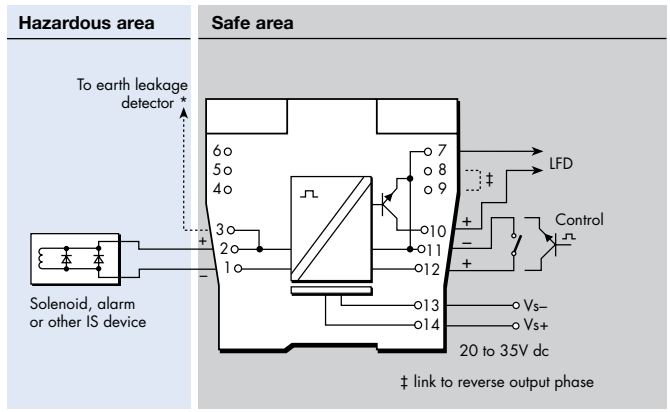
Line fault signal characteristics

Maximum off-state voltage:	35V
Maximum off-state leakage current:	10µA
Maximum on-state voltage drop:	2V
Maximum on-state current:	50mA

MTL4523 / MTL4523R



MTL5523



* Signal plug HAZ1-3 is required for access to this function

LED indicators

Green: power indication
Yellow: output status, on when output active
Red: LFD indication, on when line fault detected

Maximum current consumption

100mA at 24V dc

Power dissipation within unit

1.2W with typical solenoid valve, output on
2.0W worst case

Safety description

U_o=25V I_o=147mA P_o= 0.92W U_m= 253V rms or dc

SIL capable

These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx523/R Rev5 200913

MTL4523L
SOLENOID/ ALARM DRIVER
loop-powered with line fault detection, IIC

With the MTL4523L interface, an on/off device in a hazardous area can be controlled by a voltage signal in the safe area. It is suitable for driving loads such as solenoids. Line fault detection (LFD), which operates when the output is energised, is signalled by a safe-area solid-state switch which energises if a field line is open or short-circuited. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 3.

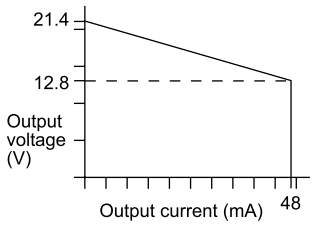
SPECIFICATION

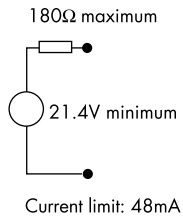
See also common specification

Number of channels
One

Location of load
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A, hazardous location

Minimum output voltage **Equivalent output circuit**





Input voltage
20 to 35V dc

Hazardous-area output

Minimum output voltage:	12.8V at 48mA
Maximum output voltage:	24V from 180Ω
Current limit:	48mA

Output ripple
< 0.5% of maximum output, peak to peak

Response time
Output within 10% of final value within 100ms

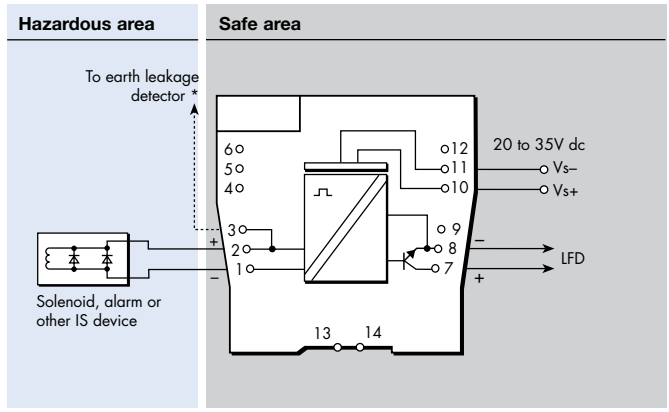
Line fault detection (LFD)
Open or short circuit in field cabling energises solid state line fault signal
LFD transistor is switched on, provided that the field circuit impedance is > 55Ω and < 4kΩ.

Line fault signal characteristics

Maximum off-state voltage:	35V
Maximum off-state leakage current:	10µA
Maximum on-state voltage drop:	2V
Maximum on-state current:	50mA

Note: LFD signal is Zener-diode protected against inductive loads

MTL4523L



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Yellow: output status, on when output active
Red: LFD indication, on when line fault detected

Maximum current consumption
100mA at 24V dc

Power dissipation within unit
1.2W with typical solenoid valve, output on

Safety description
U_o=25V I_o=147mA P_o= 0.92W U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPS4523L Rev 6 241014

MTL4523V/VL – MTL5523V/VL

SOLENOID/ALARM DRIVER

with line fault detection, IIC

With the MTLx523V/VL interface, an on/off device in a hazardous area can be controlled by a voltage signal in the safe area. It is suitable for driving loads such as solenoids. Line fault detection (LFD), which operates irrespective of the output state, is signalled by a safe-area solid-state switch which energises if a field line is open or short–circuited. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 3.

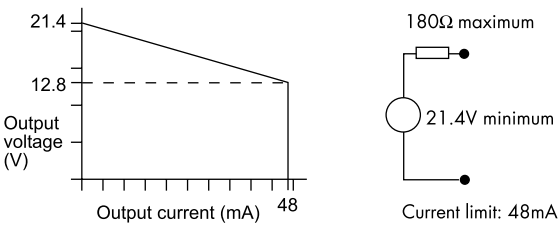
SPECIFICATION

See also common specification

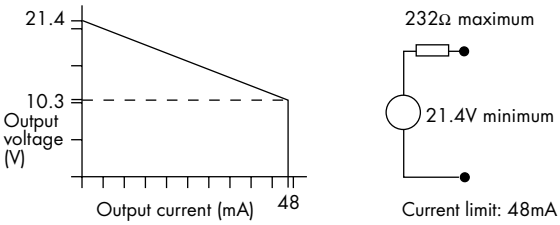
Number of channels
One

Location of load
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A, hazardous location

Minimum output voltage (MTLx523V) **Equivalent output circuit**



Minimum output voltage (MTLx523VL) **Equivalent output circuit**



Hazardous-area output (MTLx523V)
Minimum output voltage: 12.8V at 48mA
Maximum output voltage: 24V from 180Ω
Maximum off-state output voltage: 4V from 180Ω
Current limit: 48mA

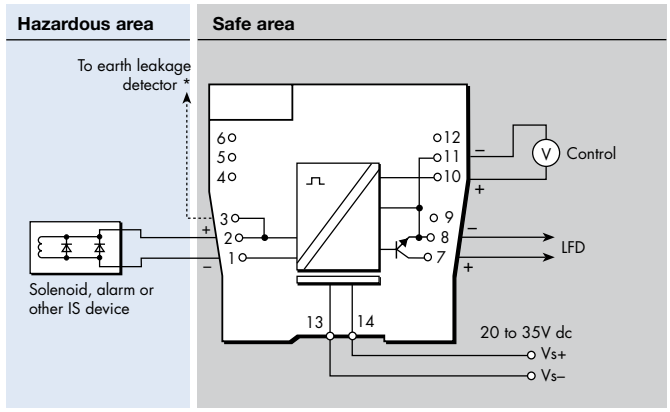
Hazardous-area output (MTLx523VL)
Minimum output voltage: 10.3V at 48mA
Maximum output voltage: 24V from 232Ω
Maximum off-state output voltage: 4V from 232Ω
Current limit: 48mA

Output ripple
< 0.5% of maximum output, peak to peak

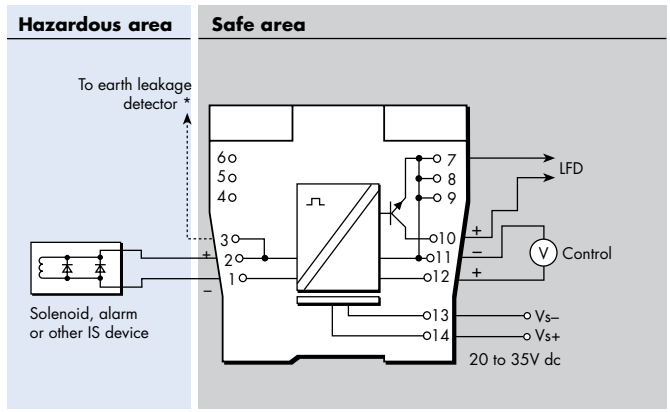
Control input
Suitable for 24V logic drive
Output turns on if > 18V applied across control input
Output turns off if < 5V applied across control input
Maximum control input voltage: 28V
Maximum control system output leakage current: 0.5mA

Response time
Output within 10% of final value within 100ms

MTL4523V/MTL4523VL



MTL5523V/MTL5523VL



*Signal plug HAZ1-3 is required for access to this function

Line fault detection (LFD)
Open or short circuit in field cabling energises solid state line-fault signal.
LFD transistor is switched off, provided that the field circuit impedance is > 55Ω and < 4kΩ.

Line fault signal characteristics
Maximum off-state voltage: 35V
Maximum off-state leakage current: 10µA
Maximum on-state voltage drop: 2V
Maximum on-state current: 50mA

LED indicators
Green: power indication
Yellow: output status, on when output active
Red: LFD indication, on when line fault detected

Maximum current consumption
100mA at 24V dc

Power dissipation within unit
1.2W with typical solenoid valve, output on
2.0W worst case

Safety description (MTLx523V)
V_o=25V I_o=147mA P_o= 0.92W U_m = 253V rms or dc

Safety description (MTLx523VL)
V_o=25V I_o=108mA P_o= 0.68W U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx523V-VL Rev2 200913

MTL4524 – MTL5524

SOLENOID/ALARM DRIVER

switch operated with override, IIC

The MTLx524 enables an on/off device in a hazardous area to be controlled by a volt-free contact or logic signal in the safe area. It can drive loads such as solenoids, alarms, LEDs and other low power devices that are certified as intrinsically safe or are classified as non-energy storing simple apparatus.

The MTL4524 allows a second safe-area switch or logic signal to be connected enabling the output to be disabled to permit, for example, a safety system to override a control signal.

The MTL5524 has its phase reversed by connecting a wire link between pins 8 and 9.

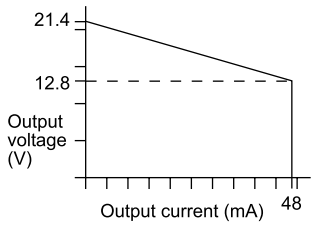
SPECIFICATION

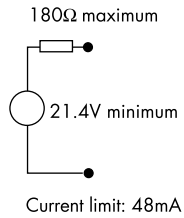
See also common specification

Number of channels
One

Location of load
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div.1, Group A, hazardous location

Minimum output voltage **Equivalent output circuit**





Hazardous-area output
Hazardous-area output

Minimum output voltage:	12.8V at 48mA
Maximum output voltage:	24V from 180Ω
Maximum off-state output voltage:	4V from 180Ω
Current limit:	48mA

Output ripple
< 0.5% of maximum output, peak-to-peak

Control input
Suitable for switch contacts, an open collector transistor or logic drive
0 = input switch closed, transistor on or <1.4V applied
1 = input switch open, transistor off or >4.5V applied

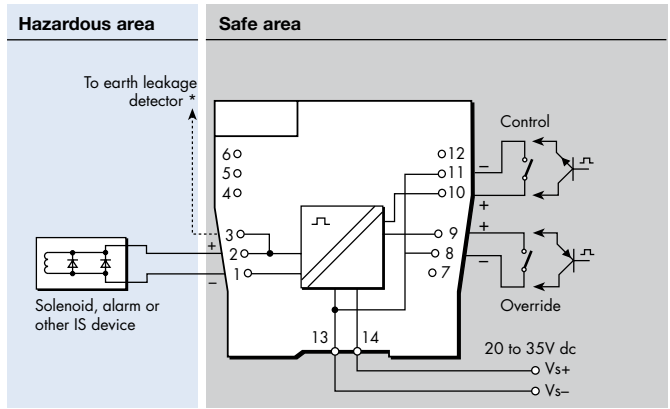
Override input on MTL4524
An open collector transistor or a switch connected across the terminals can be used to turn the output off whatever the state of the control input
0 = transistor on or switch closed
1 = transistor off or switch open

Control and override inputs on MTL4524

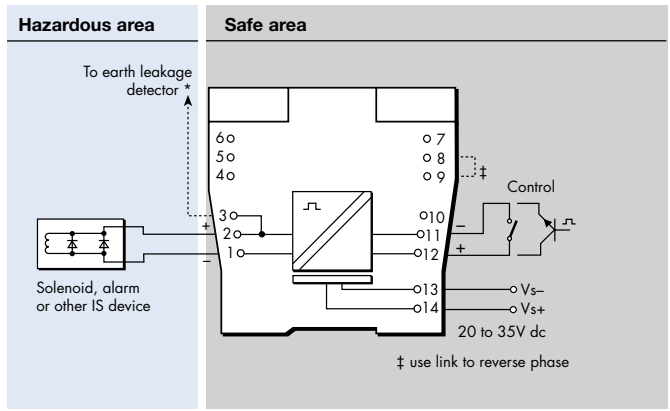
Control input	Override input	Output state
0	0	off
0	1	on
1	0	off
1	1	off

Response time
Output within 10% of final value within 100ms

MTL4524



MTL5524



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: output status, on when output active

Maximum current consumption
100mA at 24V dc

Power dissipation within unit
1.3W with typical solenoid valve, output on
1.9W worst case

Safety description
U_o=25V I_o=147mA P_o= 0.92W U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx524 Rev 5 121114

MTL4524S
SOLENOID/ALARM DRIVER
switch operated with 24V override, IIC

The MTL4524S enables an on/off device in a hazardous area to be controlled by a volt-free contact or a floating logic signal in the safe area. It can drive loads such as solenoids, alarms, LEDs and other low power devices that are certified as intrinsically safe or are classified as non-energy storing simple apparatus. By connecting a second safe-area voltage, the output can be disabled to permit, for example, a safety system to override a control signal.

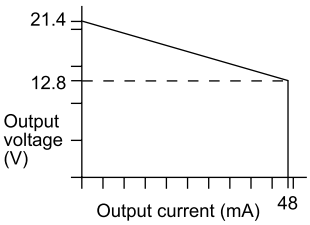
SPECIFICATION

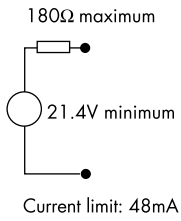
See also common specification

Number of channels
One

Location of load
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div.1, Group A, hazardous location

Minimum output voltage **Equivalent output circuit**





Hazardous-area output

Minimum output voltage:	12.8V at 48mA
Maximum output voltage:	24V from 180Ω
Maximum off-state output voltage:	4V from 180Ω
Current limit:	48mA

Output ripple
< 0.5% of maximum output, peak-to-peak

Control input (must be fully-floating)
Suitable for switch contacts or an opto-isolator
0 = input switch closed, transistor on or < 1.4V applied
1 = input switch open, transistor off or > 4.5V applied

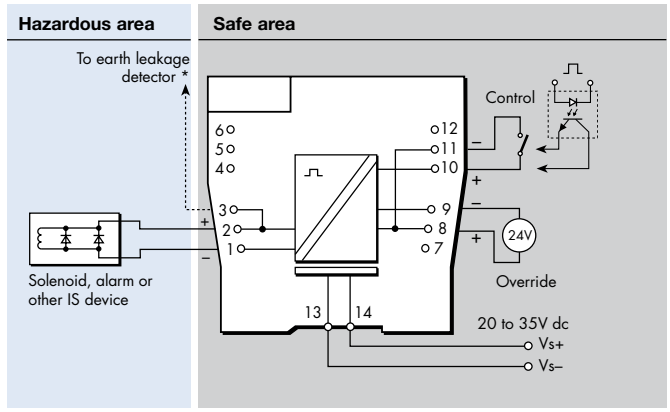
Override input
A 24V logic signal applied across the terminals allows the solenoid/alarm to be operated by the control input. If it is disconnected, the solenoid/alarm is off.
0 = < 2.0V applied across terminals 8 & 9
1 = > 9.0V applied across terminals 8 & 9
(nominal switching point 4.5V)

Control and override inputs

Control input	Override input	Output state
0	0	off
0	1	on
1	0	off
1	1	off

Response time
Output within 10% of final value within 100ms

MTL4524S



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: output status, on when output active

Maximum current consumption
100mA at 24V dc

Power dissipation within unit
1.3W with typical solenoid valve, output on
1.9W worst case

Safety description
U_o=25V I_o=147mA P_o= 0.92W U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPS4524S Rev4 200913

MTL4525 – MTL5525

SOLENOID/ALARM DRIVER

switch operated with override, IIC, low power

The MTLx525 enables an on/off device in a hazardous area to be controlled by a volt-free contact or logic signal in the safe area. It can drive loads such as solenoids, alarms, LEDs and other low power devices that are certified as intrinsically safe or are classified as non-energy storing simple apparatus.

The MTL4525 allows a second safe-area switch or logic signal to be connected that enables the output to be disabled to permit, for example, a safety system to override a control signal.

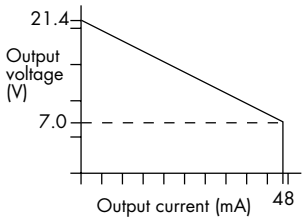
SPECIFICATION

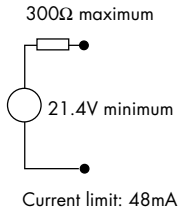
See also common specification

Number of channels
One

Location of load
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div.1, Group A, hazardous location

Minimum output voltage **Equivalent output circuit**





Hazardous-area output
Hazardous-area output

Minimum output voltage:	7V at 48mA
Maximum output voltage:	24V from 300Ω
Maximum off-state output voltage:	4V from 300Ω
Current limit:	48mA

Output ripple
< 0.5% of maximum output, peak-to-peak

Control input on MTL4525
Suitable for switch contacts, an open collector transistor or logic drive
0 = input switch closed, transistor on or < 1.4V applied
1 = input switch open, transistor off or > 4.5V applied

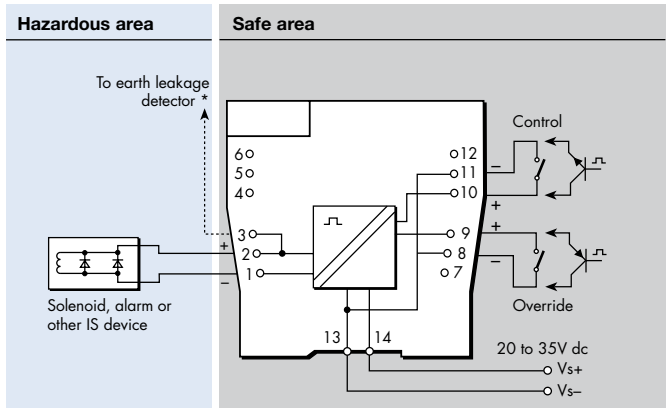
Override input on MTL4525
An open collector transistor or a switch connected across the terminals can be used to turn the output off whatever the state of the control input
0 = transistor on or switch closed
1 = transistor off or switch open

Control and override inputs on MTL4525

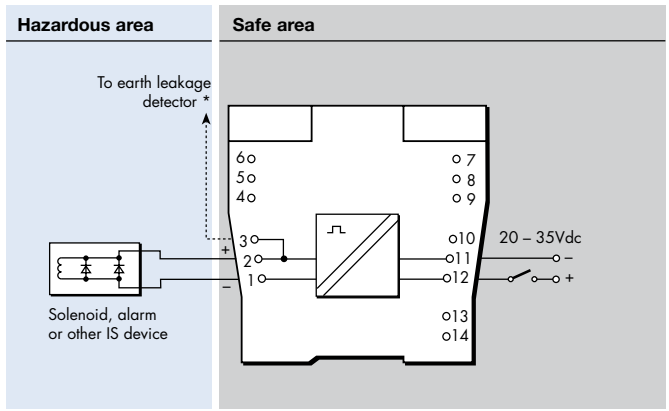
Control input	Override input	Output state
0	0	off
0	1	on
1	0	off
1	1	off

Response time
Output within 10% of final value within 100ms

MTL4525



MTL5525



* Signal plug HAZ1-3 is required for access to this function

LED indicators
Green: power indication
Yellow: output status, on when output active

Maximum current consumption
100mA at 24V dc

Power dissipation within unit
1.3W with typical solenoid valve, output on
1.9W worst case

Safety description
U_o=25V I_o=83.3mA P_o=0.52W U_m= 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx525 Rev 5 121114

MTL4526 – MTL5526
SWITCH-OPERATED RELAY
2–channel IS–output

The MTLX526 enables two separate IS circuits in a hazardous area to be contact controlled by one or two, on/off, control signals in a safe area. Applications include the calibration of strain–gauge bridges; changing the polarity (and thereby the tone) of an IS sounder; the testing of IS fire alarms; and the transfer of safe-area signals into an annunciator with IS input terminals not segregated from each other. The output–relay contacts are certified as non–energy–storing apparatus, and can be connected to any IS circuit without further certification, provided that separate IS circuits are such that they would remain safe if connected together.

SPECIFICATION

See also common specification

Number of channels
Two, fully floating
Location of control circuit
Safe area
Input/output characteristics
Contact/Logic mode
(Inputs suitable for switch contacts, an open–collector transistor or logic drive)

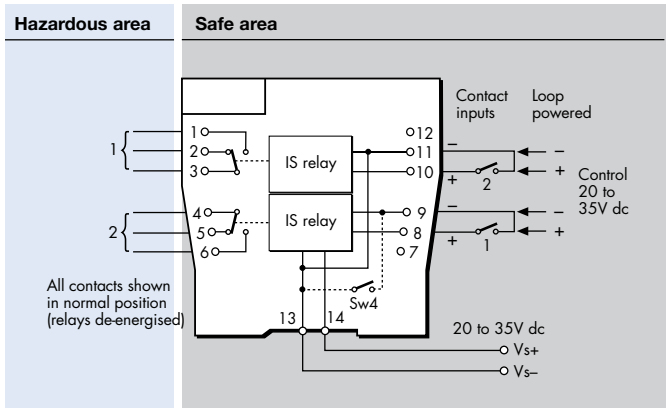
Relay energised if	< 450Ω or < 1V applied
Relay de–energised if	> 5kΩ or > 2V applied (35V max.)

Loop powered mode

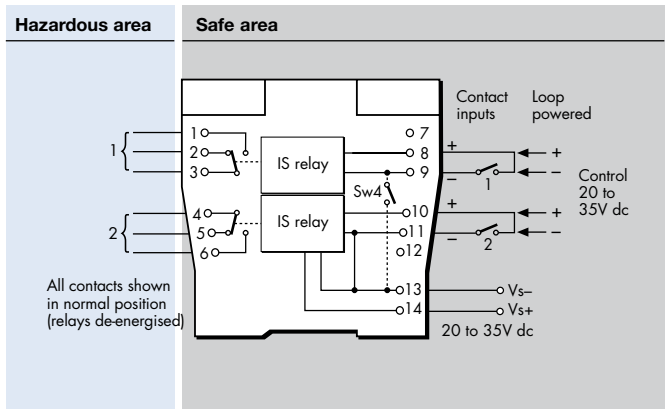
Relay energised if	>20V
Relay de-energised if	<17V

Power supply failure protection
Relays de–energised if supply fails
Response time
25ms nominal
Contacts (suitable for connection to IS circuits)
1–pole changeover per channel
Contact rating
250V dc, limited to 30V dc for IS applications, 2A (reactive loads must be suppressed)
Contact life expectancy
2 x 10^7 operations at maximum IS load
Relay drive (see switch setting table)
Choice of "loop-powered" or "contact/logic" control, for both channels, by switch selection. A further switch option ("1in2out") enables either input, in contact/logic mode, to activate *both* outputs.

MTL4526



MTL5526



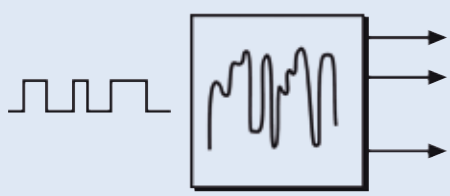
LED indicators
Green: power indication
Yellow: two: output status, on when relay energised
Power requirement, Vs
41mA at 20V dc
44mA at 24V dc
60mA at 35V dc
Power dissipation within unit
1.1W maximum at 24V
Safety description (each channel)
Non-energy–storing apparatus: relay contacts may be connected to any IS circuit without further consideration
User switch settings for operating mode

Mode	Function	SW1	SW2	SW3	SW4
Contact/Logic Input	2 ch	Off	On	On	On
	1in2out	On	On	On	On
Loop Powered	2 ch	Off	Off	Off	Off

EPSx526 Rev5 210513

Isolator Applications

PULSE AND VIBRATION INPUT -				
Backplane Device	DIN-rail Device	No. of channels	Input from hazardous area	Important features
MTL4531	MTL5531	1	2-wire & 3-wire vibration probes	dc and ac voltage transfer
MTL4532	MTL5532	1	Switch, proximity detector, current pulse, voltage pulse	Repeats frequency and converts to analogue value, plus trip function
	MTL5533	2	2-wire & 3-wire vibration probes	dc and ac voltage transfer



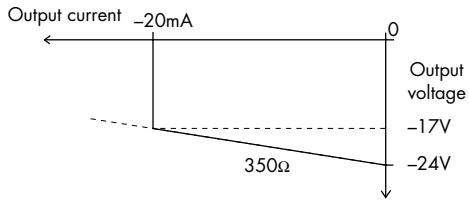
MTL4531 – MTL5531
VIBRATION TRANSDUCER INTERFACE

The MTLx531 repeats a signal from a vibration sensor in a hazardous area, providing an output for a monitoring system in the safe area. The interface is compatible with 3-wire eddy-current probes and accelerometers or 2-wire current sensors; the selection is made by a switch on the side of the module.

SPECIFICATION

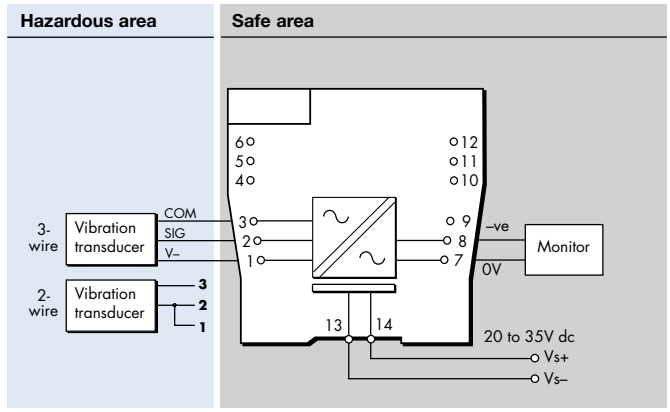
See also common specification

Number of channels
One
Sensor type
2- or 3-wire vibration transducer
Location of signal source
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location
Hazardous-area input
Input impedance
(terminals 2 & 3): 10kΩ
Transducer supply voltage, 3-wire (terminals 3 & 1)

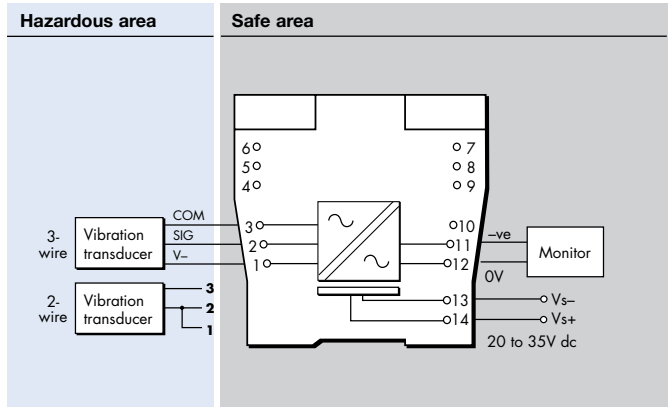


Transducer supply current, 2-wire
3.3mA (nom.) for 2-wire sensors, user selectable by switch
Signal range
Minimum –20V, maximum –0.5V
DC transfer accuracy at 20°C
<±50mV
AC transfer accuracy at 20°C
0Hz to 1kHz: ±1%
1kHz to 10kHz: –5% to +1%
10kHz to 20kHz: –10% to +1%
Temperature coefficient
±50ppm/°C (10 to 65°C)
±100ppm/°C (–20 to 10°C)
Voltage bandwidth
–3dB at 47kHz (typical)
Phase response
<14µs, equivalent to:
–1° at 200Hz
–3° at 600Hz
–5° at 1kHz
–50° at 10kHz
–100° at 20kHz
Safe-area output impedance
<20Ω

MTL4531



MTL5531



LED indicator
Green: power indication
Supply voltage
20 to 35V dc
Maximum current consumption (10mA transducer load)
96mA at 24V
Maximum power dissipation within unit
2W
Safety description
Terminals 3 to 1
U_o=26.6V I_o=94mA P_o=0.66W U_m = 253V rms or dc
Terminals 3 to 2
Non-energy-storing apparatus ≤1.5V, ≤0.1A and ≤25mW

Note -
Refer to the Instruction Manual for recommendations on mounting of these modules.

Due to the high power dissipation the maximum ambient temperature for these modules when mounted in horizontal orientation is:

- close packed 45°C
- minimum of 10mm spacing 55°C

MTL4532 – MTL5532

PULSE ISOLATOR

pulse & 4/20mA current outputs

The MTLx532 isolates pulses from a switch, proximity detector, current pulse transmitter or voltage pulse transmitter located in a hazardous area. It is ideal for applications involving high pulse rates and fast response times, by repeating the pulses into the safe area. An analogue output proportional to frequency is also provided, together with a relay output, which may be configured to act as an alarm. Configuration is carried out with a personal computer.

SPECIFICATION

See also common specification

Number of channels
One, fully floating

Sensor type
Switch or proximity detector (NAMUR/BS EN 60947–5–6:2001)
2– or 3–wire voltage or pulse transmitter

Location of switch
Zone 0, IIC, T6 hazardous area
Div. 1, Group A, hazardous location

Location of proximity detector or transmitter
Zone 0, IIC, T4–T6 if suitably certified
Div.1, Group A, hazardous location

Input

Switch input:
Output ON if switch is closed

Proximity detector input:
Excitation: 7.0 to 9.0V dc from 1kΩ nominal
Output ON if input > 2.1mA* (< 2kΩ)
Output OFF if input < 1.2mA* (> 10kΩ)
Switching hysteresis: 0.2mA (650Ω) nominal
*NAMUR and BS EN 60947–5–6:2001standards

Current pulse input:
Transmitter supply: 16.5V dc at 20mA
Short circuit current: 24mA
Output: I_{in} > 9.0mA = ON, I_{in} < 7.0mA = OFF
Switching hysteresis: 0.5mA

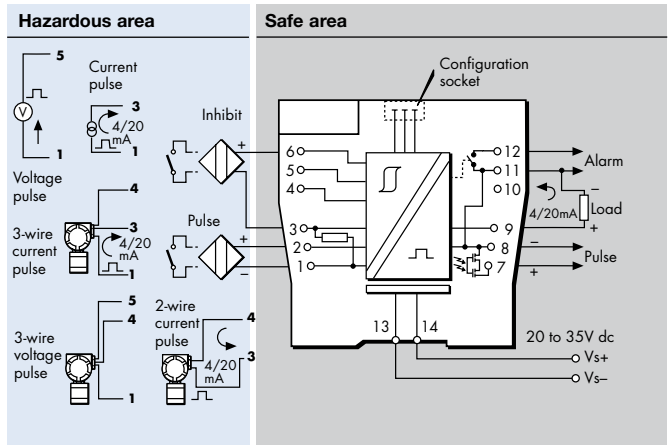
Voltage pulse input
Input impedance: > 10kΩ
Switching point voltage (V_{sp}): 3, 6, or 12V nominal
(User selectable by switches on the side of the module)
Output: V_{in} > V_{sp} = ON, V_{in} < V_{sp} = OFF
Switching hysteresis: 100mV + (0.1 x V_{sp}) typical

Safe-area pulse output
Maximum delay: 10µs
Maximum off–state voltage: 35V
Maximum off–state leakage current: 10µA
Maximum on–state resistance: 25Ω
Maximum on–state current: 50mA
Output OFF if supply fails
Note: LFD signal is Zener-diode protected against inductive loads

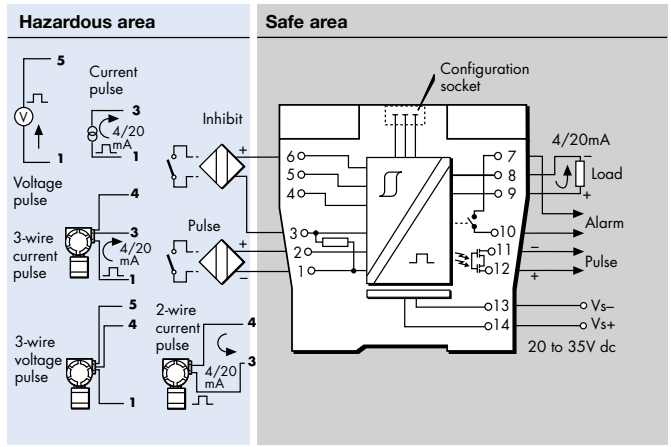
Safe-area current output
Input capture delay: 2 signal periods (5ms min.)
Signal range: 4 to 20mA
Under/over range: 0 to 22mA
Load resistance: 0 to 450Ω @20mA
Output resistance: >1MΩ
Ripple: < 50µA peak-to-peak
Accuracy: better than 20µA at 20°C
Temperature drift: < 1µA/°C
Risetime (10% - 90%, after step change): 60 ms

Alarm output
Relay ON in alarm, 0.5A @ 35Vdc max.

MTL4532



MTL5532



Pulse width
High: 10µs min
Low: 10µs min

Frequency range
0 – 50kHz - pulse output mode
0 – 10KHz - for analogue output

LED indicators
Green: power indication
Yellow: on when output circuit is on
Red: flashing when line fault or error

Power requirement
65mA at 24V dc
70mA at 20V dc
55mA at 35V dc

Power dissipation within unit
1.35W maximum at 24V
1.75W maximum at 35V

Safety description (U_m = 253V rms or dc)

Terminals 2 to 1 and 6 to 1
U_o=10.5V I_o=14mA P_o=37mW

Terminals 4 to 3 and 1
U_o=28V I_o=93mA P_o=651mW

Terminals 3 to 1
Non-energy-storing apparatus ≤1.5V, ≤0.1A and ≤25mW; can be connected without further certification into any IS loop with an open-circuit voltage <28V

Terminals 5 to 4 and 1
V_{max} ≤ 28V, I_{max} ≤ 94mA, P_{max} ≤ 0.66W

Configurator
A personal computer running MTL PCS45 software with a PCL45USB serial interface.

EPSx532 Rev4 210513

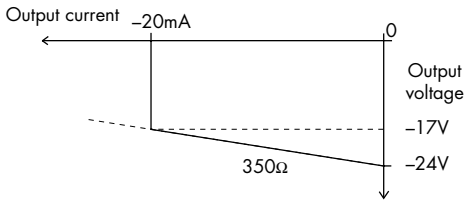
MTL5533
VIBRATION TRANSDUCER INTERFACE
2-channel

The MTL5533 repeats signals from vibration sensors in a hazardous area, providing outputs for a monitoring system in the safe area. The interface is compatible with 3-wire eddy-current probes and accelerometers or 2-wire current sensors, the selection is made by switches on the side of the module.

SPECIFICATION

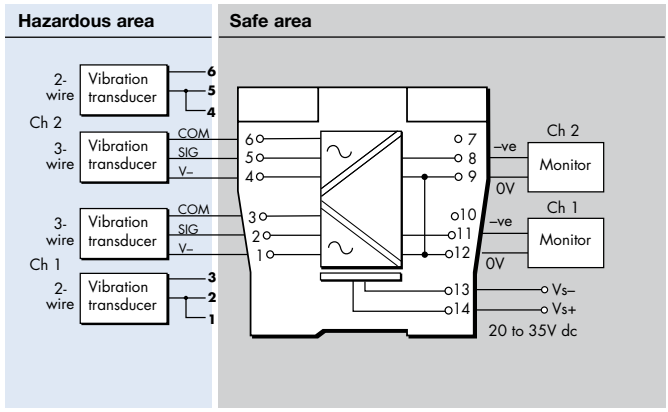
See also common specification

Number of channels
Two
Sensor type
2- or 3-wire vibration transducer
Location of signal source
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location
Hazardous-area input
Input impedance
(terminals 2 & 3, 5 & 6): 10kΩ
Transducer supply voltage, 3-wire (terminals 3 & 1 and 6 & 4)



Transducer supply current, 2-wire
3.3mA (nom.) for 2-wire sensors, user selectable by switch
Signal range
Minimum –20V, maximum –0.5V
DC transfer accuracy at 20°C
<±50mV
AC transfer accuracy at 20°C
0Hz to 1kHz: ±1%
1kHz to 10kHz: –5% to +1%
10kHz to 20kHz: –10% to +1%
Temperature coefficient
±50ppm/°C (10 to 65°C)
±100ppm/°C (–20 to 10°C)
Voltage bandwidth
–3dB at 47kHz (typical)
Phase response
<14µs, equivalent to:
–1° at 200Hz
–3° at 600Hz
–5° at 1kHz
–50° at 10kHz
–100° at 20kHz
Safe-area output impedance
<20Ω

MTL5533



LED indicator
Green: power indication
Supply voltage
20 to 35V dc
Maximum current consumption (10mA transducer load/ch)
130mA at 24V
Maximum power dissipation within unit
2.7W *
Safety description
Terminals 3 to 1 and 6 to 4
U_o=26.6V I_o=94mA P_o=0.66W U_m= 253V rms or dc
Terminals 3 to 2 and 6 to 5
Non-energy-storing apparatus ≤1.5V, ≤0.1A and ≤25mW

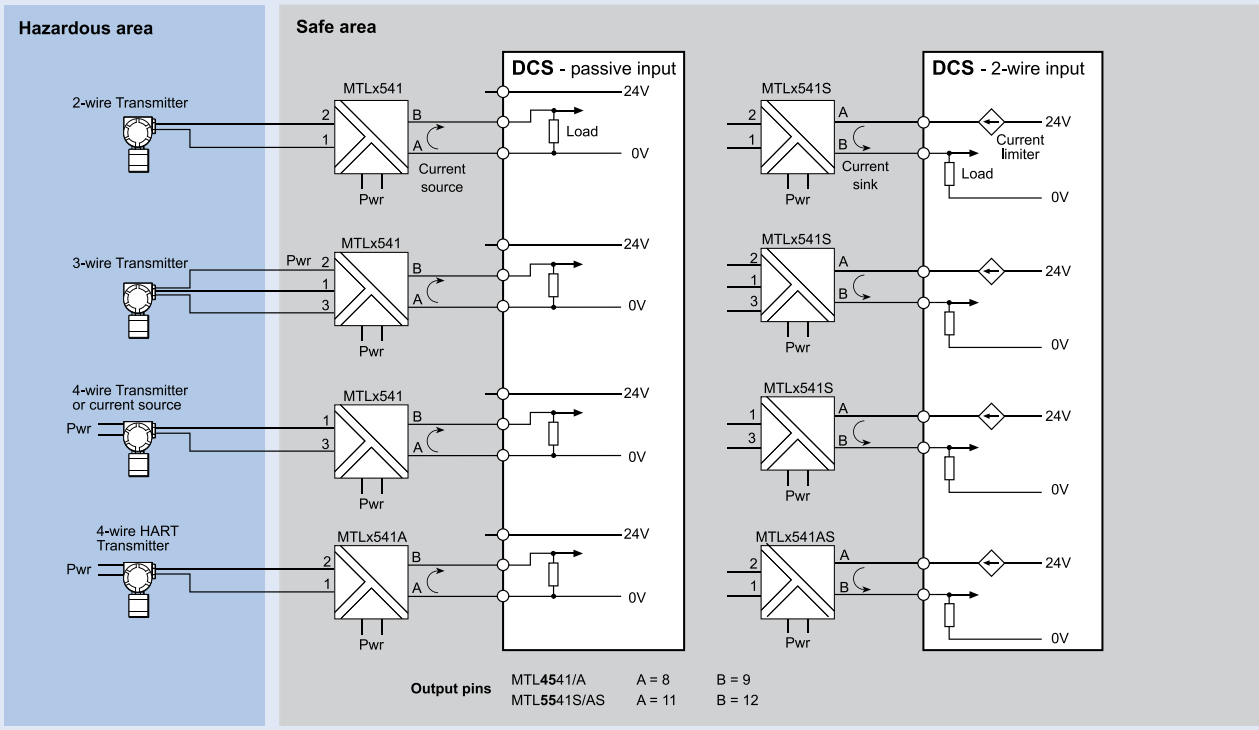
Note -
Refer to the Instruction Manual for recommendations on mounting of these modules.

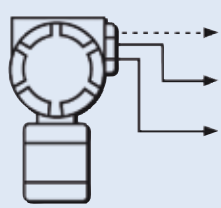
A minimum spacing of 10mm must be applied between these and any other modules on the DIN-rail.

Isolator Applications

ANALOGUE INPUT - TRANSMITTERS, 4-20mA CONVENTIONAL AND 'SMART'				
Backplane Device	DIN-rail Device	No. of channels	Output to hazardous area	Important features
MTL4541/S	MTL5541/S	1	16.5V min @ 20mA	Compatible with most 2/3wire smart transmitters, source & sink variants
MTL4541A/AS	MTL5541A/AS	1	Passive current sink	For separately powered transmitters, source & sink variants
MTL4544/S	MTL5544/S	2	16.5V min @ 20mA	Compatible with most 2/3wire smart transmitters, source & sink variants
MTL4544A/AS	MTL5544A/AS	2	Passive current sink	For separately powered transmitters, source & sink variants
MTL4544D	MTL5544D	1	16.5V min\ @ 20mA	Compatible with most 2/3wire smart transmitters, dual outputs

Two/Three Terminal Input - High Density





MTL4541/S – MTL5541/S

REPEATER POWER SUPPLY

4/20mA, HART®, 2- or 3-wire transmitters

The MTLx541 provides a fully-floating dc supply for energising a conventional 2- or 3-wire 4/20mA transmitter, which is located in a hazardous area, and repeats the current in another floating circuit to drive a safe-area load. For HART 2-wire transmitters, the unit allows bi-directional communications signals superimposed on the 4/20mA loop current. Alternatively, the MTLx541S acts as a current sink for a safe-area connection rather than driving a current into the load. Separately powered current sources, such as 4-wire transmitters, can be connected but will not support HART communication.

SPECIFICATION

See also common specification

Number of channels
One

Location of transmitter
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location

Safe-area output

Signal range:	4 to 20mA
Under/over-range:	0 to 24mA
Safe-area load resistance (MTLx541)	
@ 24mA:	0 to 360Ω
@ 20mA:	0 to 450Ω
Safe-area load (MTLx541S)	
Current sink:	600Ω max.
Maximum voltage source:	24V dc
Safe-area circuit output resistance:	> 1MΩ

Safe-area circuit ripple
< 50µA peak-to-peak

Hazardous-area input

Signal range:	0 to 24mA (including over-range)
Transmitter voltage:	16.5V at 20mA

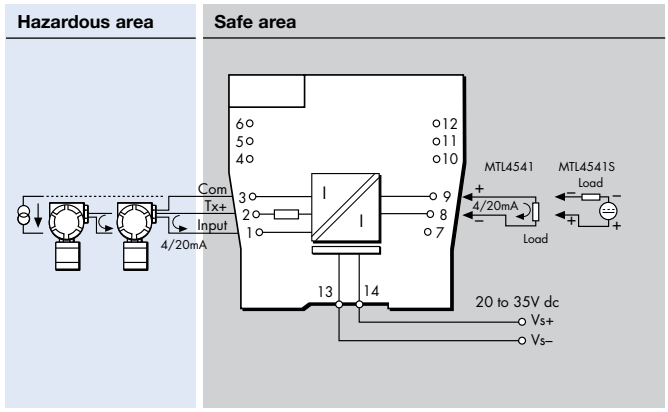
Transfer accuracy at 20°C
Better than 15µA

Temperature drift
< 0.8µA/°C

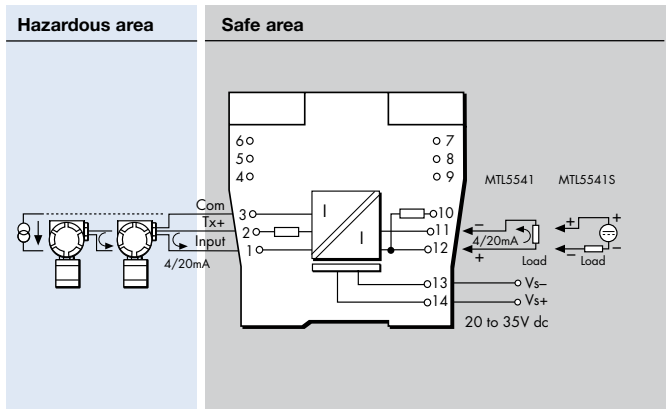
Response time
Settles to within 10% of final value within 50µs

Communications supported
HART (terminals 1 & 2 only)

MTL4541 / MTL4541S



MTL5541 / MTL5541S



LED indicator
Green: power indication

Maximum current consumption (with 20mA signal)
51mA at 24V

Power dissipation within unit (with 20mA signal)

MTLx541	0.7W @ 24V dc
MTLx541S	1.0W @ 24V dc

Safety description

Terminals 2 to 1 and 3:
U_o=28V I_o=93mA P_o=651mW U_m= 253V rms or dc

Terminals 1 to 3:
Simple apparatus ≤1.5V, ≤0.1A and ≤25mW; can be connected without further certification into any IS loop with an open-circuit voltage <28V

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx541/S Rev4 200913

MTL4541A/AS – MTL5541A/AS
CURRENT REPEATER
4/20mA passive i/p for HART® transmitters

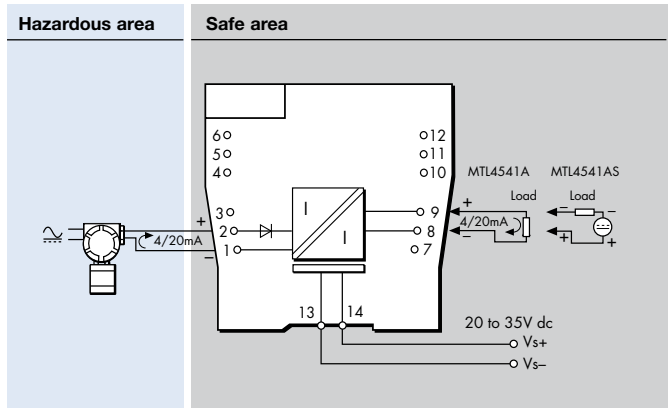
The MTLx541A provides an input for separately powered 4/20mA transmitters and also allows bi–directional transmission of HART communication signals superimposed on the 4/20mA loop current. Alternatively, the MTLx541AS acts as a current sink for a safe-area connection rather than driving a current into the load.

SPECIFICATION

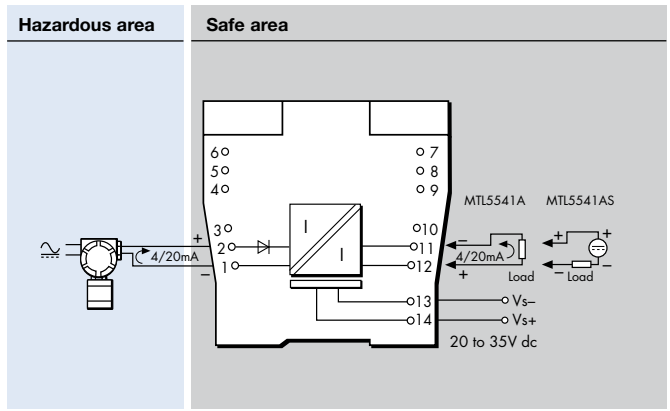
See also common specification

Number of channels
One
Location of transmitter
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div.1, Group A, hazardous location
Hazardous area input
Signal range: 4 to 20mA
Under/over-range: 1.0 to 21.5mA
Input impedance for HART signals
at terminals 1, 2: > 230Ω
Maximum input volt drop
at terminals 1, 2: < 6.6V
i.e. a transmitter load of 330Ω at 20mA
Safe-area output
Signal range: 4 to 20mA
Under/over-range: 1.0 to 21.5mA
Safe-area load resistance (MTLx541A)
Conventional transmitters: 0 to 360Ω
Smart transmitters: 250Ω ±10%
Safe-area load (MTLx541AS)
Current sink: 600Ω max.
Maximum voltage source: 24V DC
Safe-area circuit output resistance: > 1MΩ
Safe–area circuit ripple
< 50µA peak-to-peak up to 80kHz
Transfer accuracy at 20°C
Better than 20µA
Temperature drift
< 1µA/°C
Response time
Settles within 200µA of final value after 20ms
Communications supported
HART

MTL4541A / MTL4541AS



MTL5541A / MTL5541AS



LED indicator
Green: power indication
Power requirement (with 20mA signal)
50mA at 20V
45mA at 24V
35mA at 35V
Power dissipation within unit (with 20mA signals)
MTLx541A 0.8W @ 24V dc
MTLx541AS 1.1W @ 24V dc
Safety description
Terminals 1 to 2:
U_m = 253V rms or dc.
8.6V (diode). This voltage must be considered when calculating the load capacitance.
Non-energy-storing apparatus ≤1.5V, ≤0.1A and ≤25mW; can be connected without further certification into any IS loop with an open-circuit voltage <28V

EPSx541A/AS Rev3 210513

MTL4544/S – MTL5544/S

REPEATER POWER SUPPLY

2-channel, 4/20mA, HART®, 2- or 3- wire transmitters

The MTLx544 provides fully-floating dc supplies for energising two conventional 2-wire or 3-wire 4/20mA or HART transmitters located in a hazardous area, and repeats the current in other circuits to drive two safe-area loads. For smart transmitters, the unit allows bi-directional transmission of digital communication signals superimposed on the 4/20mA loop current. Alternatively, the MTLx544S acts as a current sink for a safe-area connection rather than driving a current into the load. Separately powered current sources, such as 4-wire transmitters, can be connected but will not support HART communication.

SPECIFICATION

See also common specification

Number of channels
Two

Location of transmitter
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location

Safe-area output

Signal range:	4 to 20mA
Under/over-range:	0 to 24mA
Safe-area load resistance (MTLx 544)	
@ 24mA:	0 to 360Ω
@ 20mA:	0 to 450Ω
Safe-area load (MTLx544S)	
Current sink:	600Ω max.
Maximum voltage source:	24V dc
Safe-area circuit output resistance:	> 1MΩ

Safe-area circuit ripple
< 50µA peak-to-peak

Hazardous-area input

Signal range:	0 to 24mA (including over-range)
Transmitter voltage:	16.5V at 20mA

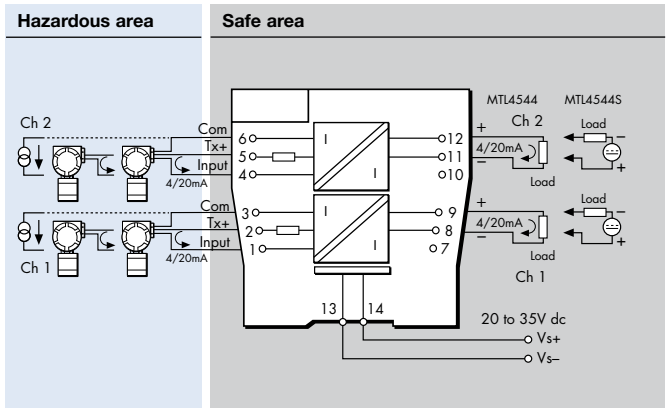
Transfer accuracy at 20°C
Better than 15µA

Temperature drift
< 0.8µA/°C

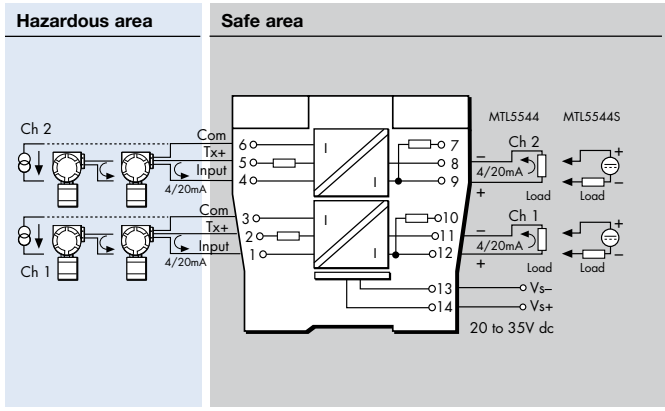
Response time
Settles to within 10% of final value within 50µs

Communications supported
HART (terminals 1 & 2 and 4 & 5 only)

MTL4544 / MTL4544S



MTL5544 / MTL5544S



LED indicator
Green: power indication

Maximum current consumption (with 20mA signals)
96mA at 24V dc

Power dissipation within unit (with 20mA signals)

MTLx544	1.4W @ 24V dc
MTLx544S	1.9W @ 24V dc

Safety description (each channel)

Terminals 2 to 1 and 3, and 5 to 4 and 6:
U_o=28V I_o=93mA P_o=651mW U_m = 253V rms or dc

Terminals 1 to 3 and 4 to 6:
Simple apparatus ≤1.5V, ≤0.1A and ≤25mW; can be connected without further certification into any IS loop with an open-circuit voltage <28V

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx544/S Rev4 200913

MTL4544A/AS – MTL5544A/AS

CURRENT REPEATER

4/20mA passive i/p for HART® transmitters

The MTLx544A provides an input for separately powered 4/20mA transmitters and also allows bi–directional transmission of HART communication signals superimposed on the 4/20mA loop current, so that the transmitter can be interrogated either from the operator station or by a hand-held communicator (HHC). Alternatively, the MTLx544AS acts as a current sink for a safe-area connection rather than driving a current into the load.

SPECIFICATION

See also common specification

Number of channels
Two

Location of transmitter
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div.1, Group A, hazardous loc ation

Hazardous area input

Signal range:	4 to 20mA
Under/over-range:	1.0 to 21.5mA

Input impedance for HART signals
at terminals 1, 2 and 4, 5: > 230Ω

Maximum input volt drop
at terminals 1, 2 and 4, 5: < 6.6V
i.e. a transmitter load of 330Ω at 20mA

Safe-area output

Signal range:	4 to 20mA
Under/over-range:	1.0 to 21.5mA
Safe-area load resistance (MTL5544A)	
Conventional transmitters:	0 to 360Ω
Smart transmitters:	250Ω ±10%
Safe-area load (MTL5544AS)	
Current sink:	600Ω max.
Maximum voltage source:	24V DC
Safe-area circuit output resistance:	> 1MΩ

Safe–area circuit ripple
< 50µA peak-to-peak up to 80kHz

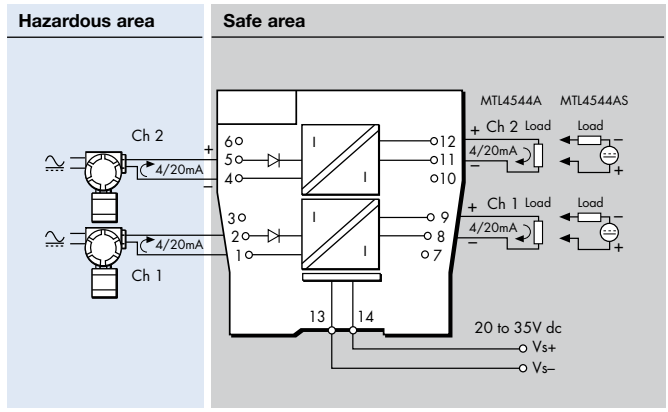
Transfer accuracy at 20°C
Better than 20µA

Temperature drift
< 1µA/°C

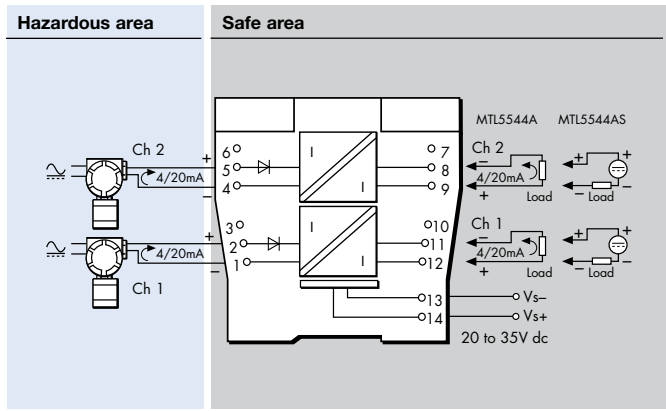
Response time
Settles within 200µA of final value after 20ms

Communications supported
HART

MTL4544A / MTL4544AS



MTL5544A / MTL5544AS



LED indicator
Green: power indication

Power requirement (with 20mA signal)
70mA at 24V
85mA at 20V
50mA at 35V

Power dissipation within unit (with 20mA signals)
MTLx544A 1.5W @ 24V dc
MTLx544AS 2.0W @ 24V dc

Safety description

Terminals 1 to 2 and 4 to 5:
U_m = 253V rms or dc.
8.6V (diode). This voltage must be considered when calculating the load capacitance.
Non-energy-storing apparatus ≤1.5V, ≤0.1A and ≤25mW; can be connected without further certification into any IS loop with an open-circuit voltage < 28V

MTL4544D – MTL5544D

REPEATER POWER SUPPLY

single channel, 4/20mA, HART®
for 2- or 3-wire transmitters, two outputs

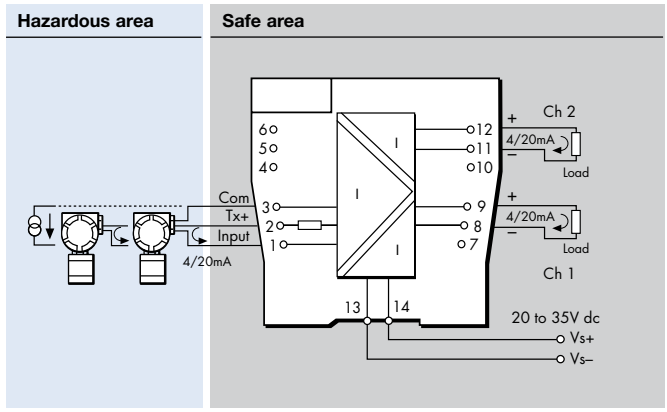
The MTLx544D provides a fully-floating dc supply for energising a conventional 2- or 3-wire 4/20mA transmitter located in a hazardous area, and repeats the current in other circuits to drive two safe-area loads. For HART 2-wire transmitters, the unit allows bi-directional transmission of digital communication signals superimposed on the 4/20mA loop current. Separately powered current sources, such as 4-wire transmitters, can be connected but will not support HART communication.

SPECIFICATION

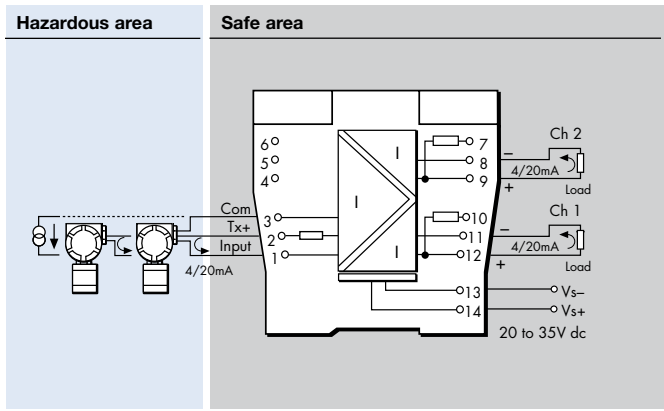
See also common specification

Number of channels
One
Location of transmitter
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A hazardous location
Safe-area output
Signal range: 4 to 20mA
Under/over-range: 0 to 24mA
Safe-area load resistance
@ 24mA: 0 to 360Ω
@ 20mA: 0 to 450Ω
Safe-area circuit output resistance: > 1MΩ
Safe-area circuit ripple
< 50µA peak-to-peak
Hazardous-area input
Signal range: 0 to 24mA (including over-range)
Transmitter voltage: 16.5V at 20mA
Transfer accuracy at 20°C
Better than 15µA
Temperature drift
< 0.8µA/°C
Response time
Settles to within 10% of final value within 50µs
Communications supported
HART (terminals 1 & 2, output Ch 1 only)

MTL4544D



MTL5544D



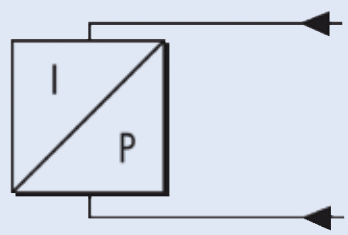
LED indicator
Green: power indication
Maximum current consumption (with 20mA signals)
96mA at 24V dc
Power dissipation within unit (with 20mA signals)
1.4W @ 24V dc
Safety description
Terminals 2 to 1 and 3:
U_o=28V I_o=93mA P_o=651mW U_m = 253V rms or dc
Terminals 1 to 3:
Simple apparatus ≤1.5V, ≤0.1A and ≤25mW; can be connected without further certification into any IS loop with an open-circuit voltage <28V

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx544D Rev4 200913

Isolator Applications

ANALOGUE OUTPUT - CONTROLLER OUTPUTS, I/P CONVERTERS				
Backplane Device	DIN-rail Device	No. of channels	Output to hazardous area	Important features
MTL4546	MTL5546	1	1mA <Io<24mA Vmax = 16V	Suitable for HART valve positioners, LFD
MTL4546Y	MTL5546Y	1	1mA <Io<24mA Vmax = 16V	Suitable for HART valve positioners, open cct LFD
MTL4549	MTL5549	2	1mA <Io<24mA Vmax = 16V	Suitable for HART valve positioners, LFD
MTL4549Y	MTL5549Y	2	1mA <Io<24mA Vmax = 16V	Suitable for HART valve positioners, open cct LFD



MTL4546/C/Y – MTL5546/Y
ISOLATING DRIVER
for 4–20mA HART® valve positioners
with line fault detection

The MTLx546 accepts a 4/20mA floating signal from a safe-area controller to drive a current/pressure converter (or any other load up to 800Ω) in a hazardous area. For HART valve positioners, the module also permits bi-directional transmission of digital communication signals. Process controllers with a readback facility can detect open or short circuits in the field wiring: if these occur, the current taken into the terminals drops to a preset level. The MTL4546C and the MTLx546Y are very similar to the MTLx546 except that they provide open circuit detection only (i.e. no short-circuit detection).

SPECIFICATION

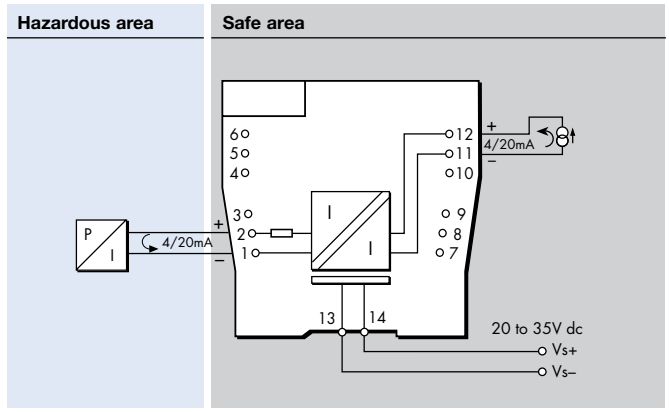
See also common specification

Number of channels
One
Location of I/P converter
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A, hazardous location
Working range
4 to 20mA
Digital signal bandwidth
500Hz to 10kHz
Maximum load resistance
800Ω (16V at 20mA)
Minimum load resistance
90Ω (short-circuit detection at < 50Ω)
Output resistance
> 1MΩ
Under/over range capability
Under range = 1mA
Over range = 24mA (load ≤ 520Ω)
Input and output circuit ripple
< 40µA peak-to-peak
Transfer accuracy at 20°C
Better than 20µA
Temperature drift
< 1.0µA/°C
Input characteristics

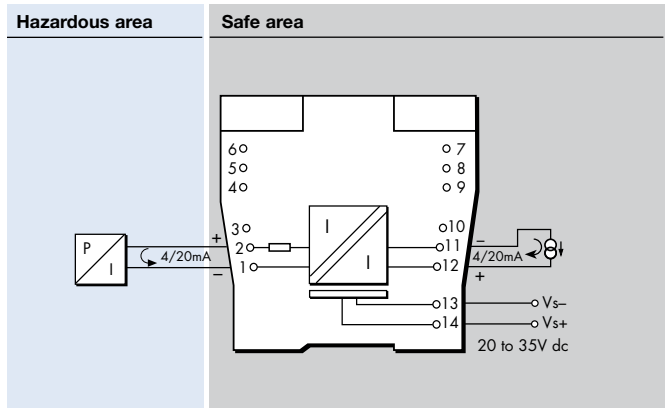
Field wiring state	MTLx546	MTL4546C	MTLx546Y
Normal	< 6.0V	< 6.0V	< 6.0V
Open-circuit	< 0.9mA	< 0.9mA	< 0.5mA
Short-circuit	< 0.9mA	N.A.	N.A.

Response time
Settles within 200µA of final value within 100ms
Communications supported
HART

MTL4546 / MTL4546C / MTL4546Y



MTL5546 / MTL5546Y



LED indicator
Green: power indication
Maximum current consumption (with 20mA signals into 250Ω load)
35mA at 24V dc
Power dissipation within unit (with 20mA signals into 250Ω load)
0.8W at 24V
Safety description
U_o=28V I_o=93mA P_o=651mW U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

MTL4549/C/Y - MTL5549/Y

ISOLATING DRIVER

two-channel, for 4–20mA, HART®
valve positioners with line fault detection

The MTLx549 accepts 4/20mA floating signals from safe-area controllers to drive 2 current/pressure converters (or any other load up to 800Ω) in a hazardous area. For HART valve positioners, the module also permits bi-directional transmission of digital communication signals. Process controllers with a readback facility can detect open or short circuits in the field wiring: if these occur, the current taken into the terminals drops to a preset level. The MTL4549C and MTLx549Y are very similar to the MTLx549 except that they provide open circuit detection only (i.e. no short-circuit detection).

SPECIFICATION

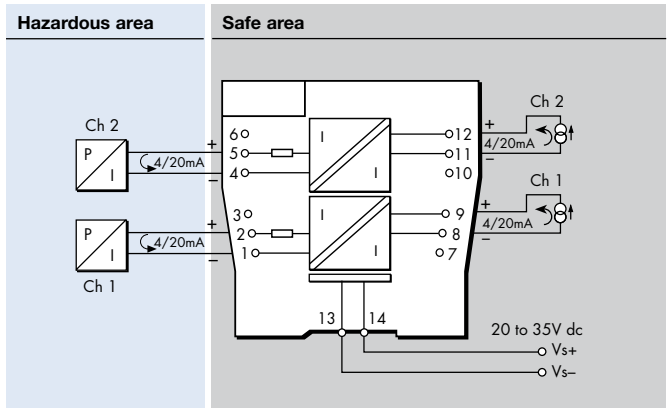
See also common specification

Number of channels
Two
Location of I/P converter
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A, hazardous location
Working range
4 to 20mA
Digital signal bandwidth
500Hz to 10kHz
Maximum load resistance
800Ω (16V at 20mA)
Minimum load resistance
90Ω (short-circuit detection at < 50Ω)
Output resistance
> 1MΩ
Under/over range capability
Under range = 1mA
Over range = 24mA (load ≤ 520Ω)
Input and output circuit ripple
<40µA peak-to-peak
Communications supported
HART
Transfer accuracy at 20°C
Better than 20µA
Temperature drift
< 1.0µA/°C
Input characteristics

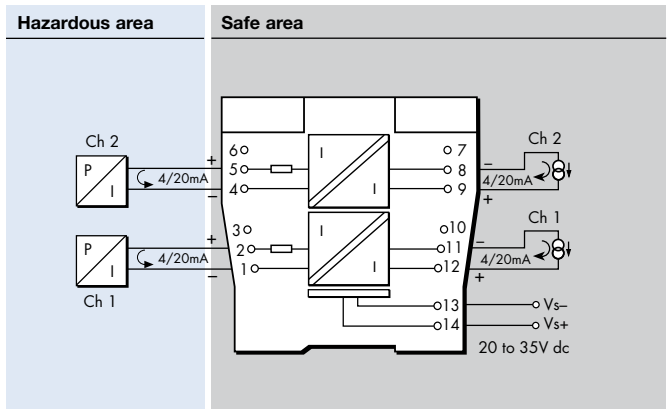
Field wiring state	MTL4549	MTL4549C	MTL4549Y
Normal	< 6.0V	< 6.0V	< 6.0V
Open-circuit	< 0.9mA	< 0.9mA	< 0.5mA
Short-circuit	< 0.9mA	N.A.	N.A.

Response time
Settles within 200µA of final value within 100ms

MTL4549 / MTL4549C / MTL4549Y



MTL5549 / MTL5549Y



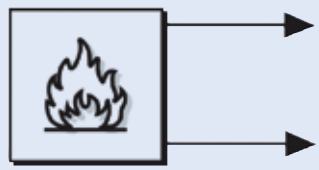
LED indicator
Green: power indication
Maximum current consumption (with 20mA signals into 250Ω load)
70mA at 24V dc
Power dissipation within unit (with 20mA signals into 250Ω load)
1.6W at 24V
Safety description (each channel)
U_o=28V I_o=93mA P_o=0.65W U_m = 253V rms or dc

SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx549/C/Y Rev4 200913

Isolator Applications

ANALOGUE INPUT - FIRE AND SMOKE DETECTORS				
Backplane Device	DIN-rail Device	No. of channels	Output to hazardous area	Important features
MTL4561	MTL5561	2	Loop powered	0-40mA, fire and smoke detectors



MTL4561 – MTL5561
FIRE AND SMOKE DETECTOR INTERFACE
2-channel

The MTLx561 is a loop-powered 2–channel interface for use with conventional fire and smoke detectors located in hazardous areas. In operation, the triggering of a detector causes a corresponding change in the safe–area current. The unit features reverse input polarity protection, while 'no-fail' earth fault detection on either line can be provided by connecting an earth leakage detector to terminal 3 and/or 6.

SPECIFICATION

See also common specification

Number of channels
Two, fully floating, loop powered

Location of fire and smoke detectors
Zone 0, IIC, T4–6 hazardous area if suitably certified
Div. 1, Group A, hazardous area

Input voltage
6 to 30V dc

Current range
1 to 40mA, nominal

Quiescent safe–area current at 20°C
(hazardous–area terminals open circuit)
< 400µA at Vin = 24V per channel

Integral input polarity protection
Input circuit protected against reverse polarity

'No-fail' earth fault protection
Enabled by connecting terminals 3 and/or 6 to an earth leakage detector (see notes below)
Fault on either line of each channel proclaimed: unit continues working

Minimum output voltage Vout at 20°C
For Vin ≤ 25V: Vout = Vin – (0.38 x current in mA) – 2V
For Vin > 25V: Vout = 22.5V – (0.35 x current in mA)

Maximum output voltage
28V from 300Ω

Transfer accuracy at 20°C
Better than 400µA

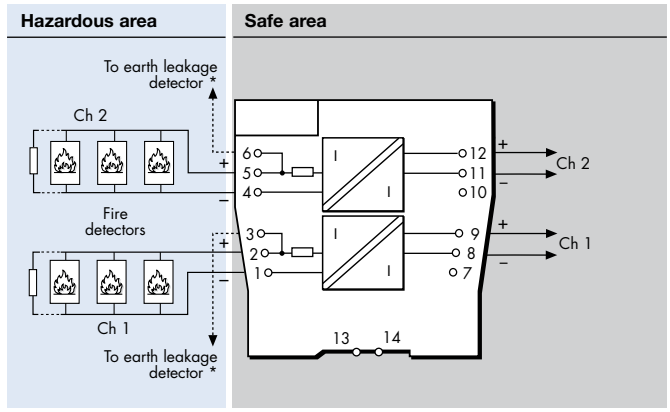
Temperature drift
< 4µA/°C (0°C to 60°C)
< 15µA/°C (–20°C to 0°C)

Response time to step input
Settles to within 5% of final value within 1.5ms

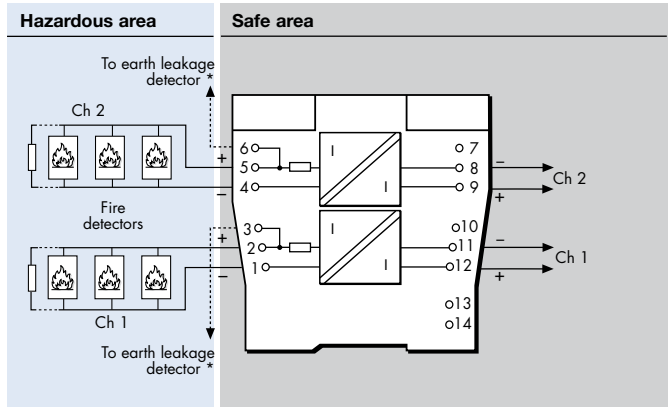
Power dissipation within unit
0.7W maximum at 24V with 40mA signal (each channel)
0.9W maximum at 30V with 40mA signal (each channel)

Notes:
1. *To maintain isolation between the two channels, separate earth leakage detectors are needed.*
2. *The earth leakage detectors introduce a 100µA, 1Hz ripple to the field circuit.*

MTL4561



MTL5561



*Signal plug HAZ1-3 is required for access to this function

Safety description for each channel
U_o=28V I_o=93mA P_o=0.65W U_m = 253V rms or dc

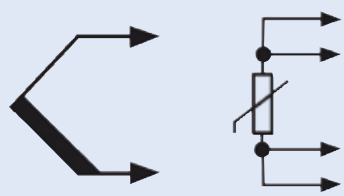
SIL capable
These models have been assessed for use in IEC 61508 functional safety applications.
See data on MTL web site and refer to the safety manual.

EPSx561 Rev4 200913

Isolator Applications

TEMPERATURE INPUT - THERMOCOUPLE AND mV SOURCES, THC				
Backplane Device	DIN-rail Device	No. of channels	Input from hazardous area	Important features
MTL4573	MTL5573	1	Thermocouple or mV sources	Configurable linearised converter, early burn-out detect
MTL4575	MTL5575	1	Thermocouple or mV sources	Configurable linearised converter, trip alarm, early burn-out detect
MTL4576-THC	MTL5576-THC	2	Thermocouple or mV sources	Configurable linearised converter, early burn-out detect, custom options
MTL4581	MTL5581	1	Thermocouple or mV sources	Wire break detection

TEMPERATURE INPUT - RESISTANCE SENSORS, RTD				
Backplane Device	DIN-rail Device	No. of channels	Input from hazardous area	Important features
MTL4573	MTL5573	1	Pt, Cu, Ni sensors 2/3/4 wire	Configurable linearised converter
MTL4575	MTL5575	1	Pt, Cu, Ni sensors 2/3/4 wire	Configurable linearised converter, trip alarm
MTL4576-RTD	MTL5576-RTD	2	Pt, Cu, Ni sensors 2/3 wire	Configurable linearised converter, custom options
	MTL5582	1	Pt, RTD sensors 2/3/4 wire	2/3/4 wire output connections



MTL4573 – MTL5573
TEMPERATURE CONVERTER
THC or RTD input

The MTLx573 converts a low-level dc signal from a temperature sensor mounted in a hazardous area into a 4/20mA current for driving a safe-area load. Software selectable features include linearisation, ranging, monitoring, testing and tagging for all thermocouple types and 2-, 3- or 4-wire RTDs. (For thermocouple applications the HAZ-CJC plug on terminals 1–3 includes an integral CJC sensor). Configuration is carried out using a personal computer.

SPECIFICATION

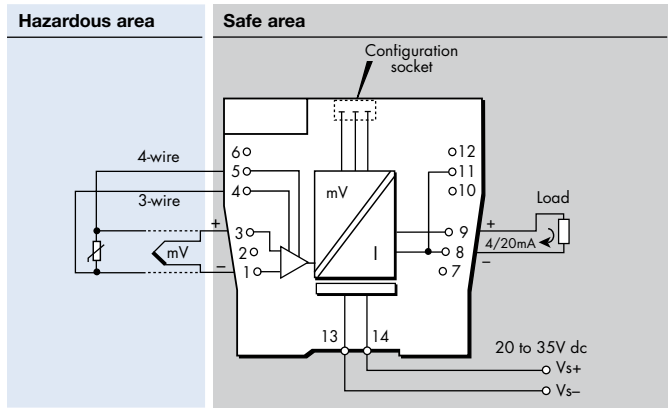
See also common specification

Number of channels
One
Location of signal source
Zone 0, IIC, Hazardous area
Division 1, Groups A-D, hazardous location
Signal source

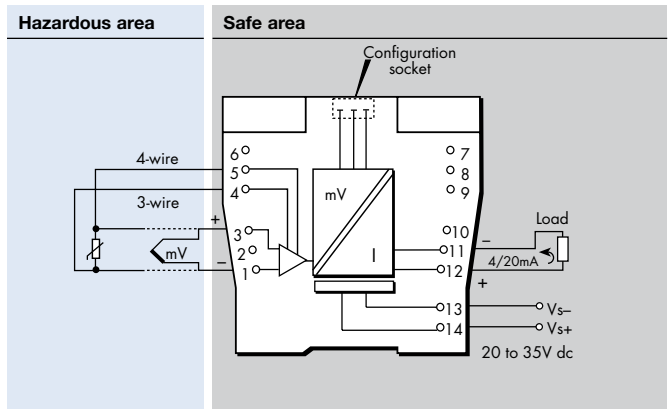
Input	Type		Min. span
THC	J,K,T,E,R,S,B,N	BS EN 60584-1:1996	3mV
	XK	GOST P8.585-2001	
mV	-75 to +75mV		3mV
RTD 2/3/4 wire	Pt100, Pt500, Pt1000	BS EN 60751:2008	10,50,100Ω
	Cu-50, Cu-53	GOST 6651-94	10Ω
	Ni100, Ni500, Ni1000	DIN43760:1985	10,50,100Ω
Resistance	0 to 400Ω		10Ω

RTD excitation current
200µA nominal
Cold junction compensation, THC input
Selectable ON or OFF
Cold junction compensation error
≤ 1.0°C
Common mode rejection
120dB for 240V at 50Hz or 60Hz
Series mode rejection
40dB for 50Hz or 60Hz
Calibration accuracy (at 20°C)
(includes hysteresis, non-linearity and repeatability)
Inputs:
mV/THC: ± 15µV or ± 0.05% of input value (whichever is greater)
Pt 100 - RTD: ± 80mΩ
Output: ± 11µA
Temperature drift (typical)
Inputs:
mV/THC: ± 0.003% of input value/°C
Pt 100 - RTD: ± 7mΩ/°C
Output: ± 0.6µA/°C
Example of calibration accuracy and temperature drift (RTD input)
Span: 250Ω
Accuracy: ± (0.08/250 + 11/16000) x 100% = 0.1% of span
Temperature drift: ± (0.007/250 x 16000 + 0.6) µA/°C = ±1.0µA/°C

MTL4573



MTL5573



Safety drive on sensor failure
Upscale, downscale, or off
Early burnout
Early burnout detection for thermocouples (when selected)
EBD indicated when loop resistance increase is > 50Ω
Output range
4 to 20mA nominal into 600Ω max.
Out of range characteristic - MTL or NAMUR NE43
Maximum lead resistance (THC)
600Ω
Response time
Typical 500 ms
LED indicator
Green: EBD alarm indication, power and status indication
Yellow: alarm indication
Maximum current consumption (with 20mA signal)
50mA at 24V
Power dissipation within unit (with 20mA signal)
1.2W at 24V
Safety description
Refer to certificate for parameters. U_m=253V rms or dc
Configurator
A personal computer running MTL PCS45 software with a PCL45USB serial interface.

MTL4575 – MTL5575
TEMPERATURE CONVERTER
THC or RTD input + Alarm

The MTLx575 converts a low-level dc signal from a temperature sensor mounted in a hazardous area into a 4/20mA current for driving a safe-area load. Software selectable features include linearisation, ranging, monitoring, testing and tagging for all thermocouple types and 2-, 3- or 4-wire RTDs. (For thermocouple applications the HAZ-CJC plug on terminals 1–3 includes an integral CJC sensor). Configuration is carried out using a personal computer. A single alarm output is provided and may be configured for process alarm or to provide notice of early thermocouple failure.

SPECIFICATION

See also common specification

Number of channels
One
Signal source
THC types J, K, T, E, R, S, B or N to BS 60584 and XK
mV input
RTDs 2/3/4-wire platinum to BS 60751
Pt 100, Pt 500, Pt 1000
Cu-50 & Cu-53
Ni 100/500/1000 DIN 43760
Location of signal source
Zone 0, IIC, T4-6 hazardous area
Division 1, Group A, hazardous location
Input signal range
–75 to +75mV, or 0 to 400Ω (0 to 1000Ω Pt & Ni sensors)
Input signal span
3 to 150mV, or 10 to 400Ω (10 to 1000Ω Pt & Ni sensors)
RTD excitation current
200µA nominal
Cold junction compensation
Automatic or selectable
Cold junction compensation error
≤ 1.0°C
Common mode rejection
120dB for 240V at 50Hz or 60Hz (500ms response)
Series mode rejection
40dB for 50Hz or 60Hz
Calibration accuracy (at 20°C)
(includes hysteresis, non-linearity and repeatability)

Inputs: (500ms response)	
mV/THC:	± 15µV or ± 0.05% of input value (whichever is greater)
RTD:	± 80mΩ
Output:	± 11µA

Temperature drift (typical)

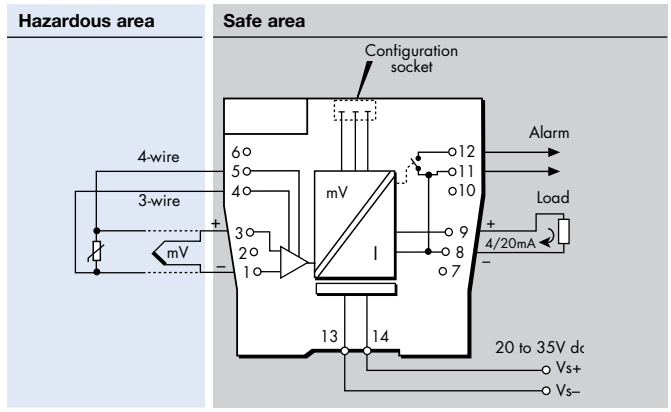
Inputs:	
mV/THC:	± 0.003% of input value/°C
RTD:	± 7mΩ/°C
Output:	± 0.6µA/°C

Example of calibration accuracy and temperature drift
(RTD input - 500ms response)

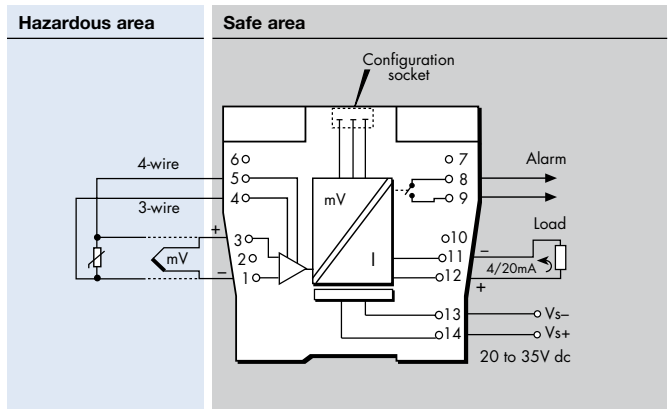
Span:	250Ω
Accuracy:	± (0.08/250 + 11/16000) x 100% = 0.1% of span
Temperature drift:	± (0.007/250 x 16000 + 0.6) µA/°C = ±1.0µA/°C

Safety drive on sensor failure
Upscale, downscale, or off

MTL4575



MTL5575



Early burnout
Early burnout detection for thermocouples (when selected)
Alarm trips when loop resistance increase is > 50Ω
Output range
4 to 20mA nominal into 600Ω max.
Alarm output (configurable)
Relay ON in alarm, 250mA @ 35V max
Maximum lead resistance (THC)
600Ω
Response time
Configurable - 500 ms default
(Accuracy at 100/200ms - contact MTL)
LED indicator
Green: power and status indication
Yellow: alarm indication, on when contacts are closed
Maximum current consumption (with 20mA signal)
50mA at 24V
Power dissipation within unit (with 20mA signal)
1.2W at 24V
Safety description
Refer to certificate for parameters. U_m=253V rms or dc
Configurator
A personal computer running MTL PCS45 software with a PCL45USB serial interface.

EPSx575 Rev3 041113

MTL4576-RTD – MTL5576-RTD

TEMPERATURE CONVERTER

RTD/potentiometer input, 2-channel

The MTLx576–RTD converts signals from resistance temperature detectors (RTDs) mounted in a hazardous area, into 4/20mA currents for driving safe-area loads. Software selectable features include input type and characterisation, ranging, monitoring, testing and tagging. Configuration is carried out using a personal computer. The MTLx576–RTD is compatible with 2– and 3–wire RTD inputs. The MTLx576-RTD can also be configured to drive two safe-area loads from a single input.

SPECIFICATION

See also common specification

Number of channels
Two

Signal source
2-/3-wire RTDs to BS 60751
Pt 100, Pt 500, Pt 1000
Cu-50 & Cu-53
Ni 100/500/1000 DIN 43760

Location of signal source
Zone 0, IIC, T4–6 hazardous area
Division 1, Group A, hazardous location

Input signal range
0 to 400Ω (0 to 4000Ω Pt & Ni sensors)

Input signal span
10 to 400Ω (10 to 1000Ω Pt & Ni sensors)

RTD excitation current
200µA nominal

Common mode rejection
120dB for 240V at 50Hz or 60Hz

Series mode rejection
40dB for 50Hz or 60Hz

Calibration accuracy (at 20°C)
(includes hysteresis, non-linearity and repeatability)

Input:	± 80mΩ
Output:	± 16µA

Temperature drift (typical)

Input:	± 7mΩ/°C
Output:	± 0.6µA/°C

Example of calibration accuracy and temperature drift (RTD input)

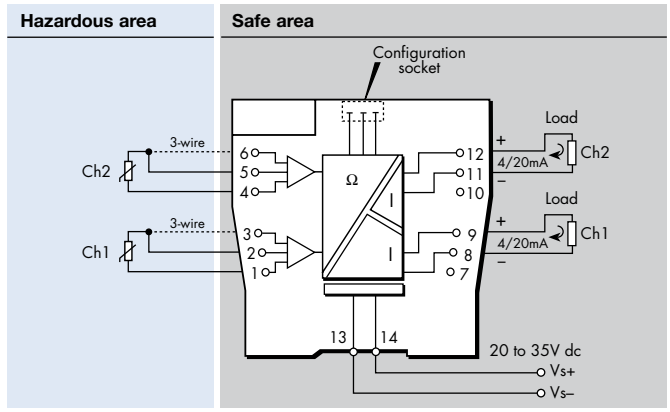
Span:	250Ω
Accuracy:	± (0.08/250 + 16/16000) x 100% = 0.13% of span
Temperature drift:	± (0.007/250 x 16000 + 0.6) µA/°C = ±1.0µA/°C

Safety drive on sensor failure
Upscale, downscale, or off

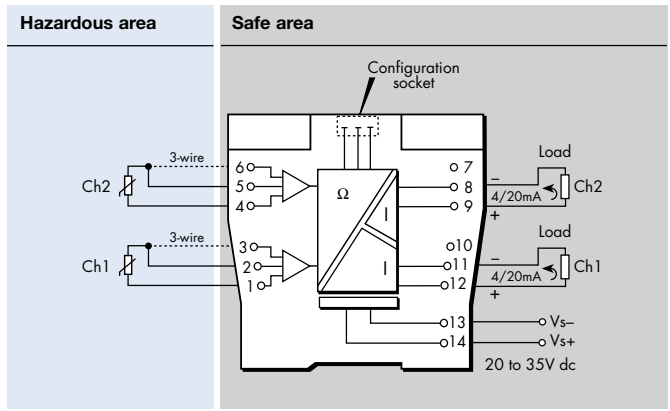
Output range
4 to 20mA nominal into 300Ω max.

Response time
Configurable - 500 ms default
(Accuracy at 100/200ms - contact MTL)

MTL4576-RTD



MTL5576-RTD



LED indicator
Green: power and status indication
Yellow: one provided for channel status
Red: alarm indication

Power requirement, Vs with 20mA signal
60mA at 24V

Power dissipation within unit with 20mA signal
1.4W at 24V

Isolation
Functional channel–channel isolation for safe and hazardous–area circuits

Safety description
Refer to certificate for parameters. U_m=253V rms or dc

Configurator
A personal computer running MTL PCS45 software with a PCL45USB serial interface.

MTL4576-THC – MTL5576-THC
TEMPERATURE CONVERTER
mV/THC input, 2-channel

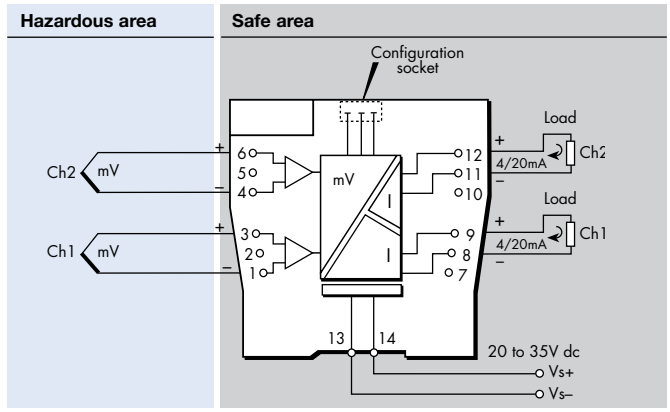
The MTLx576–THC converts low–level dc signals from temperature sensors mounted in a hazardous–area into 4/20mA currents for driving safe-–area loads. Software selectable features include linearisation for standard thermocouple types, ranging, monitoring, testing and tagging. Configuration is carried out using a personal computer. The hazardous–area connections include cold–junction compensation and do not need to be ordered separately.

SPECIFICATION

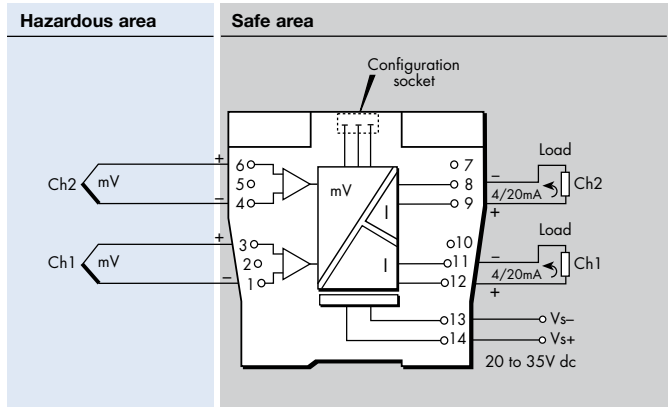
See also common specification

Number of channels
Two
Signal source
THC types J, K, T, E, R, S, B or N to BS 60584 and XK
mV input
Location of signal source
Zone 0, IIC, T4–6 hazardous area
Division 1, Group A, hazardous location
Input signal range
–75 to +75mV
Input signal span
3 to 150mV
Cold junction compensation
Automatic or selectable
Cold junction compensation error
≤ 1.0°C
Common mode rejection
120dB for 240V at 50Hz or 60Hz
Series mode rejection
40dB for 50Hz or 60Hz
Calibration accuracy (at 20°C)
(includes hysteresis, non-linearity and repeatability)
Input: ±15µV or ±0.05% of input value (whichever is greater)
Output: ±16µA
Temperature drift (typical)
Input: ±0.003% of input value/°C
Output: ±0.6µA/°C
Safety drive on sensor burnout
Upscale, downscale, or off
Output range
4 to 20mA nominal into 300Ω max.
Maximum lead resistance
300Ω
Response time
Configurable - 500 ms default
(Accuracy at 100/200ms - contact MTL)

MTL4576-THC



MTL5576-THC



LED indicator
Green: power and status indication
Yellow: one provided for channel status
Red: alarm indication
Power requirement, Vs with 20mA signal
60mA at 24V
Power dissipation within unit with 20mA signal
1.4W at 24V
Isolation
Functional isolation channel–channel for safe and hazardous–area circuits.
Safety description
Refer to certificate for parameters. Um=253V rms or dc
Configurator
A personal computer running MTL PCS45 software with a PCL45USB serial interface.

MTL4581 – MTL5581
MILLIVOLT/THERMOCOUPLE ISOLATOR
for low-level signals

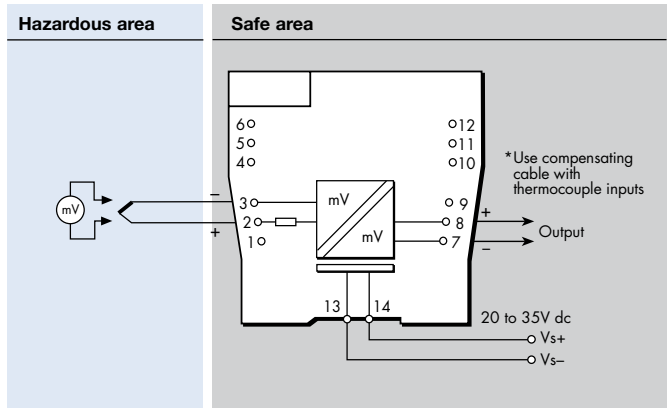
The MTLx581 takes a low-level dc signal from a voltage source in a hazardous area, isolates it, and passes it to a receiving instrument located in the safe area. The module is intended for use with thermocouples utilising external cold-junction compensation. A switch enables or disables the safety drive in the event of thermocouple burnout or cable breakage; a second switch permits the selection of upscale or downscale operation as appropriate.

SPECIFICATION

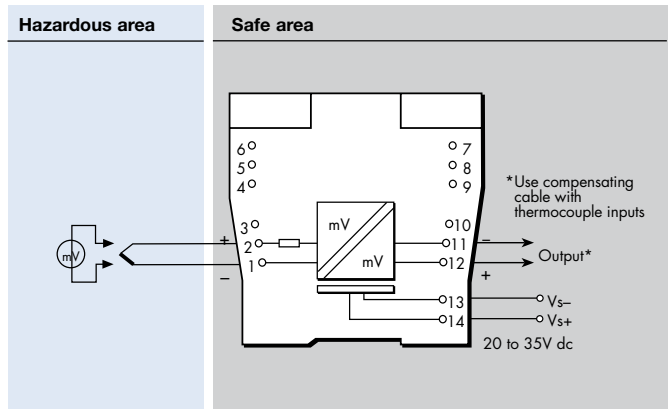
See also common specification

Number of channels
One
Signal source
Any dc millivolt source
Location of millivolt source
Zone 0, IIC, T4–T6 hazardous area if suitably certified
Div. 1, Group A, hazardous location
Input and output signal range
0 to ± 50mV, overrange to ± 55mV
Maximum lead resistance 600Ω
Output resistance
60Ω nominal
Transfer accuracy@20°C
Linearity and repeatability < 0.05% of reading or ± 5µV, whichever is the greater
Temperature drift
< 2µV/°C, maximum
Response time
Settles to within 10% of final value within 150µs
Frequency response
dc to 4kHz nominal
Safety drive on THC burnout
Two switches enable or disable the safety drive and select upscale or downscale operation

MTL4581



MTL5581



LED indicator
Green: power indication
Power requirement, Vs
30mA max, 20V dc to 35V dc
Power dissipation within unit
0.7W typical at 24V
0.91W at 35V
Safety description
Terminals 1 to 2
Non-energy-storing apparatus ≤ 1.5V, ≤ 0.1A and ≤ 25mW; can be connected without further certification into any IS loop with an open-circuit voltage <28V

EPSx581 Rev2 200913

MTL5582
RESISTANCE ISOLATOR
to repeat RTD signals

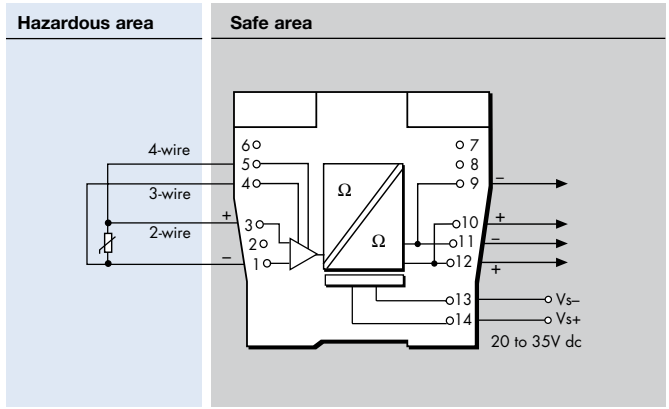
The MTL5582 connects to a 2-, 3-, or 4-wire resistance temperature device (RTD) or other resistance located in a hazardous area, isolates it and repeats the resistance to a monitoring system in the safe area. The module is intended typically (but not exclusively) for use with Pt100 3-wire RTDs. Switches enable selection of 2-, 3-, or 4-wire RTD connection. The MTL5582 should be considered as an alternative, non-configurable MTL5575, for use in RTD applications where a resistance input is preferred or needed instead of 4/20mA. The design is notable for its ease of use and repeatability. The number of wires which can be connected on the safe-area side of the unit is independent of the number of wires which can be connected on the hazardous-area side. The module drives upscale in the case of open circuit detection. Note that this module is not suitable for use with measurement systems where the resistance input channels are multiplexed.

SPECIFICATION

See also common specification

Number of channels
One
Location of RTD
Zone 0, IIC, T4 hazardous area
Div. 1, Group A, hazardous location
Resistance source
2-, 3-, or 4-wire* RTDs to BS 1904/DIN 43760 (100Ω at 0°C)
*user selectable by switches (factory set for 3-wire)
Resistance range
10Ω to 400Ω
RTD excitation current
200µA nominal
Output configuration
2, 3 or 4 wires (independent of mode selected for hazardous area terminals)
Output range
10Ω to 400Ω (from a 100µA to 5mA source)
Temperature drift
±10mΩ/C° typical (0.01%/°C @ 100Ω)
Response time
To within 4% of final value within 1s
Not suitable for muliplexed input cards
Safety drive on open-circuit sensor
Upscale to 420Ω nominal
Transfer accuracy@20°C
<0.15Ω at excitation current 1 - 5mA
<0.25Ω at excitation current 0.5 - 1mA

MTL5582



LED indicator
Green: power indication
Power requirements, Vs
33mA at 24V
35mA at 20V
28mA at 35V
Maximum power dissipation within unit
0.8W at 24V
1.0W at 35V
Safety description
Terminals 1 and 3
Uo = 1.2V Io = 4mA Po = 1.2mW U_m = 253V rms or dc
Non-energy-storing apparatus ≤ 1.5V, ≤ 0.1A, ≤ 25mW; can be connected without further certification into any IS loop with an open circuit voltage < 5V.
Terminals 1 and 3 and 4 and 5
Uo = 6.6V Io = 42mA Po = 69mW

Isolator Applications

GENERAL PURPOSE MODULES AND ACCESSORIES		
Backplane Device	DIN-rail Device	Important features
MTL4599	MTL5599	Dummy isolator modules for securing spare cable cores
MTL4599N		Feed-through for non-IS signals onto backplane
MTL4220		8ch Earth leakage detector
	MTL5051	Serial-data comms isolator
	MTL5314	Trip amplifer
MTL4600		Backplane mounted general purpose isolators
	MPA5500	Mains power supply for individual MTL5500 module
	MTL5991	Mains power supply, 24V, 2A capacity
	MTL5500 powerbus kit	Links power to 8, 16, 24, 32 MTL5500 modules
	MTL5500	Enclosures
	MTL5500	Accessories
CPSxx		Standard backplanes for 4, 8, 16, 24 MTL4500 modules
PCL45USB / PCS45		Hardware adaptor for configuration of converter modules, together with pc software

Other mounting and connection accessories for both product ranges are identified within the following pages

MTL4599 - MTL5599
DUMMY ISOLATOR

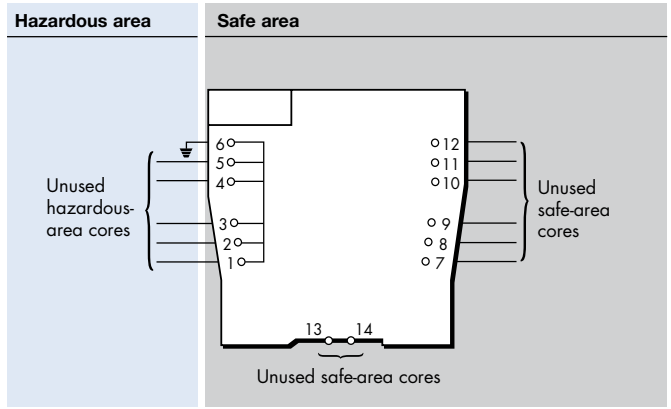
The primary function of the MTLx599, which can be used with all other MTLx500 Series units, is to provide termination and earthing facilities for unused cable cores from hazardous areas.

SPECIFICATION

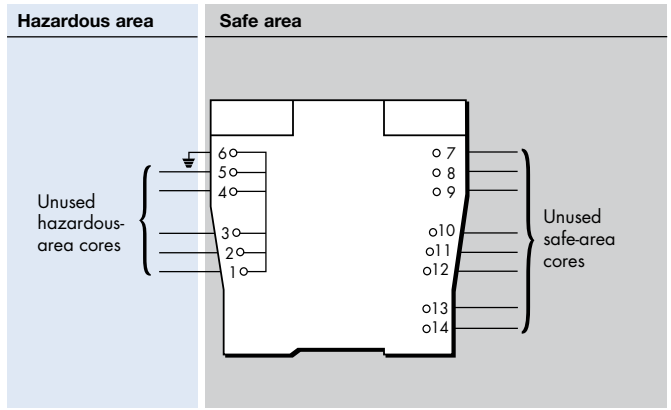
See also common specification

Weight
60g

MTL4599



MTL5599



MTL4599N
GENERAL PURPOSE FEED-THROUGH MODULE

The feed–through termination module allows non–IS connections to the MTL4500 backplanes. The wires from the field are connected using screw terminals. Six terminals are provided on top of the module and linked down to the multiway connector on the backplane. The terminals and cables conform to IS regulations so that non–IS and IS signals can be mixed on the same backplane.

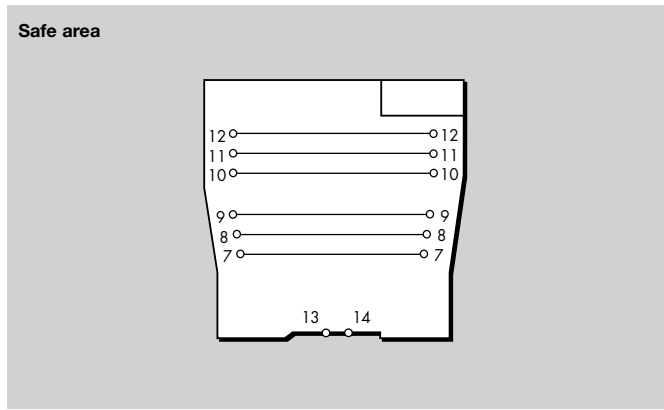
Note: Must not be used with signals >50V or >0.25A

SPECIFICATION

See also common specification

Weight
60g

MTL4599N



EPSx599/N Rev3 200913

MTL4220
EARTH LEAKAGE DETECTOR

The MTL4220 scans up to eight floating electrical circuits, hazardous or safe area, and warns if the resistance to earth on any input falls below 10kΩ. It enables other MTL4500/MTL5500 Series units to be used in the 'no-fail' mode, whereby earth faults on field lines can be detected and rectified without upsetting control or needing emergency action. Eight LED indicators enable faults to be easily located to any input. A self-test facility enables the unit to be checked automatically or manually to ensure the integrity of the whole system. During test the relay is de-energised and the eight LED indicators are illuminated if the unit is healthy. This has no effect on the monitored circuits.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of inputs
Eight independent inputs

Signal source
MTL4500/MTL5500 Series modules with provision for earth leakage detection
Note: inputs are not isolated from each other

Monitoring signal
5V, 0.1mA, 1Hz, intrinsically safe

Earth fault resistance to de-energise relay (7-8 closed)
<10kΩ, on any input

Earth fault resistance that will not de-energise relay (8-9 closed)
>50kΩ, on all inputs

Response time
<50s for 8 input scan

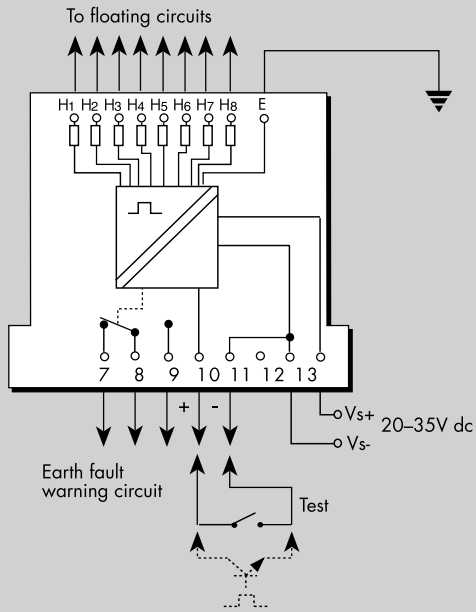
Series mode rejection
60V dc, 10V rms 50Hz

Relay output characteristics
Single pole changeover
Contact rating: 35V dc, 250mA, 5VA
Contact life expectancy: 10^5 operations at maximum load
Note: reactive loads must be adequately suppressed

LED indicators
Red: one provided for each of eight inputs, ON when earth fault detected on the corresponding input
Green: one provided for power indication

Test facility
Terminals 10 and 11 are suitable for switch contacts, an open-collector transistor or logic drive:
TEST = input switch closed, transistor on or <1.4V applied across terminals 10 and 11; relay will de-energise within 1s and all red LED indicators light
OPERATE = input switch open, transistor off or >4.5V applied across terminals 10 and 11; relay will return to normal operating mode within 50s

Safe Area



Terminal	Function
$H_1 - H_8$	Connections to MTL4500/MTL5500 Series modules
E	Earth
7	Earth fault signal (normally closed)
8	Earth fault signal (common)
9	Earth fault signal (normally open)
10	Test +ve
11	Test –ve
13	Supply –ve
14	Supply +ve

Power requirement, Vs
35mA max at 20 to 35V
18mA typical at 20 to 35V

Power dissipation within unit
0.9W max. at 24V
1.3W max. at 35V
0.45W typical at 24V

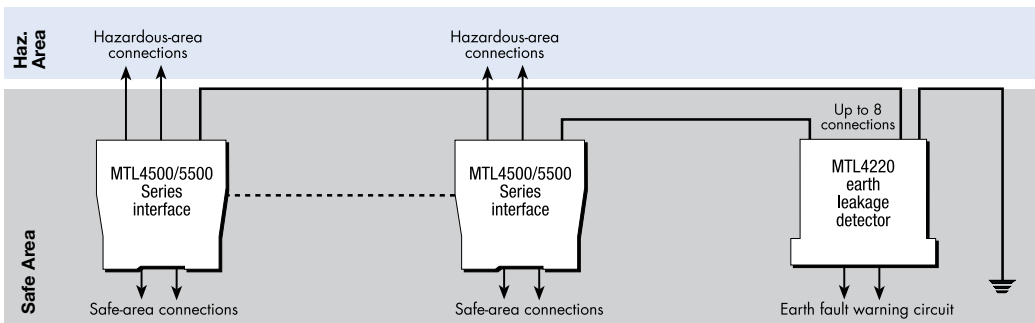
Isolation
250V ac between safe- and hazardous-area circuits

Safety description
9V, 65kΩ, 0.14mA, U_m=250Vrms or dc

Dimensions
104(L) x 15.8(W) x 107(H) mm

Mounting
BPS04 and BPS08 backplanes (For dimensions see CPS04/08)

Note: This unit is supplied with three individual 3-way connectors as standard.



Please note that in addition to typical switch/proximity detector applications, the MTL4220 can also be used with switched outputs (eg, solenoids, alarms and LEDs), and with most analogue signals. For more information, call your local MTL representative.

Note: some MTL4500/MTL5500 Series modules are multichannel and could require one connection for each channel.

EPS4220 Rev1 190412

MTL5051
SERIAL-DATA COMMS ISOLATOR

The MTL5051 provides bi-directional serial data communication from a computer system in safe area to instrumentation in a hazardous area. It is used to provide a fully floating dc supply for, and serial data communications to MTL646 and MTL647 IS text displays; other IS instrumentation; keyboards or a mouse. It can also be used for data communications across a hazardous area.

SPECIFICATION

See also common specification

Location of field equipment
Zone 0, IIC, T4-6 hazardous area
Div 1, Group A hazardous location

Safe-area signal
RS232 or RS422

Hazardous-area signal

MTL640 Series mode:

To hazardous area:	3V signal superimposed on 12V (nominal) supply
From hazardous area:	5mA signal superimposed on quiescent current

Across hazardous area communications mode:

To hazardous area:	10mA current source
From hazardous area:	10mA current source

IS RS232/TTL devices mode:

To hazardous area:	RS232-compatible signal levels
From hazardous area:	TTL/RS232 signals

LED Indicators
Green: power indication

Max. power dissipation within unit
1.7W at 24V, 25mA load

Maximum power consumption (25mA load)

At Vs=20V,	105mA
At Vs=24V,	90mA
At Vs=35V,	70mA

Comms bandwidth

643/4 mode	1200 to 9600 baud
Other modes	up to 19.2 kbaud

Safety description

Terminals 1,2,3,4 only	14V,	800mW,	192mA
Terminals 1,3,4 only	14V,	350mW,	88mA
Terminals 1,2,3 only	14V,	450mW,	108mA
Terminals 1,5,6 only	15V,	70mW,	35mA
Terminals 1,2,5,6 only	20V,	460mW,	139mA
Terminals 1,2,3,4,5,6 only	20V,	810mW,	227mA

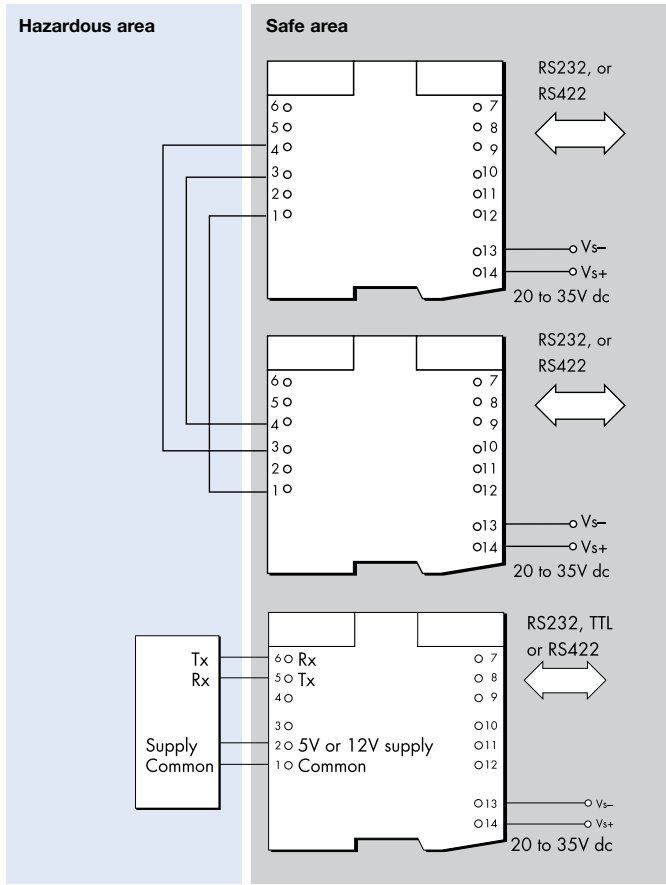
Hazardous area supply terminal 2

+12V mode	12.0V ± 5% (load <23mA)
+12V mode	8.0V min (load >23 to <50mA)
+5V	5.6V ± 5% (load >23 to <50mA)

Hazardous Interfacing
See MTL640 Series for details of interfacing with MTL646 and MTL647 IS text displays.

Across hazardous areas communications mode
The MTL5051 is used in pairs to transfer bi-directional full-duplex data across hazardous areas, as shown above. Current switching is used to minimise the bandwidth-limiting effects of long cables.

Interfacing to an IS keyboard, mouse or other device
Communicating with RS232-level interfaces, such as an IS keyboard, mouse, etc. is achieved by using one or more MTL5051 units as required by the device. (TTL level interfaces are also accommodated by the TTL-compatibility feature of RS232 receivers.) The supply to the IS equipment may be selected to be either 5V or 12V by switch on top of unit.



MTL5051 Terminals	MTL640 mode	Comms mode	Other IS devices
1	Common	Common	Common
2	V signal	-	5V/12V
3	I return	Rx	-
4	-	Tx	-
5	-	-	Tx
6	-	-	Rx
Switch			
1a	ON	OFF	OFF
1b	ON	ON	OFF/ON

Terminals	RS232 mode	TTL mode	RS422 mode
7	-	-	Rx –
8	-	-	Rx +
9	-	Tx	Tx +
10	Tx	-	Tx –
11	Common	Common	Common
12	Rx	Rx	-
13	Supply – ve	Supply – ve	Supply –ve
14	Supply +ve	Supply +ve	Supply +ve
Switch			
2a	OFF	ON	ON
2b	ON	OFF	OFF

Note: the normal RS232 limitations of bandwidth versus cable length are applicable. As a rule of thumb, speed(baud) x length(metres) < 150,000.

EPS5051 RevQ 260312

MTL5314
TRIP AMPLIFIER
4/20mA, for 2- or 3-wire transmitters

The MTL5314 connects to a 2- or 3-wire 4/20mA transmitter or current source located in the hazardous area. It supplies one or two configurable alarm signals to the safe area via changeover relays. Each relay may be configured individually to signal an alarm condition (relay de-energised) when the input signal is greater than or less than a pre-set value.

In addition, the MTL5314 can be connected in series to the hazardous-area side of an MTL5541 4/20mA repeater power supply (or equivalent device) to provide two trip alarm outputs direct from the transmitter signal (see schematic diagram). Looping the transmitter signal through the MTL5314 (via terminals 1 and 3) does not affect HART® communications.

SPECIFICATION

See also common specification

Number of channels
One, with two configurable alarms

Location of field equipment
Zone 0, IIC, T4–T6 hazardous area, if suitably certified
Div 1, Group A, hazardous location

Safe-area output
Two relays with changeover contacts

Hazardous-area input
Signal range: 0 to 24mA
(including over-range)

Voltage available for transmitter (terminals 1 and 2)
>17V at 20mA

Current input (terminals 1 to 3)
Input resistance 25Ω maximum

Response time
<75ms

Trip-points
Trip-points can be adjusted by the user via multiturn potentiometers accessible on the top of the unit.

Trip-point range	0.5 to 22mA
Effective resolution	20µA
Trip-point drift with temperature	1.5µA/°C max.
Hysteresis	min 1% of trip-point range max 1.7% of trip-point range

Relay type
Single pole, changeover contacts
Note: reactive loads must be adequately suppressed

Relay characteristics

Contact rating	250V ac, 2A, cosø >0.7 40V dc, 2A, resistive load
Contact life expectancy	$3.3x10^5$ operations

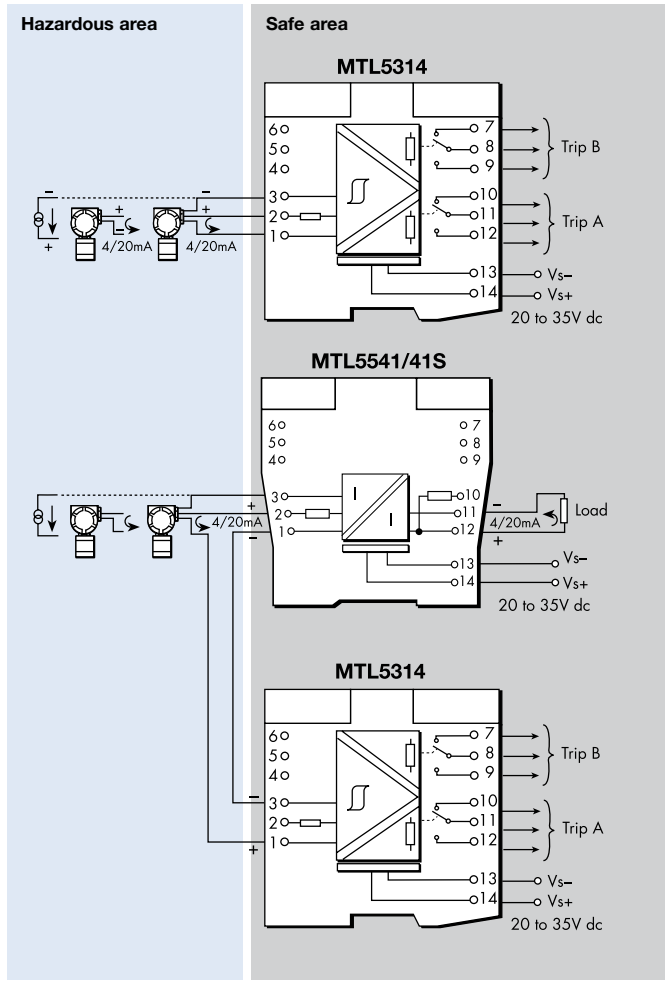
LED indicators
Power LED green, illuminated when the power is connected to the module
Status LED yellow, one per trip, illuminated when relay is energised (not tripped)

Supply voltage
20 to 35V dc

Maximum current consumption (with 20mA signal)
85mA at 24V
100mA at 20V
60mA at 35V

Maximum power dissipation within the unit (with 20mA signal)
1.7W at 24V
1.8W at 35V

HART® is a registered trademark of the HART Communication Foundation.



Terminal	Function
1	Current input
2	Transmitter supply +ve
3	Common
7	Trip B (NC)
8	Trip B (COM)
9	Trip B (NO)
10	Trip A (NC)
11	Trip A (COM)
12	Trip A (NO)
13	Supply –ve
14	Supply +ve

Safety description

Terminals 2 to 1 and 3	28V, 300Ω, 93mA
Terminals 1 and 3	These terminals meet clause 5.4 of EN50020 : 1994 and have the following parameters: U ≤ 1.5V, I ≤ 0.1A, P ≤ 25mW. They can be connected without further certification into an IS loop with open circuit voltage of not more than 28V. See certificate for further details.

EPS5314 RevQ 091110

MTL4600 SERIES
ISOLATED SYSTEM SOLUTIONS

Isolation - protecting your system
Designing your plant with good clean earth systems is not always possible. Poor ground conductivity, large process areas and heavy electrical machinery, all contribute to increased noise. This noise is induced or conducted into adjacent wiring, which in turn degrades the quality of the signals passing through the cables. Without isolation this noise is superimposed on the process signal causing a loss af accuracy, poor control and possibly failures or false trips.

Many control systems, PLC's and safety systems do not have full isolation between channels. In compact well defined plant layouts this is acceptable, but these are not always guaranteed. To avoid interference between channels, isolation is the solution.

The MTL4600 series isolators offer reduced risk and greater protection to the system, with all the advantages of a common design approach for both IS and non-IS signals.

System Solutions
Building on the base of MTL4500 series solutions, the MTL4600 offers a high level of signal isolation for installations where multiple loops on a common connection are not desirable.

Signal isolation provides excellent protection against surges, common faults and noisy environments. It also eliminates the risk of earth loops between different areas of the plant, which, if not isolated, can cause significant errors or failures under fault conditions.

MTL4600 isolators are fully compatible with all existing backplanes used with MTL4500 series and many control systems. The form factor and signal types offer the user a common approach for both IS and non-IS signals.

MTL4600	Function	Channels	Description
MTL4604	DI	1	1 ch DI relay output + NE LFD alarm
MTL4610	DI	4	4 ch DI
MTL4611	DI	1	1 ch DI C/O relay output + LFD
MTL4614	DI	1	1 ch DI relay output + LFD alarm
MTL4614D	DI	1	1 ch dual relay output
MTL4616	DI	2	2 ch DI relay output + LFD
MTL4617	DI	2	2 ch DI relay output + LFD alarm
MTL4621	DO	1	loop powered solenoid/alarm driver
MTL4623	DO	1	solenoid/alarm driver + LFD
MTL4623R	DO	1	solenoid/alarm driver + rev LFD
MTL4623L	DO	1	solenoid/alarm driver loop powered + LFD
MTL4624	DO	1	solenoid/alarm driver switch cont + OVR
MTL4624S	DO	1	solenoid/alarm driver switch cont + OVR
MTL4626	RO	2	2 ch DI relay output
MTL4632	Pulse	1	pulse isolator

MTL4600	Function	Channels	Description
MTL4641	AI	1	1 ch smart Tx repeater 4-20mA
MTL4641A	AI	1	1 ch smart repeater 4-20mA passive I/P
MTL4641S	AI	1	1 ch smart Tx repeater 4-20mA sink
MTL4641AS	AI	1	1 ch repeater 4-20mA passive I/P sink
MTL4644	AI	2	2 ch smart Tx repeater 4-20mA
MTL4644A	AI	2	2 ch smart repeater 4-20mA passive I/P
MTL4644AS	AI	2	2 ch repeater 4-20mA passive I/P sink
MTL4644D	AI 1 in 2 out	1	dual O/P smart Tx repeater
MTL4644S	AI	2	2 ch smart Tx repeater 4-20mA sink
MTL4646	AO	1	1 ch smart 4-20mA output + LFD
MTL4646Y	AO	1	1 ch smart 4-20mA output + OC LFD
MTL4649	AO	2	2 ch smart 4-20mA output + LFD
MTL4649Y	AO	2	2 ch smart 4-20mA output + OC LFD
MTL4675	TI	1	temperature converter + alarm
MTL4676-RTD	TI	2	2 ch RTD temperature converter
MTL4676-THC	TI	2	2 ch THC temperature converter

For data sheets please visit http://www.mtl-inst.com/product/mtl4600_series/

MTL4500, MTL4600, MTL5500, MTL5000 SERIES
COMMON SPECIFICATIONS

Please go to our website at www.mtl-inst.com for the latest information regarding safety approvals, certificates and entity parameters.

Connectors
Each unit is supplied with signal connectors, as applicable. When using crimp ferrules for the hazardous or non-hazardous (safe) signal connectors the metal tube length should be 12mm and the wire trim length 14mm.

Isolation
250V rms, tested at 1500V rms minimum, between safe- and hazardous-area terminals.
MTL4500/4600: 50V between safe-area circuits and power supply
MTL5500: 250V rms between safe-area circuits and power supply

Supply voltage
20 – 35V dc

Location of units
Safe area

Terminals
Accepts conductors of up to 2.5mm² stranded or single-core

Mounting
MTL4500/4600
MTL4500 series backplanes
MTL5500/5000
T-section 35mm DIN rail (7.5 or 15mm) to EN 50022

Ambient temperature limits
–20 to +60°C (–6 to +140°F) operating
–40 to +80°C (–40 to +176°F) storage

Humidity
5 to 95% relative humidity

Weight
Approximate (except where indicated)

MTL4500/4600	140g
MTL5500/5000	150g

EMC
to EN61326 and NE21*

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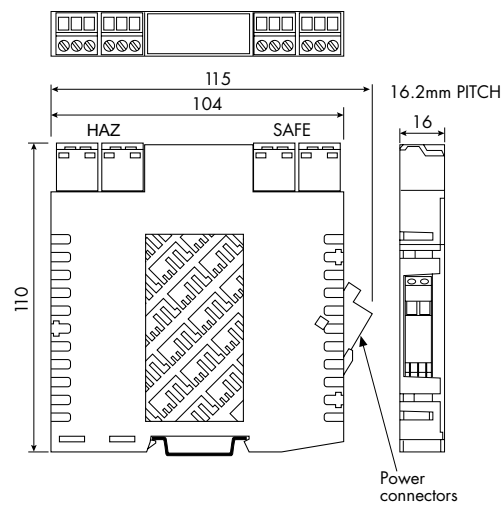
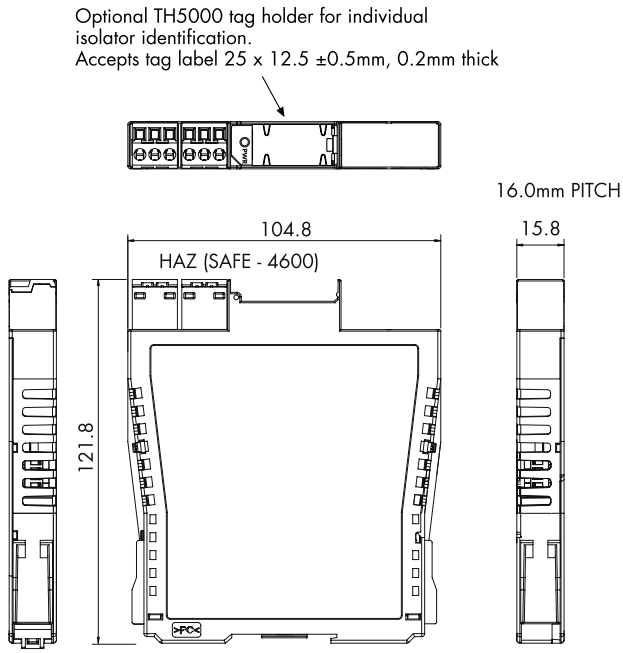
MTL5000

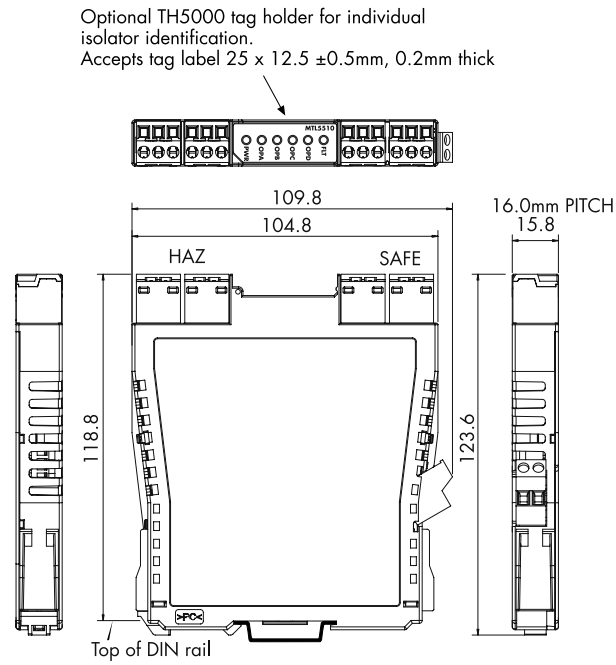


DIMENSIONS (mm)

MTL4500 (MTL4600)



MTL5500



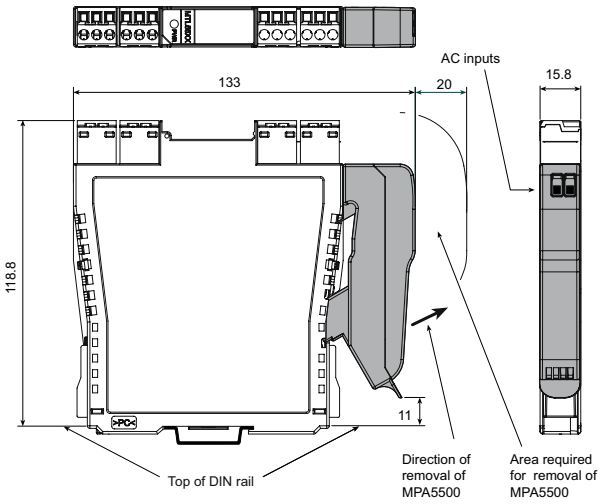
** MTL4500, 4600, 5500*
For 20mS power interruption compliance, a suitable power supply must be used.

EPSx5CS Combo Rev3 200913

MPA5500
A.C. POWER ADAPTOR

The MPA5500 enables any MTL5500 Series module that is normally powered from a nominal 24V DC supply (i.e. those that are not loop-powered) to be powered from a high-voltage AC supply.

It plugs into the power socket (terminals 13 and 14) of an MTL5500 module and clips securely onto the module housing. The 25V DC power output from the adaptor is sufficient to supply a single module and can be connected to any normal AC power source.

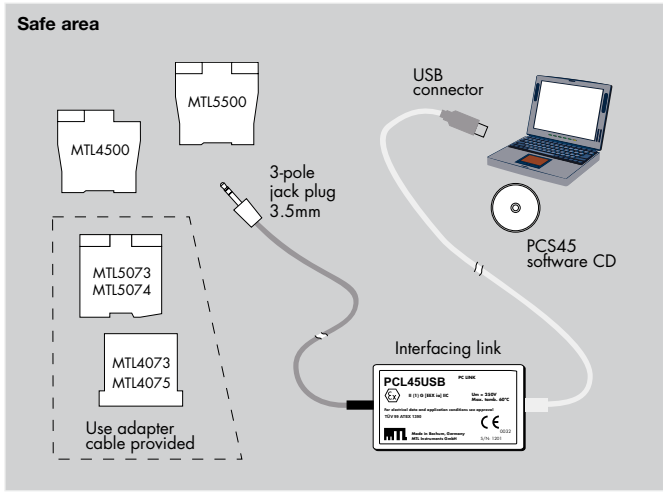


SPECIFICATION

Input voltage
85 – 265V AC, (45–65Hz)
Efficiency
71% typ. at 230V AC
Power dissipation
1.2W typ at 230V AC.
Input terminals
Cage-clamp terminals accommodating conductors up to 1.5mm^2 stranded or 16AWG single-core
Input protection
internal fuse, not user serviceable
Output voltage
25Vdc ± 10%
Output current
120mA at 25V
Ambient temperature
Operating: –20 to +60°C
Storage: –40 to +80°C
Mounting
Plugs into and clips onto MTL5500 Series I/O module
It is not for use with any equipment other than MTL5500.
Humidity
5 to 95% relative humidity
Mechanical
Ingress Protection: IP20
Material: polycarbonate
Weight: 28g approx.
Standards compliance
EN 61326, EN 61010

PCS45/PCL45USB
CONFIGURATOR FOR MTL CONVERTERS

The PCS45/PCL45USB configurator allows MTL converters to be configured from a standard PC running a Microsoft® Windows® operating system. It comprises PC software, provided on a CD (PCS45), and an ATEX certified interfacing link (PCL45USB). Converters can be configured from the safe area, while on-line, and configurations can be saved to disk and printed out when required. It is suitable for use with MTL4000, MTL4500, MTL5000 and MTL5500 series products.

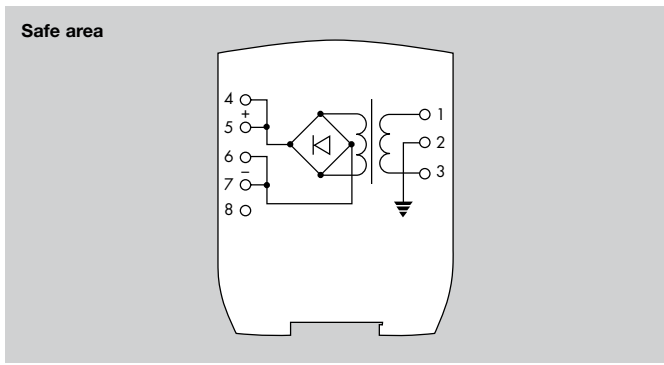


SPECIFICATION

PCL45USB hardware
Location
Safe area
Connections
PC side: USB B(F) socket
Converter side: cable with 3.5mm jackplug, 3-pole for MTL4500 and MTL5500 series converters. An adapter cable is provided for other earlier MTL converters.
Cable lengths
Converter side (fitted): 1.5m
USB cable A(M) to B(M) (supplied): 2m
Ambient temperature limits
–10°C to +60°C operating
–20°C to +70°C storage
Humidity
5 to 95% relative humidity (non-condensing)
Weight
200g
PCS45 Configuration software
Compatible with Windows XP, Win7, Win8.
Consult MTL for operation with any other operating system.
Software medium
PCS45 supplied on CD
Updates are available at www.mtl-inst.com
Recommended minimum PC configuration
Microsoft Windows XP, Win7, Win8
20MB of available hard disc space
CD ROM drive
Available USB port
Printer (local or network)

MTL5991
24V DC POWER SUPPLY

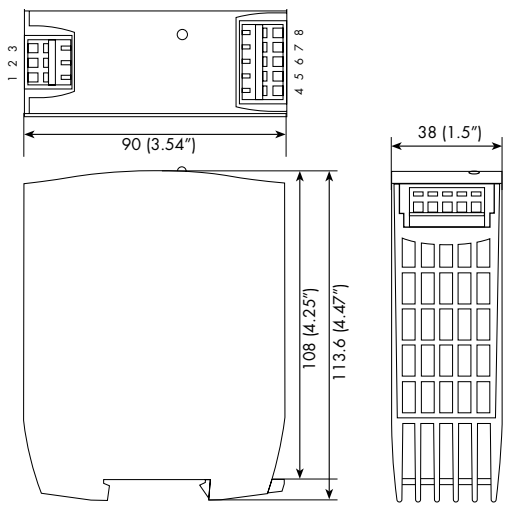
A DIN-rail mounted unit for locations where a dc supply is not readily available. The wide input power supply range makes this unit universally applicable and the 24V dc, 2A output will drive a useful number of MTL5000 and MTL5500 series modules.



SPECIFICATION

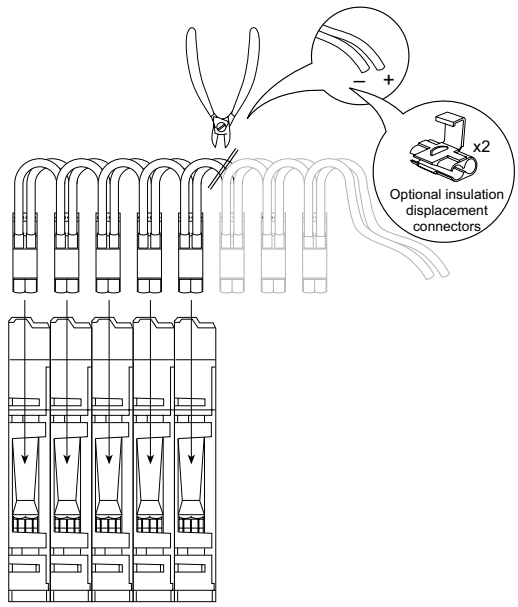
Power supply
85 to 264V ac 47 to 63Hz
Power dissipation within unit
7.2W @ 2A
Mounting
35mm DIN (top hat) rail
Output voltage
24V dc nom (23.64 min/24.36 max)
Output current
2A maximum (1.7A with <105V ac input)
LED indicators
Green: Power indication
Weight
310g
Ambient temperature
Operating temperature –10°C to +50°C
Storage temperature –40°C to +85°C
Terminals
Cage clamp type accommodating conductors up to 2.5mm², stranded or single-core

Note: Segregation between hazardous and safe area wiring must be maintained.



MTL5500 SERIES
POWERBUS KITS
PB - 8T,16T,24T,32T

A quick and easy way to distribute DC power to MTL5500 Series modules. Each powerbus kit includes 4 single ferrules, 4 twin ferrules and 2 insulation displacement connectors (Scotchlok).



SPECIFICATION

Available in 4 different lengths:
PB - 8T = 8 connectors and loops
PB - 16T = 16 connectors and loops
PB - 24T = 24 connectors and loops
PB - 32T = 32 connectors and loops
Insulation material :
PVC
Conductor :
24 strands of 0.2mm dia (0.75mm²) standard copper
Insulation thickness :
0.5 to 0.8 mm
Current rating :
12A max
Operating temperature range :
–20°C to +60°C
Max voltage drop on 32 modules drawing 130mA max :
0.5V

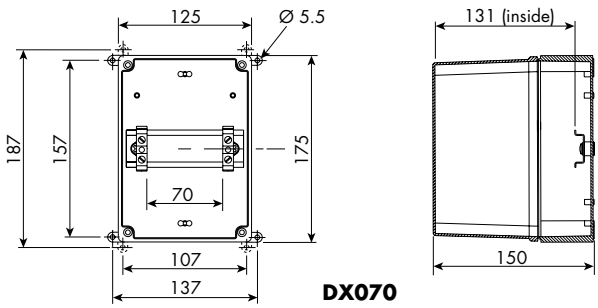
CHOOSING A POWERBUS KIT

Choose a powerbus where the number of power plugs is greater than or equal to the number of isolators to be powered and if necessary cut the powerbus to the required number of terminations.

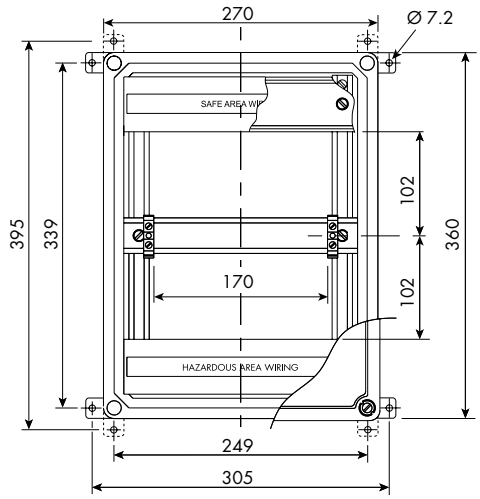
Note: To reduce the risk of excessive voltage drop or overcurrent do not connect powerbuses in series.

MTL5500 SERIES
ENCLOSURES

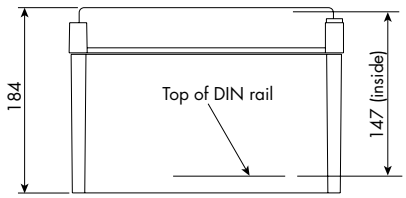
DIMENSIONS (mm) AND MOUNTING



DX070



DX170



SPECIFICATION

Construction
Glass reinforced polycarbonate base - DX070
Glass reinforced polyester base - DX170
Transparent polycarbonate lid

Protection
Dust-tight and water-jet proof to IEC529:IP65

Lid fixing
Captive fixing screws

Weight (excluding barriers/isolators) kg
DX070 0.8
DX170 2.6

Items provided
DIN rail - fitted
ETL7000 Earth terminals (2 x) - fitted
"Take care IS" front adhesive label
Cable trunking (DX170 only)

Note: Isolators are not included.

Mounting
Wall fixing lugs provided. For further details refer to INM5500.

Tagging and earth rail
Accommodates MTL5500 Series accessories.

Permitted location
Safe (non-hazardous) area

Note: N. America/Canada - Enclosures are rated NEMA 4X so can be used in Class 1, Division 2 (gases) location, but check with local requirements and ensure all cable entries also conform. Additional warning label will be required on or near the enclosure, see installation details. Not suitable for Class II or III, Division 2 hazardous locations.

Approximate capacities (on DIN rail between earth terminals)

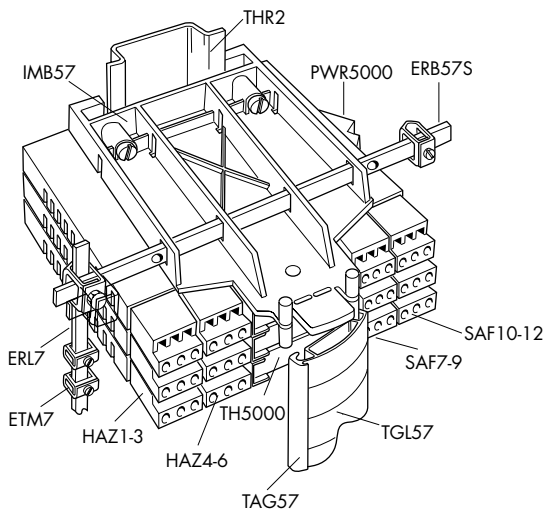
	Number of MTL5500 isolators	
DX070	4	(2)*
DX170	10	(8)*

** Use these figures when IMB57 mounting blocks for tagging/earth are included.*

Ambient temperature limits
Dependent on units fitted. See instruction manual INM5500.

MTL5500 SERIES
ACCESSORIES

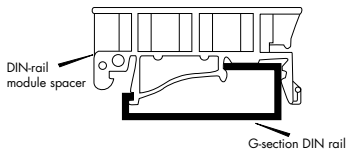
MTL5500 Series isolators mount quickly and easily onto standard DIN rail. A comprehensive range of accessories simplifies earthing and tagging arrangements.



MOUNTING

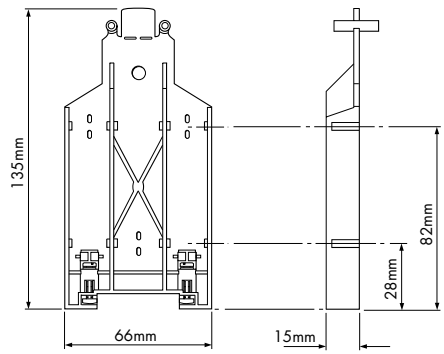
THR2 DIN rail,1m length
DIN rail to EN50022; BS5584; DIN46277

MS010 DIN rail module spacer, 10mm, pack of 5
Grey spacer, one required between each MTL5533 or MTL5995-PS and any adjacent module on a DIN rail, to provide 10mm air-circulation space between modules

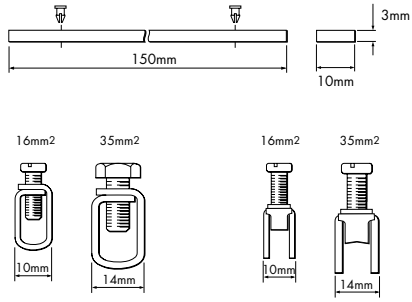


EARTH RAILS AND TAG STRIP

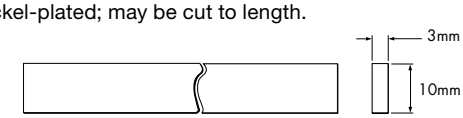
IMB57 Insulating mounting block
One required at each end of a tagging strip/earth rail. Suitable for low-profile (7.5mm) and high-profile (15mm) symmetrical DIN rail.



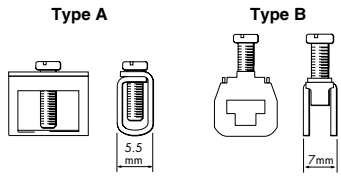
ERB57S Earth-rail bracket, straight
Nickel-plated; supplied with two push fasteners, one (14mm, 35mm^2) earth-rail clamp and one (10mm, 16mm^2) earth clamp.



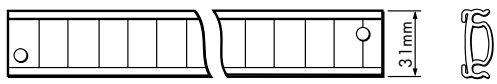
ERL7 Earth rail, 1m length
Nickel-plated; may be cut to length.



ETM7 Earth terminal, bag of 50
For terminating cable screens and 0V returns on the ERL7 earth rail. For cables ≤ 4mm^2. Exact dimension dependent on manufacturer.



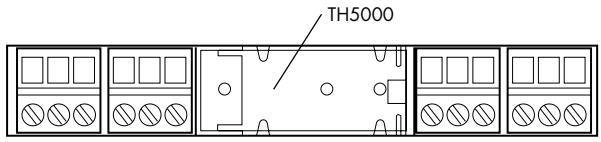
TAG57 Tagging strip, 1m length
Cut to size. Supplied with tagging strip label suitable for MTL5000 or MTL5500 modules.



TGL57 Tagging strip labels, set of 10 x 0.5m
Spares replacement, for use with TAG57 tagging strip. Suitable for MTL5000 or MTL5500 modules.

INDIVIDUAL ISOLATOR IDENTIFICATION

TH5000 tag holders
Each isolator may be fitted with a clear plastic tag holder, as shown below. Order TH5000, pack of 20.



CONNECTORS

Each MTL5500 unit is supplied with signal and power connectors, as applicable.

Spares replacement connectors are available separately; see ordering information.

See also 'MTL5500 Series powerbus kits'

CUSTOM, STANDARD AND UNIVERSAL BACKPLANES
FOR EASY DCS INTEGRATION

- Total flexibility
- Reduce wiring
- Simplify installation
- Special functions
- Signal conditioning
- HART® integration

The MTL4500 Series backplanes, enclosures and other accessories provide comprehensive, flexible and remarkably compact mounting facilities for system vendors, original equipment manufacturers and end users alike.

CUSTOMISED BACKPLANES

MTL provides a complete design and manufacturing service for customised backplanes. Customised backplanes give the vendors and users of process control and safety systems the opportunity to integrate MTL4500/HART® modules directly into their system architecture. As there are no hazardous-area circuits on the backplanes, customised versions can be produced without the need for IS certification, so simplifying design and lowering costs.

UNIVERSAL CUSTOM BACKPLANES

The 'universal' backplane allows a fast and economic approach to providing a custom interface. Where tight time schedules exist, the backplane can be installed to allow the panel building and wiring to be completed. The customised adapter card can then be plugged in at any time up to integrated test.

ADAPTER CARDS

Adapter cards already exist for many of the DCS companies. In addition there is a range of general purpose cards that offer reduced wiring for use with specific MTL modules. These are also available in left- and right-hand versions to ease panel wiring.

STANDARD MTL BACKPLANES

Standard MTL backplanes are available to accommodate 4, 8, 16, or 24 modules using screw-clamp connectors for the safe-area circuits. On an individual backplane, any module can be plugged into any position and module types can be mixed. For 8-, 16- and 24-way backplanes, screw-clamp connectors which plug into the backplanes provide primary and secondary 24V dc power supplies. Power to several 8- or 16-way backplanes can be interconnected to reduce and simplify wiring – see instruction manual INM4500 for details.

OPTIONAL ACCESSORIES

Optional accessories include colour coded tagging strip kits for all three sizes of backplane and earth rail kits for 8 and 16-way versions. Mounting accessories are available for surface (all backplanes), T-section and G-section DIN-rail (8- and 16-way versions), and a horizontal plate for mounting 24-way backplanes in 19-inch racks.

WEATHERPROOF ENCLOSURES

Weatherproof enclosures are available for applications where separate safe–area enclosures are required for backplanes with modules. Available to accommodate one 4-way or one 8-way backplane, they are manufactured from GRP giving protection against dust and water to IEC529:IP65. The lids are made from transparent high-strength polycarbonate so that LEDs, switches, etc, on the tops of the modules are easy to see.

DCS VENDORS/SYSTEMS SUPPORTED:

ABB Automation
S100, INFI90, S800

Emerson
Delta V, M Series, S Series

GE Bentley-Nevada

HIMA
HIMax

Honeywell
PMIO, C200, C300, UPIO, Safety Manager, USIO

Rockwell Automation
ICS Triplex, Plantguard

Schneider Electric
Foxboro I/A, Triconex Trident/ Tricon, Modicon

Siemens
ET200, S7

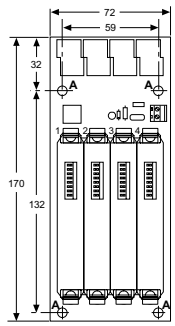
Yokogawa
Centum R3, VP, Prosafe RS, CS3000

MTL CPS STANDARD BACKPLANES

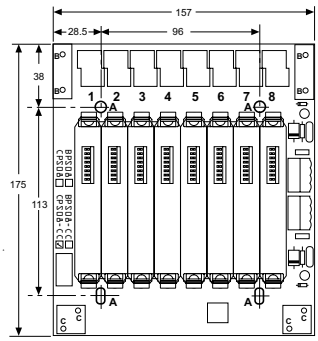
Backplane model no.	Number of modules	Safe-area connections	MOUNTING KITS			ACCESSORIES		
			Surface	DIN–rail (T or G)	19–inch rack	Earth–rail kit	Tagging strip kit	Spare fuse pack
CPS04	4	Screw–clamp	SMS01	DMK01	–	–		FUS1.0ATE5
CPS08	8	Screw–clamp	SMS01	DMK01	–	ERK08	TSK08	FUS1.0ATE5
CPS16	16	Screw–clamp	SMS01	DMK01	–	ERK16	TSK16	FUS2.0ATE5 or FUS2.5ATE5
CPS24	24	Screw–clamp	SMS01	DMK01	HMP24	–	TSK24	FUS4.0ATE5

EPS45/5500 Rev4 121114

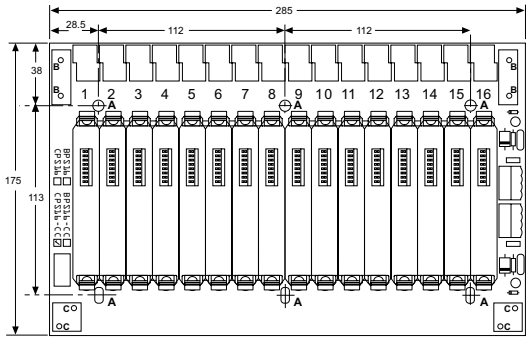
CPS BACKPLANE DIMENSIONS (mm)



CPS04
CPS04-CC

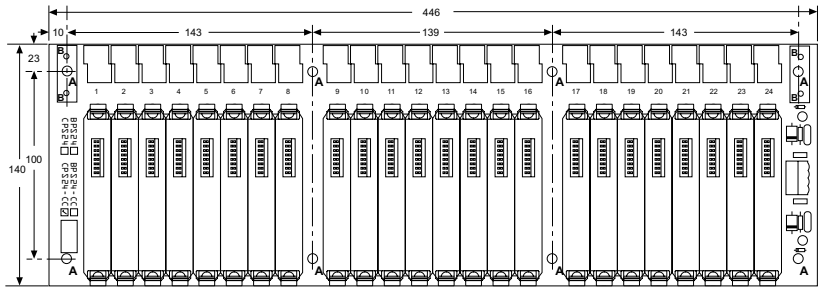


CPS08
CPS08-CC



CPS16
CPS16-CC

-CC - Conformal Coating

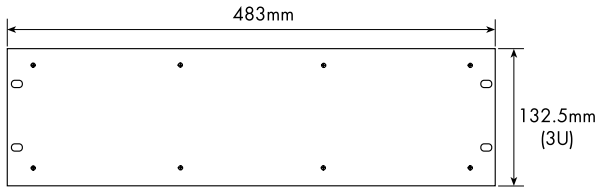


CPS24

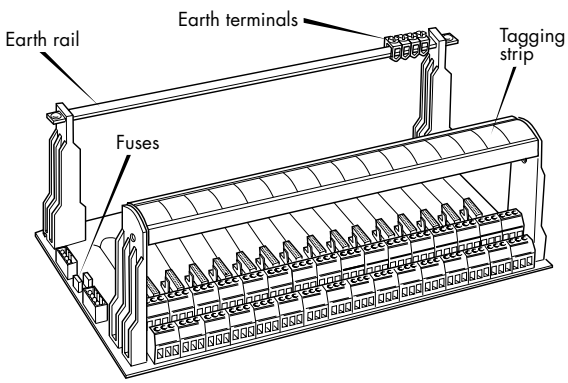
Power requirements, Vs
21V dc to 35V dc through plug-in connectors
Safe–area connections
CPS: 2.5mm^2 screw-clamp terminals – 6 positions per module
Weight (without modules or accessories)

CPS04:	96g
CPS08:	225g
CPS16:	419g
CPS24:	592g

HMP24 - 19" RACK MOUNTING PLATE FOR CPS24



BACKPLANE ACCESSORIES



SCK45 - backplane clips

10 x strip of four

MCK45 - backplane clips

16 x strip of two

The given data is only intended as a product description and should not be regarded as a legal warranty of properties or guarantee. In the interest of further technical developments, we reserve the right to make design changes.

MTL4500 series backplanes can be customised for specific applications and customer's requirements. All the signals on the backplane are 'safe-area' so custom designs are possible without the need for certification. MTL offers a fast and efficient customising service upon request.

Many installations can benefit from the use of existing custom solutions. These provide reduced system wiring, modularisation of the channels to match the IO card. In addition diagnostics, such and line fault detection, can be grouped prior to connection into the system.

Remote cable connections:

In addition to the many DCS solutions, listed on a previous page, are backplanes and cables that are ideal when the isolators are mounted in remote cabinets and the signals need to be returned to the system via a multicore cable.

CP-DYN SERIES

FTA	Size	Function	MTL modules
CP-DYNB-AIO	B	16ch analogue input /output	MTL4541, 4546Y, 4575
CP-DYNB-AI250	B	16ch analogue input	MTL4541, 4575
CP-DYNA-2AIO	A	16ch analogue input / output	MTL4544, 4549Y
CP-DYNB-DI	B	16ch digital input	MTL4511, 4514
CP-DYNB-DILF	B	16ch digital input with LFD	MTL4514
CP-DYNB-2DI	B	32ch digital input	MTL4513, 4516, 4517
CP-DYNB-4DI	B	48ch digital input	MTL4510
CP-DYNB-DO	B	16ch digital output	MTL4521, 4521L

DESCRIPTION

For use when the IS interfaces are remotely mounted from the control system, this series of cable connected FTAs provide a simple plug/socket connection method for IS field devices to any control system. The FTAs come fitted with mounting pillars for surface mounting or may be used with the DIN rail mounting kit to mount on a single DIN rail.

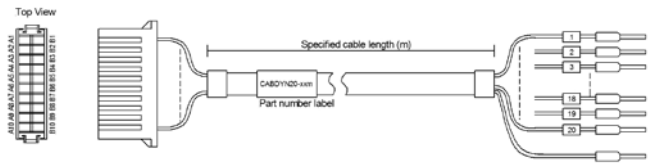
The cable connections between the system card and the FTA use the Tyco Dynamic series of connector which provide a reliable and high density solution.

CABLES

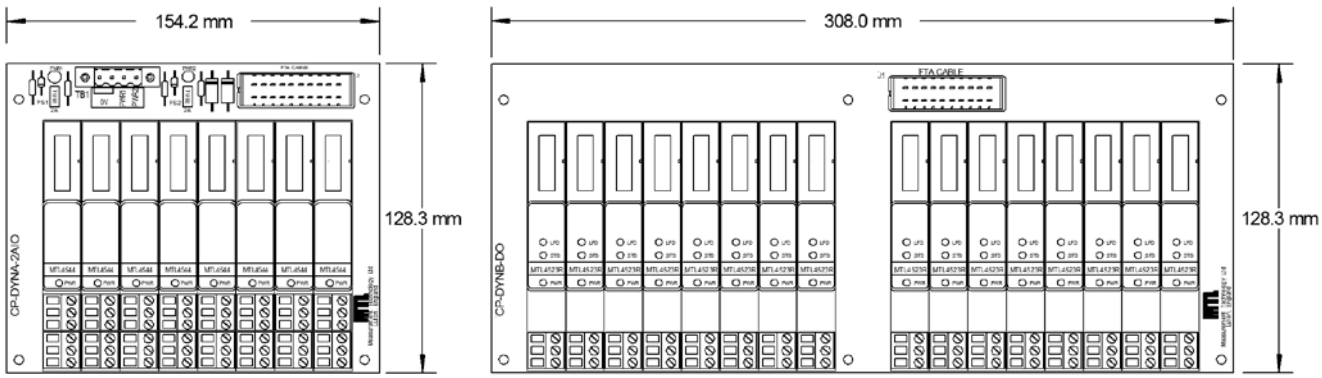
All FTAs use the Tyco 20 pin Dynamic series of connectors. Cables are fitted with a mating connector and free ends the other, for connection to the system card.

Cable ordering code

CABDYN20-0.5	0.5m cable
CABDYN20-1	1.0m
CABDYN20-2	2.0m
CABDYN20-3	3.0m
CABDYN20-5	5.0m
CABDYN20-8	8.0m
CABDYN20-10	10m
CABDYN20-15	15m
CABDYN20-20	20m
CABDYN20-25	25m
CABDYN20-30	30m



CP-DYN DIMENSIONS

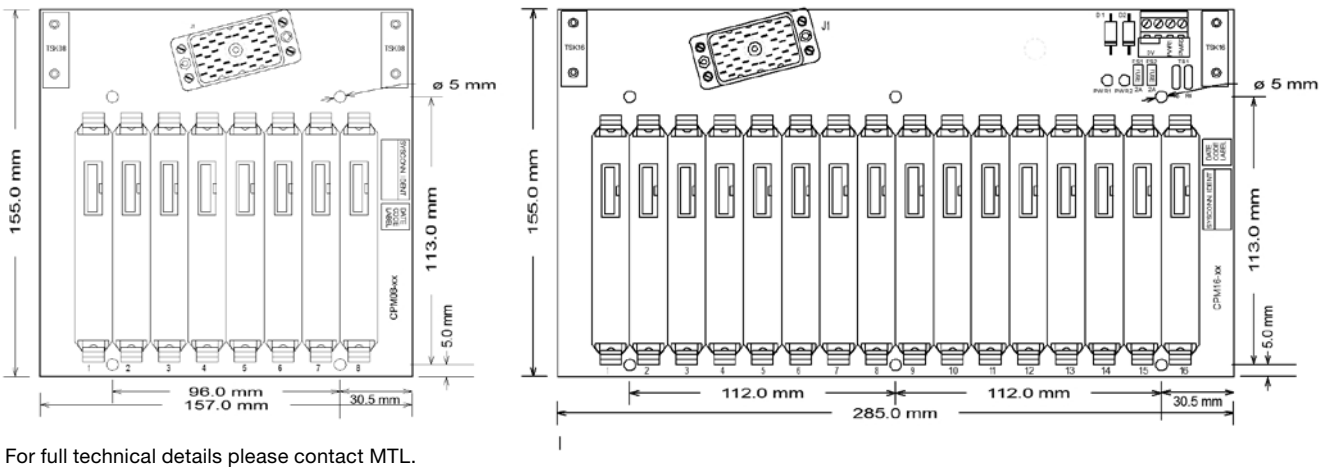


For full technical details please contact MTL.

CPELCO SERIES

A range of dedicated backplanes to interface with MTL4500 series intrinsically safe isolator modules and the MTL HART maintenance system products. The backplanes offer a standard Elco interface connector for use in systems where the IS interfaces are remote from the DCS.

Backplane	Function	MTL module	Cable
CPM08-2AIO	16ch AI 4-20mA	MTL4544/4576/4549Y x 8	Elco38 x 1
CPM08-2AV	16ch AI 1-5V	MTL4544/4576 x 8	Elco38 x 1
CPM16-AIO	16ch AIO 4-20mA	MTL4541/4575/4546Y	Elco38 x 1
CPM16-2AIO	32ch AI 4-20mA	MTL4544/4576/4549Y x 16	Elco38 x 2
CPM16-2AV	32ch AI 1-5V	MTL4544/4576 x 16	Elco38 x 2
CPM08-DDI	16ch DI	MTL4513/4516	Elco38 x 1
CPM16-DO	16ch DO	MTL4524/4523R	Elco38 x 1
CGM08-DO	8ch DO	MTL4521/4521L (loop powered)	Elco38 x 1

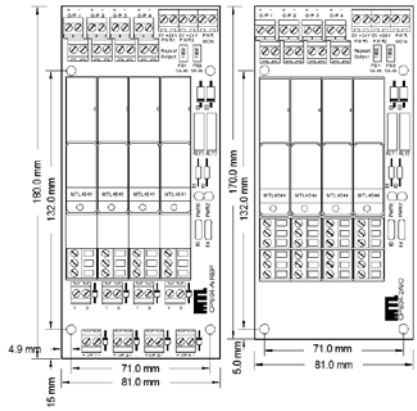


For full technical details please contact MTL.

ANALOGUE SIGNAL REPEAT

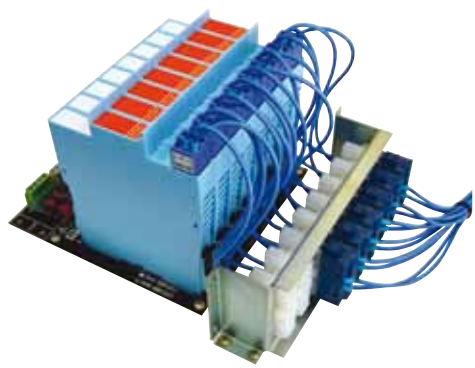
CPS04-AIREP backplane may be used to generate a repeat output from a single transmitter source. This includes high integrity loops in general purpose applications. The MTL4641 is used to generate an isolated repeat signal from an existing 4-20mA loop.

CPS04-2AIO, 8 channel backplane, is used with IS signals with 2 channel AI or AO modules or with the MTL4544D to generate 4 inputs with repeat outputs.



MTL CUSTOM BACKPLANE SOLUTIONS

A wide range of backplanes can be offered with application specific functions. System connection options and modularity for individual signal types can be provided to offer significant space and cost savings. Please contact MTL if you wish to discuss your application requirements.



PRODUCT MIGRATION

Migration options for legacy MTL4000 series installations are also available. This enables isolators to be easily upgraded, or re-connecting existing isolators to a new control system, with the minimum of disturbance to existing wiring. For more information on product migration visit the resource section at www.mtl-inst.com

ORDERING INFORMATION

MTL4500/5500 Series isolators
Specify part number: eg, **MTL4511, MTL5575**

Individual isolator identification

TH5000	Tag holder (Pack of 20)

Connectors - MTL4500 & MTL5500

HAZ1-3	Hazardous-area plug, terminals 1, 2 and 3
HAZ4-6	Hazardous-area plug, terminals 4, 5 and 6
HAZ-CJC	Hazardous-area plug, terminals 1 and 3 with cold-junction sensor
HAZ-CJC2	Hazardous-area plug, terminals 4 and 6 with cold-junction sensor
SAF1-3	Safe-area plug, terminals 1, 2 and 3
SAF4-6	Safe-area plug, terminals 4, 5 and 6

Connectors - MTL5500 only

SAF7-9	Safe-area plug, terminals 7, 8 and 9
SAF10-12	Safe-area plug, terminals 10, 11 and 12
PWR5000	Power connector, terminals 13 and 14

PowerBus - MTL5500 only

PB-8T	Powerbus Kit for up to 8 isolators
PB-16T	Powerbus Kit for up to 16 isolators
PB-24T	Powerbus Kit for up to 24 isolators
PB-32T	Powerbus Kit for up to 32 isolators

MTL5500 Mounting accessories

THR2	1m length of DIN rail to EN 50022; BS 5584; DIN 46277
MS010	DIN-rail module spacer, 10mm (pack of 5)

MTL5500 Earth-rail and tag strip accessories

IMB57	Insulating mounting block
ERB57S	Earth-rail bracket, straight
ERL7	Earth-rail, 1m length
ETM7	Earth terminal, bag of 50
TAG57	Tagging strip, 1m length
TGL57	Tagging strip labels, set of 10 x 0.5m

MTL5500 Enclosures

DX070	Enclosure for MTL5500 x 4
DX170	Enclosure for MTL5500 x 10

MTL4500 Standard Backplanes

CPS04	4-way backplane screw-clamp connector
CPS08	8-way backplane screw-clamp connector
CPS16	16-way backplane screw-clamp connector
CPS24	24-way backplane screw-clamp connector

MTL4500 Custom Backplanes
Contact MTL for options and advice

MTL4500 Backplane mounting accessories

DMK01	DIN-rail mounting kit, T- or G-section (pack of 40) 8-way backplanes require 4, 16-way backplanes require 6
SMS01	Surface mounting kit (pack of 40) 4- and 8-way backplanes require 4, 16-way backplanes require 6, 24-way backplanes require 8
HMP24	Horizontal mounting plate and screws for 19-inch rack mounting 24-way backplanes only
BMK08	Mounting kit for one 4- or 8-way backplane
BMK16	Mounting kit for one 16-way backplane

MTL4500 Backplane accessories

ERK08	Earth rail kit for CPS08 backplane
ERK16	Earth rail kit for CPS16 backplane
TSK08	Tagging strip kit for CPS08 backplane
TSK16	Tagging strip kit for CPS16 backplane
TSK24	Tagging strip kit for CPS24 backplane
FUS1.0ATE5	Fuse kit, 1.0A (pack of 10)
FUS2.0ATE5	Fuse kit, 2.0A (pack of 10)
FUS2.5ATE5	Fuse kit, 2.5A (pack of 10)
FUS4.0ATE5	Fuse kit, 4.0A (pack of 10)
MCK45	MTL4000 backplane conversion kit (16 clip pairs per pack)
SCK45	Module 4-clip strips (10 strips + 40 rivets per pack)
MPL01	Module position label (blank) (50 per pack)
MCC45	Module backplane connector cover (pack of 50)

Literature

INM5500	MTL5500 Series instruction manual
INM4500/ 4600	MTL4500/4600 Series instruction manual

Configurator and software

PCL45USB	Configurator, PC interface and software
PCS45	PC software

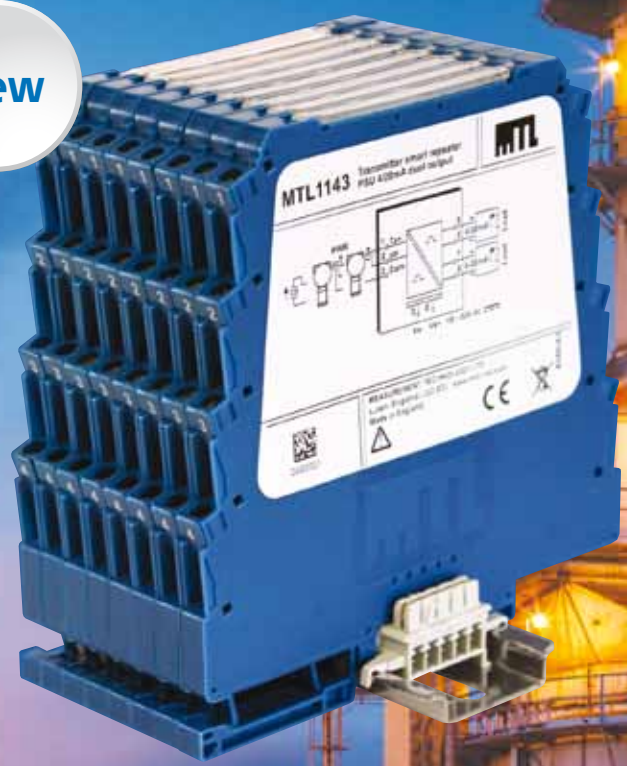
Please go to our website at www.mtl-inst.com for the latest information regarding safety approvals, certificates and entity parameters.

MTL1000 Series Signal Conditioners

For reliable, high quality process communications

The new MTL1000 Series of signal conditioning isolators complement our Intrinsic Safety products to provide a complete interface solution.

New



Reduced installation costs
Increased reliability
Single source supply

HART® Multiplexers

MTL provides the connections between HART® field instruments, control systems and process automation management software. Whether for a new installation or the upgrade of an existing facility, MTL provides solutions for traditional I/O and process systems in both IS and general purpose applications.

The HART® protocol is a powerful communication technology used to realise the full potential of digital field devices whilst preserving the traditional 4-20mA analogue signal. HART® provides simultaneous analogue and digital operation so that the 4-20mA analogue signal can be connected to conventional I/O cards or modules for measurement and control, while the digital signal can be used for monitoring process variables, accessing device status and diagnostics, or implementing configuration changes.

MTL's HART® connections provide the means to make full use of these features. By connecting field instruments, control systems and instrument management software, MTL's HART® connections allow better use of maintenance resources, reduced commissioning and process down-time, and consequent lower costs for commissioning and loop maintenance.

There are two types of HART® multiplexer to suit new or existing installations:

- The MTL4850 and new MTL4854 compact 32-channel module.
- The new MTL4851 and MTL4852 modules with 16-channel modularity.

Both of these product lines offer a full range of connection support elements and will link with most instrument management software packages by use of the relevant driver or definition files.

HART COMMUNICATION PROTOCOL

Delivering valuable process data from HART® field devices

MTL4850 and MTL4854

HART® Multiplexers for safety and valve applications

- **Mount directly to a range of customised connection units**
- **MTL4850 designed for use with SIL3 loops (non interfering)**
- **MTL4854 designed for use in partial-stroke test valve positioner applications**
- **Connect over 2000 loops on one RS485 network**
- **Auto baud rate detection**
- **LED indication for fault diagnosis**
- **Isolated Power Supply**
- **Firmware upgradeable**

The MTL4850 HART multiplexer provides a simple interface between smart devices in the field, control/safety systems and HART® instrument management software running on a PC.

The system is based on 32-channel modularity to provide a compact, easily configurable and expandable system. Using a standard RS485 serial link, up to 2016 individual HART devices can be connected to a single network.

For the optimum solution, the modules mount directly to either a range of generic or customised connection units/backplanes.

The MTL4850 is certified for the use with safety related sub-systems to IEC 61508, and is the first choice of HART multiplexer for these applications. It can be connected to signal loops that are part of safety instrumented functions up to SIL3.

With the fixed modularity of 32 channels, the speed of scanning field devices and responsiveness to PC software requests is optimised when compared to master/slave configurations.

The MTL4854 mounts on the same range of backplane as the MTL4850 but includes four HART modems that enable simultaneous communications with connected field devices to be carried out.

The primary application for this is to enable monitoring of other channels to continue while one channel is being used for valve positioner diagnostics.

Connectivity to HART Configuration and Instrument Management Software

The online access to the information contained within HART devices allows users to diagnose field device troubles before they lead to costly problems. Software can capture and use diagnostic data from HART field instruments via the MTL HART connection hardware. This allows users to realise the full potential of their field devices to optimise plant assets, which results in significant operations improvement and direct maintenance savings.

IMS products provide essential configuration, calibration, monitoring and maintenance history functions for conventional analogue (4-20 mA) and HART protocol compatible smart process instruments and field devices. They deliver powerful tools to meet the need for standardised instrument maintenance procedures and record keeping mandated by some quality standards and regulatory bodies.

The benefits of utilising these powerful software packages online include:

- Reduced commissioning time and costs
- Reduced maintenance costs
- Reduced documentation
- Reduced process downtime

The MTL4850/54 offers connectivity to a comprehensive range of FDT based software packages via the comms Device Type Manager (DTM). The DTM can be downloaded from www.mtl-inst.com. Other software packages work with the MTL4850/54 through custom software drivers or by the inclusion of the device description (DD) file for the MTL multiplexers.

EPS MTL4850_54 Rev1 131114

SPECIFICATION

Number of channels
32
Channel transmitter type
HART rev 5 – 7
Channel interface
2 connections to each channel field loop (64 total)
Host system interface
RS485 2-wire multidrop
(up to 63 MTL4850 modules can be connected to one host
RS485 baud rate
38400, 19200, 9600, 1200 baud - (auto-detected)
Address selection
8-bit interface, up to 64 addresses
Alarm output (Open Collector - Referenced to 0V)
V_{max} = 35V, I_{max} = 5mA, P_{max} = 100mW

ISOLATION

Channel-to-channel isolation
50V dc
Field loop isolation
50V dc
Module is coupled to loops via capacitor in each connection leg (i.e. 2 capacitors per channel)
RS485 interface isolation (Between module and interface)
25V dc
Alarm output isolation (Between module and output)
50V dc
PSU isolation (Between module and PSU input)
50V dc

POWER

Supply voltage
19V to 35V dc
Currrent consumption

MTL4850	MTL4854
60mA at 24V ±10%	42mA at 24V ±10%

Power dissipation

MTL4850	MTL4854
<1.6W at 24V ±10%	<1.1W at 24V ±10%

PSU protection
Reversed polarity protected

ENVIRONMENTAL

Temperature range
Operating: –40°C to +70°C
Non-operating: –40°C to +85°C
Relative humidity
5% to 95% - non-condensing

MECHANICAL

Dimensions
See drawing
Weight

MTL4850	MTL4854
125 gm	100 gm

Compatible FDT Frames include:-

FDT Frame	Manufacturer
FieldCare	Endress & Hauser/Metso Automation
PACTware	PACTware Consortium
FieldMate	Yokogawa
FDT Container	M&M Software

Approvals

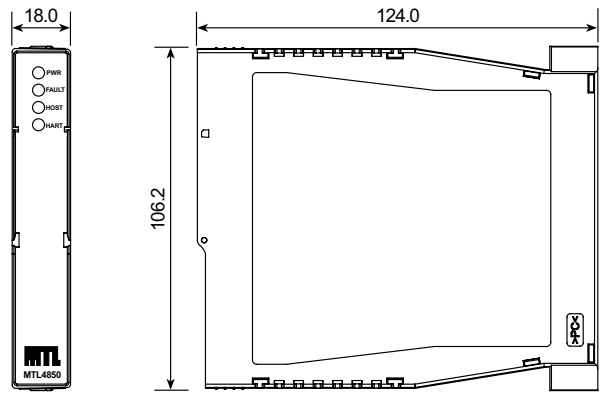
Zone 2 mounting	ATEX & IECEx
Div 2 mounting	CSA, FM & FMC

For full details of approvals and certification refer to the MTL website

LED INDICATORS

LED	Colour	State	Description
PWR	green	Off	Multiplexer is not receiving power
		On	Multiplexer is receiving power
FAULT	red	Off	Multiplexer is in the running state
		Steady flash	Multiplexer rebuild is in progress
		Short/long flash	No HART loops found
		On (steady)	A fault was detected and multiplexer operation has halted
HOST	yellow	Off	No communication on the channel
		Short flash (0.25 sec)	Correctly framed message received by the multiplexer
		Long flash (1 sec)	Response transmitted—this is re-triggerable so repeated transmissions will leave the indicator permanently on
HART	yellow	Off	No communication on the channel
		Short flash (0.25 sec)	Message transmitted
		Long flash (1 sec)	Response received - this is re-triggerable so repeated transmissions will leave the indicator permanently on

DIMENSIONS (mm)

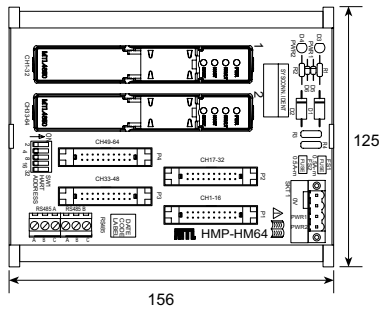


EPS MTL4850_54 Rev1 131114

MTL4850/MTL4854 BACKPLANE SPECIFICATIONS
GENERAL PURPOSE VERSIONS

HMP-HM64 BACKPLANE

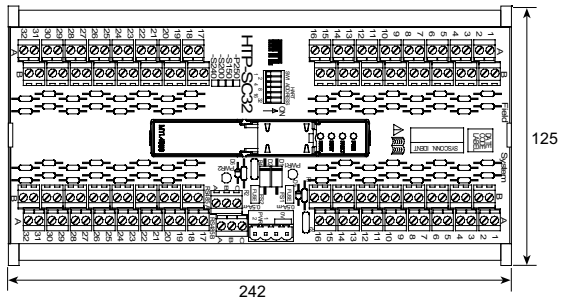
Capacity
2 x MTL4850 or MTL4854 HART multiplexer modules
Maximum power requirements
2.9W when equipped with –
2 x MTL4850 or MTL4854 HART multiplexer modules
HART interface connectors
4 x DIN41651 20-way HART signal cables
(16 HART signal connections + 4 common returns on each cable. Connections to HART signals via screw terminal interface or custom backplane. Contact MTL for details.)
Weight (excl. modules and accessories)
220g approx.



HMP-HM64

HTP-SC32 BACKPLANE *

Capacity
1 x MTL4850 or MTL4854 HART multiplexer module
Maximum power requirements
1.4W
Weight (excl. modules and accessories)
330g approx.



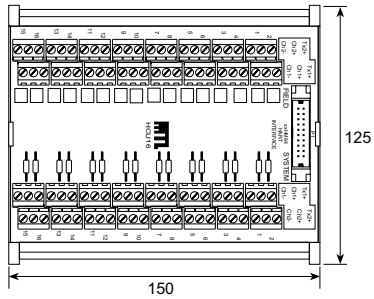
HTP-SC32

COMMON SPECIFICATION HMP-HM64 & HTP-SC32

Power requirements, Vs
21 to 35V dc through plug-in connectors
Mounting
Supplied fitted in DIN-rail (T- or G- section) carrier
RS485 port
2.5mm² screw terminals

HCU16 HART CONNECTION UNIT*

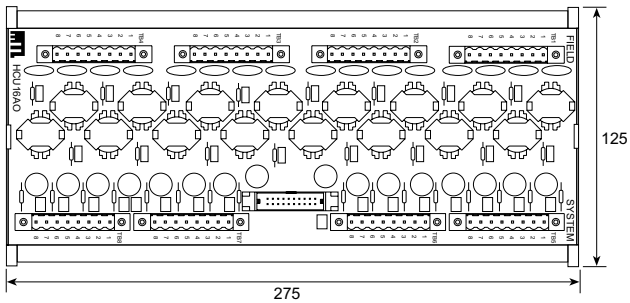
Accuracy (HCU16-P250 only)
250Ω ±0.05%
Connectors
2.5mm² screw clamp terminals
3 terminals per channel
20-way HART signal cable (to HMP-HM64)
Weight
383g approx.



HCU16

HCU16AO CONNECTION UNIT WITH FILTERS

Series impedance
dc < 2Ω
HART signal > 240Ω
Connectors
2.5mm² removable screw clamp terminals
2 terminals per channel in groups of 4 channels
20-way HART signal cable (to HMP-HM64)
Weight
768g approx.



HCU16AO

COMMON SPECIFICATION HCU16 & HCU16AO

Capacity
16 channels
Isolation
Channel-to-channel 50V dc
Mounting
Supplied fitted in DIN-rail (T- or G- section) carrier

**For further details of the model options refer to the Instruction Manual INM4850 - available from the MTL website.*

CUSTOMISED CONNECTION UNITS

MTL offers a range of general purpose and IS interfaces providing direct connection with control system I/O cables as well as HART® connectivity. For general purpose signals, a number of custom HART® interface termination units are available for most DCS and PLC I/O cards. These replace the existing DCS termination units, saving space and allowing easy upgrading. Please contact MTL for details.

MTL4850/54 BACKPLANE SPECIFICATIONS INTRINSIC SAFETY VERSIONS

CPH-SC16/CPH-SC32 BACKPLANES

Capacity
16 x MTL4541/A, MTL4546/Y isolators
16 x MTL4544/A, MTL4549/Y (CPH-SC32 only)
1 x MTL4850 or MTL4854 HART multiplexer

Power requirements, Vs
21 to 35V dc through plug-in connectors

Maximum power requirements
CPH-SC16 0.65A
CPH-SC32 1.2A

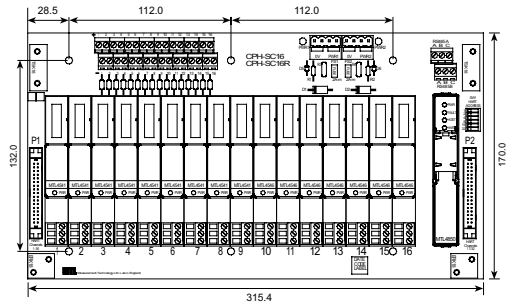
Safe-area connectors
2.5mm² screw terminals (2 terminals/module)

RS485 port
2.5mm² screw terminals

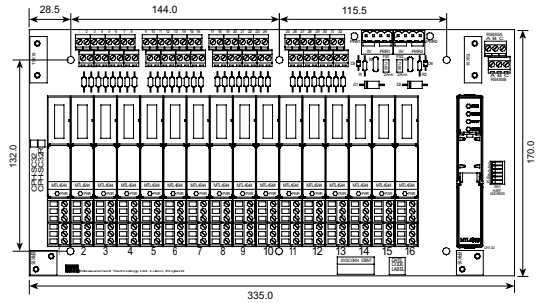
Accuracy
CPH-SCxxR: 250Ω ±0.05% conditioning resistor

Weight (excl. modules and accessories)
CPH-SC16 410g approx.
CPH-SC32 470g approx.

DIMENSIONS (mm)

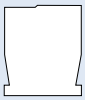


CPH-SC16(R)



CPH-SC32(R)

ORDERING INFORMATION



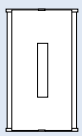
HART multiplexer

MTL4850	HART multiplexer module (connects with up to 32 loops)
MTL4854	Multi-modem HART multiplexer module (connects with up to 32 loops)

General purpose connection units

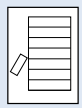
HMP-HM64	64ch HART backplane (Link to connection units via signal cable)
HCU16 †	HART connection unit, 16ch i/p
HCU16-P250 †	HART connection unit, 16ch i/p
HCU16-S150 †	HART connection unit, 16ch i/p
HCU16-S200 †	HART connection unit, 16ch i/p
HCU16AO	HART connection unit, 16ch o/p (With HART filters)
HM64RIB20-xx	20-way HART signal cable xx = 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 4.5, 6.0 (metres)

Integrated connection units



HTP-SC32 †	Integrated HART connection unit, 32ch
HTP-SC32-P250 †	Integrated HART connection unit, 32ch
HTP-SC32-S150 †	Integrated HART connection unit, 32ch
HTP-SC32-S200 †	Integrated HART connection unit, 32ch
HTP-SC32-S240 †	Integrated HART connection unit, 32ch

† See Notes



MTL4500 Series backplanes

CPH-SC16	16ch backplane
CPH-SC16R	16ch backplane (250Ω conditioning resistor)
CPH-SC32	32ch backplane
CPH-SC32R	32ch backplane (250Ω conditioning resistor)

Literature

INM4850/54	MTL4850/54 Instruction manual
INA485x	ATEX safety instructions

Notes:

no suffix	No parallel resistor, 0Ω link in series - for use with current inputs with 250Ω input impedance or HART compatible outputs
- P250	250Ω parallel resistor, 0Ω link in series - for use with 1-5V system inputs
- S150	150Ω series link, no parallel resistor - for use with current inputs with 100Ω input conditioning
- S200	200Ω series link, no parallel resistor - for use with current inputs with 50Ω or 63.5Ω input conditioning
- S240	240Ω series link, no parallel resistor - for use with isolators connected to field terminals.

MTL4851 and MTL4852

HART® Connection Systems

- **Designed to mount directly to a range of general purpose HART® connection units and IS backplanes**
- **Provides a simple interface to smart devices in the field**
- **Connect up to 7936 HART® devices on a single RS485 network**
- **LED indication for fault diagnosis**
- **Auto baud rate detection**
- **Connectivity to HART® configuration and Instrument Management software (IMS)**

The MTL4851 and MTL4852 HART connection system provides a simple interface between smart devices in the field, control systems and HART instrument management software run on a pc.

The system is based on 16-channel modularity to provide a compact, easily configurable and expandable system. Using a standard RS485 serial link up to 7936 HART devices can be connected on a single network.

For the optimum solution, choose from a range of general purpose and IS termination boards. For maximum flexibility the HMM64 HART backplane locates an MTL4851 master communications module and up to three MTL4852 secondary interface modules, with each module connecting to 16 field devices. General purpose HART connection units and IS backplanes are available fitted with an cable interface connection to the HMM64. This system can be extended with further HMS64 HART backplanes linked to the master, each carrying up to four MTL4852 secondary interface modules.

The MTL4851 and MTL4852 modules can also be located on HTP-SC16x termination boards for general purpose applications. HART loops are simply wired through these HART Termination Panels and may be grounded or floating circuits. The HTP boards offer a compact and cost-effective solution for general applications. CPH-SC16x backplanes are ideal for signal loops requiring intrinsic safety (IS) protection, combining multiplexer and IS isolator mounting. This offers considerable simplification in wiring when compared to DIN-rail based solutions.

The HCU16 HART units connect to 16 general purpose field instruments while maintaining channel to channel isolation. Resistor conditioning options are compatible with all types of I/O cards. It allows pass-through connections for transmitter power supply, input signal and common.

The HCU16AO unit includes HART filters for use with I/O cards that are incompatible with HART communication signals.

Customised backplanes and connection units are available to provide direct connection from DCS I/O cables, replacing the standard termination boards.

See also the MTL4850 datasheet for alternative HART solutions using a 32 channel multiplexer module ideally suited for use in conjunction with emergency shutdown and safety systems.

Connectivity to HART Configuration and Instrument Management Software:

The online access to the information contained within HART devices allows users to diagnose field device troubles before they lead to costly problems. Software can capture and use diagnostic data from HART field instruments via the MTL HART connection hardware. This allows users to realise the full potential of their field devices to optimise plant assets, which results in significant operations improvement and direct maintenance savings.

IMS products provide essential configuration, calibration, monitoring and maintenance history functions for conventional analogue (4-20 mA) and HART protocol compatible smart process instruments and field devices. They deliver powerful tools to meet the need for standardised instrument maintenance procedures and record keeping mandated by some quality standards and regulatory bodies.

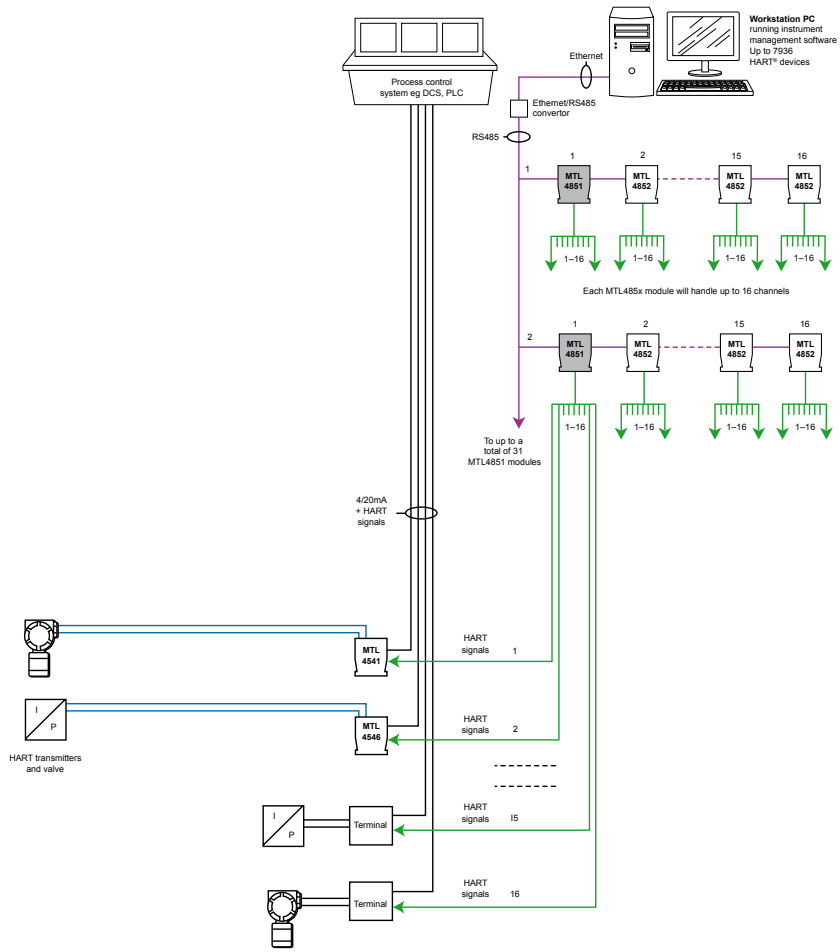
The benefits of utilising these powerful software packages online include:

- Reduced commissioning time and costs
- Reduced maintenance costs
- Reduced documentation
- Reduced process downtime

The MTL485x offers connectivity to a comprehensive range of FDT based software packages via the comms Device Type Manager (DTM). The DTM can be downloaded from www.mtl-inst.com. Other software packages, such as AMS from Emerson, work with the MTL485x through custom software drivers or by the inclusion of the device description (DD) file for the MTL multiplexers.

EPS MTL4851_52 Rev1 211014

SYSTEM OVERVIEW (TYPICAL INSTALLATION)



LED INDICATORS - MTL4851 module

LED	Colour	State	Description
PWR	green	Off	Multiplexer is not receiving power
		On	Multiplexer is receiving power
FAULT	red	Off	Multiplexer is in the running state
		Pulsing	Multiplexer build/rebuild is in progress
		Blinking	No HART loops found
		On (steady)	A fault was detected and multiplexer operation has halted
HOST	yellow	Off	No communication on the RS485 channel
		Short flash (0.25 sec)	Correctly framed message received by the multiplexer
		Long flash (1 sec)	Response transmitted—this is re-triggerable so repeated transmissions will leave the indicator permanently on
HART	yellow	Off	No communication on the channel
		Short flash (0.25 sec)	Message transmitted
		Long flash (1 sec)	Response received - this is re-triggerable so repeated transmissions will leave the indicator permanently on

LED INDICATORS - MTL4852 module

LED	Colour	State	Description
PWR	green	Off	Unit is not receiving power
		On	Unit is receiving power
HART	yellow	Pulsing	Indicating a channel is selected
		On	Channel continuously selected

EPS MTL4851_52 Rev1 211014

SPECIFICATION

MTL4851 Master Communications Module

Number of HART channels

16 (ch1 to ch16)

Channel device type

HART rev 5-7

Channel interface

2 connections to each channel

Host system interface

RS485 2-wire multidrop

(up to 31 MTL4851 modules can be connected to one host)

RS485 baud rate

38400, 19200, 9600, 1200 baud - auto detected

Address selection

up to 31 addresses, set on backplane

Alarm output

Open-collector transistor, referenced to 0V

V_{max} = 35V, I_{max} = 5mA, P_{max} = 100mW

MTL4852 Secondary Interface Module

Number of HART channels

16 (ch17 to ch256 in 16 channel groups)

Channel device type

HART rev 5-7

Channel interface

2 connections to each channel

MTL systems interface

Up to 15 off MTL4852 modules per MTL4851
Total length of interface bus, 4m max.

Power requirements

Powered from MTL4851 module

ISOLATION

Channel-to-channel isolation

50V dc

Field loop isolation

50V dc
Module is coupled to loops via capacitor in each connection leg (i.e. 2 capacitors per channel)

RS485 interface isolation (Between module and interface)

50V dc

Alarm output isolation (Between module and output)

50V dc

PSU isolation (Between module and PSU input)

50V dc

POWER SUPPLY, MTL4851 (from backplane)

Supply voltage

19V to 35V dc

Current consumption

42mA at 24V ±10% for MTL4851, plus
2mA for each MTL4852

Power dissipation (MTL4851 + 15 MTL4852)

<1.6W at 24V ±10%

PSU protection

Reversed polarity protected

ENVIRONMENTAL

Temperature range

Operating: –40°C to +60°C
Non-operating: –40°C to +85°C

Relative humidity

5% to 95% - non-condensing

MECHANICAL

Dimensions

See drawing

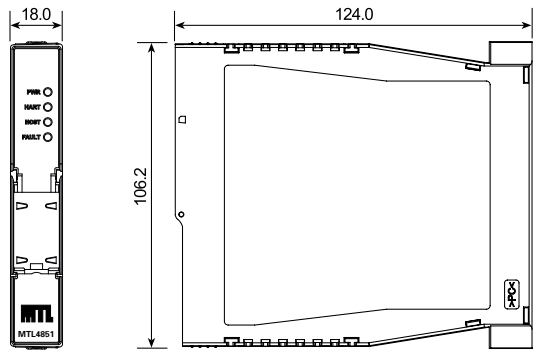
Weight

MTL4851 95gm
MTL4852 75gm

Approvals

Zone 2 mounting ATEX & IECEx pending
Div 2 mounting FM & FMc pending

DIMENSIONS (mm)



INSTRUMENT MANAGEMENT SOFTWARE

The MTL HART Connection System offers connectivity to a comprehensive range of both general instrument management software packages and dedicated software packages for optimising Valve positioner performance and maintenance including -

AMS Device Manager	Emerson Process Management
Cornerstone	Applied System Technologies
FDM	Honeywell
FDT Container	M&M Software
FieldCare	Endress & Hauser/Metso Automation
HART OPC Server	HART Communication Foundation
PACTware	PACTware Consortium
PDM	Siemens
Fieldmate	Yokogawa
DAT200 Asset Vision Basic	ABB
SoftTools	Flowserve
ValveLink	Emerson Process Management
Valvue	Masoneilan

For software packages that are based on a FDT frame i.e FieldCare, PACTware etc communication with the MTL HART multiplexer system requires the MTL Generic Communications DTM. This can be downloaded Free of Charge from the MTL website.

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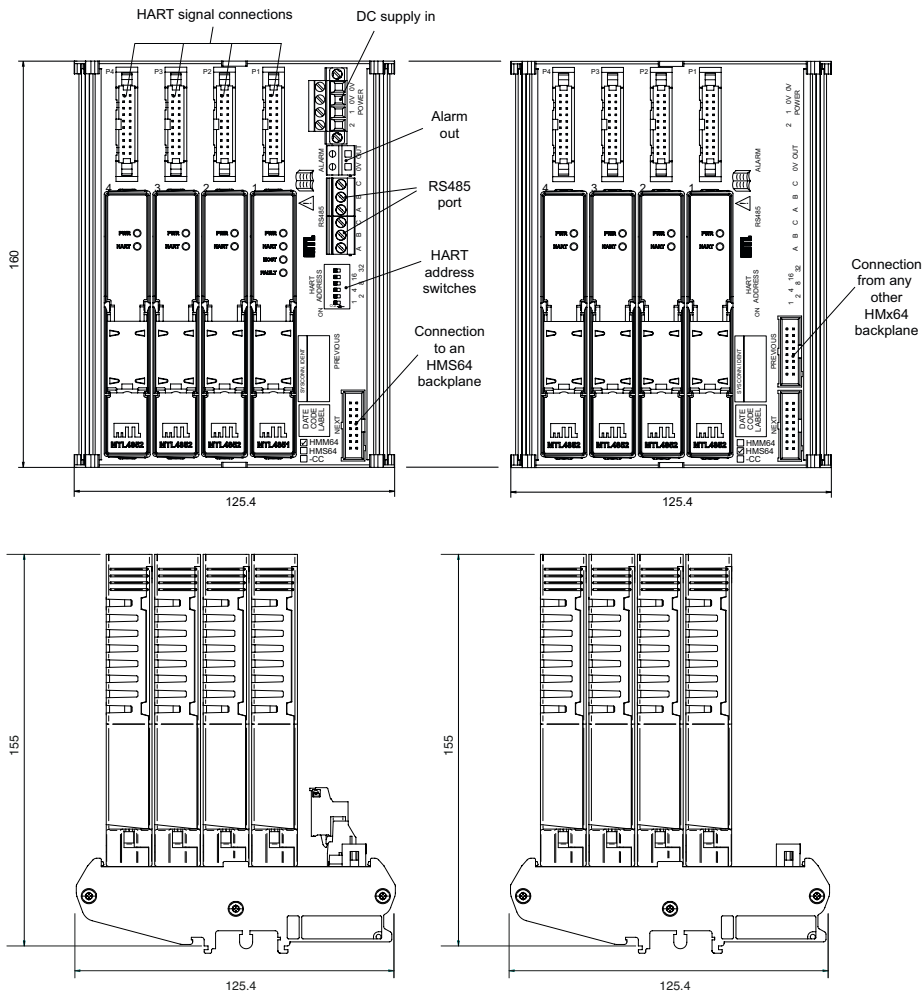
BACKPLANES FOR MTL4851/MTL4852
GENERAL PURPOSE VERSIONS



HMM64 **HMS64**

HMM64/HMS64 BACKPLANE

Capacity

HMM64 1xMTL4851, 3xMTL4852
HMS64 4xMTL4852
Max. 3xHMS64 connected to 1xHMM64

Maximum power requirements

1.9W for fully equipped HMM64, plus
3 HMS64 backplanes.

HART interface connectors

4xDIN41651 20-way HART signal cables
(16 HART signal connections + 4 common returns)
For use with HM64RIB20 cables

Backplane inter-connect

HMM64 1x DIN41651 16-way socket
HMS64 2x DIN41651 16-way socket
For use with HM64RIB16 cables

Weight (excl. modules)

215g approx.

Power requirements, Vs

21 to 35V dc through plug-in connectors, screw-secured
4 terminals for dual power supplies

RS485 port

2 terminals for bus, plus screen terminal
6 terminals in total to enable chained bus connection.
HART address switch, five poles active in six position switch

Alarm connectors

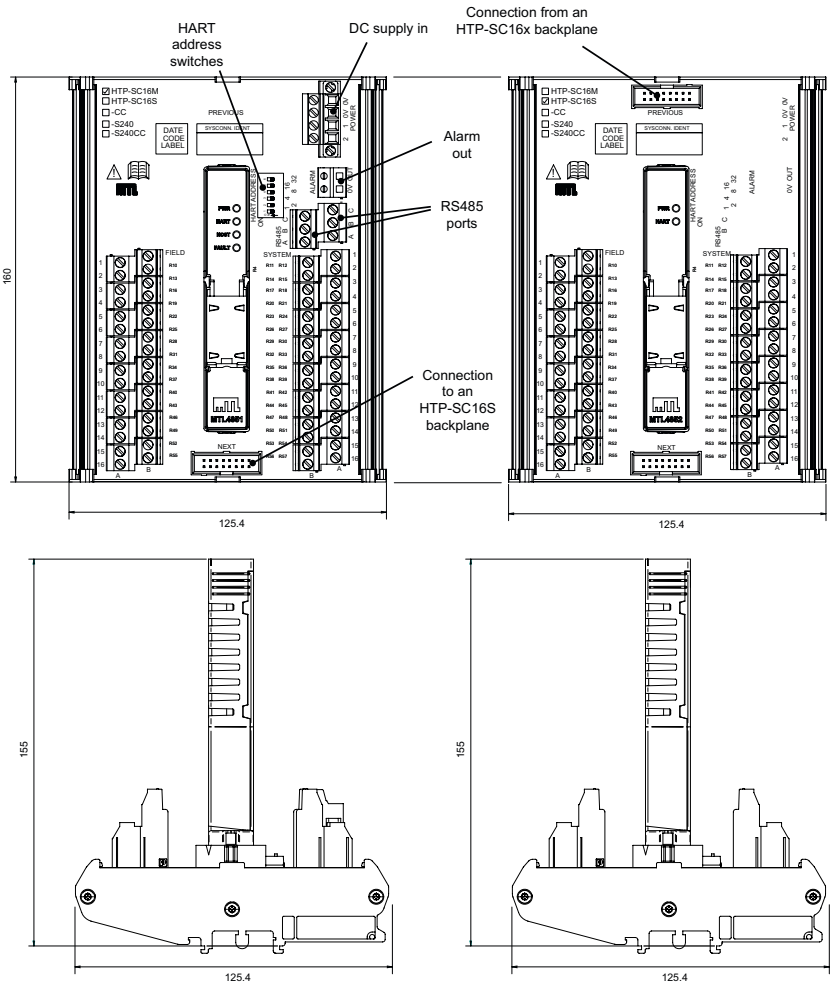
2 terminals for alarm output and alarm clear

Conductor terminals

Accept conductors of up to 2.5mm^2 stranded or single-core

EPS MTL4851_52 Rev1 211014

BACKPLANES FOR MTL4851/MTL4852
GENERAL PURPOSE VERSIONS



HTP-SC16M **HTP-SC16S**

HTP-SC16M/HTP-SC16S BACKPLANE *

Capacity

HTP-SC16M 1xMTL4851
HTP-SC16S 1xMTL4852
Max. 4xHTP-SC16S connected to 1xHTP-SC16M

Maximum power requirements

1.3W for HTP-SC16M, plus
4 HTP-SC16S backplanes.

Signal connectors

2.5mm^2 screw-clamp terminals
2 terminals per channel for field and system

Backplane inter-connect

HTP-SC16M 1x DIN41651 16-way socket
HTP-SC16S 2x DIN41651 16-way socket
For use with HM64RIB16 cables

Weight (excl. modules)

300g approx.

Power requirements, Vs

21 to 35V dc through plug-in connectors, screw-secured
4 terminals for dual power supplies

RS485 port

2 terminals for bus, plus screen terminal
6 terminals in total to enable chained bus connection.
HART address switch, five poles active in six position switch

Alarm connectors

2 terminals for alarm output and alarm clear

Conductor terminals

Accept conductors of up to 2.5mm^2 stranded or single-core

** for further details of the model options refer to the Instruction Manual INM4851 - available from the MTL website.*

BACKPLANES FOR MTL4851/MTL4852 GENERAL PURPOSE VERSIONS

HCU16 HART CONNECTION UNIT*

Accuracy (HCU16-P250 only)

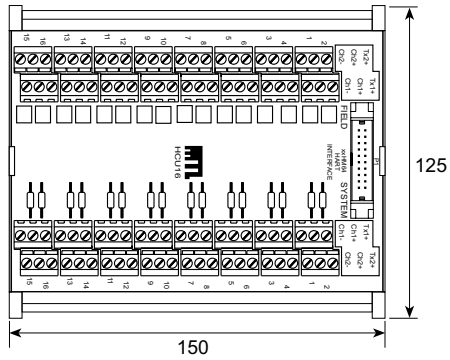
250Ω ±0.05%

Connectors

2.5mm² screw-clamp terminals
3 terminals per channel
20-way HART signal cable (to HMM64/HMS64)

Weight

383g approx.



HCU16

HCU16AO CONNECTION UNIT WITH FILTERS

Series impedance

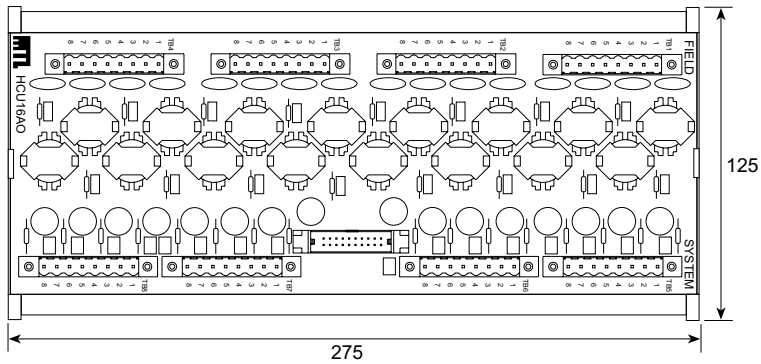
dc < 2Ω
HART signal > 240Ω

Connectors

2.5mm² removable, screw-clamp terminals
2 terminals per channel in groups of 4 channels
20-way HART signal cable (to HMM64/HMS64)

Weight

768g approx.



HCU16AO

COMMON SPECIFICATION HCU16 & HCU16AO

Capacity

16 channels

Isolation

Channel-to-channel 50V dc

Mounting

Supplied fitted in DIN-rail (T- or G- section) carrier

** for further details of the model options refer to the Instruction Manual INM4851 - available from the MTL website.*

CUSTOMISED CONNECTION UNITS

MTL offers a range of general purpose and IS interfaces providing direct connection with control system I/O cables as well as HART® connectivity. For general purpose signals, a number of custom HART® interface termination units are available for most DCS and PLC I/O cards. These replace the existing DCS termination units, saving space and allowing easy upgrading.

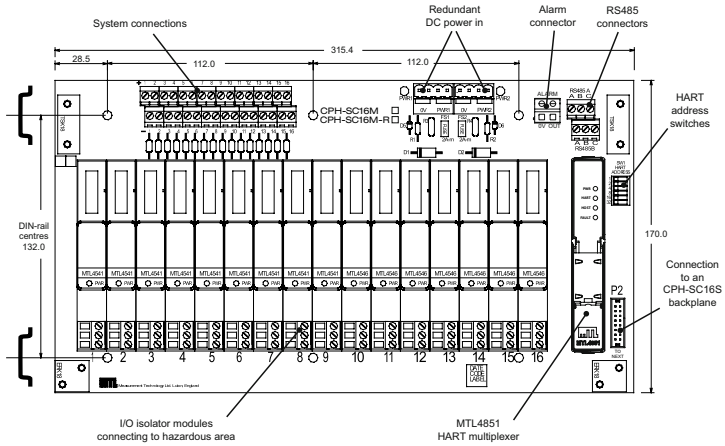
Typical system examples are:

Emerson	DeltaV and DeltaV SIS systems
HIMA	HiMax
Honeywell	Experion C300, Safety Manager, Process Manager I/O systems
Invensys	Foxboro FBM systems, Triconex Tricon & Trident systems
Siemens	ET200M
Yokogawa	Centum R3, Prosafe RS systems

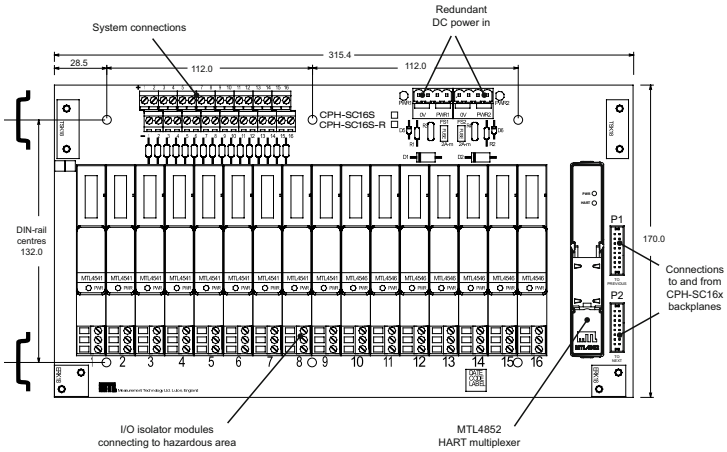
Contact MTL with details of your specific requirements.

BACKPLANES FOR MTL4851/MTL4852 INTRINSIC SAFETY VERSIONS

CPH-SC16M



CPH-SC16S



CPH-SC16M/CPH-SC16S BACKPLANES

Capacity

CPH-SC16M 1xMTL4851
CPH-SC16S 1xMTL4852
16 x MTL4541/A/S/AS, MTL4546/Y isolators
Max. 4xCPH-SC16S connected to 1xCPH-SC16M

Power requirements, Vs

21 to 35V dc through plug-in connectors,
2 x 4 terminals for dual power supplies and power chain
Dual 2.5A medium blow TE5 fuses

Maximum power requirements

CPH-SC16M 0.65A

CPH-SC16S 0.6A

Safe-area signal connectors

2.5mm2 screw-clamp terminals
2 terminals per channel for system connections

Backplane inter-connect

CPH-SC16M 1x DIN41651 16-way socket
CPH-SC16S 2x DIN41651 16-way socket
For use with HM64RIB16 cables

RS485 port

2 terminals for bus, plus screen terminal
6 terminals in total to enable chained bus connection.
HART address switch, five poles active in six position switch

Alarm connectors

2 terminals for alarm output and alarm clear

Accuracy

CPH-SC16xR: 250 Ω ±0.05% conditioning resistors
(note: MTL4541/41A only)

Weight (excl. modules and accessories)

410g approx.

** for further details of the model options refer to the Instruction Manual INM4851 - available from the MTL website.*

ORDERING INFORMATION

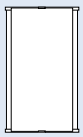
HART multiplexer

MTL4851	HART multiplexer primary module
MTL4852	HART multiplexer secondary module

Multiplexer accessories

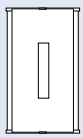
TH5000	Tag holder (Pack of 20)
ET-485	Serial RS485 to Ethernet converter

General purpose connection units



HMM64	64ch HART backplane for 1xMTL4851 & 3xMTL4852
HMS64	64ch HART backplane for 4xMTL4852
HCU16 †	HART connection unit, 16ch
HCU16-P250 †	HART connection unit, 16ch
HCU16-S150 †	HART connection unit, 16ch
HCU16-S200 †	HART connection unit, 16ch
HCU16AO	HART connection unit, 16ch o/p (With HART filters)

Integrated connection units

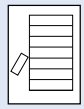


HTP-SC16M	Integrated HART connection unit, primary, 16ch
HTP-SC16M-S240	Integrated HART connection unit, 16ch, 240Ω series resistor
HTP-SC16S	Integrated HART connection unit, secondary, 16ch
HTP-SC16S-S240	Integrated HART connection unit, 16ch, 240Ω series resistor

HART Backplane accessories

RIB-CLIP16	Retaining clip for ribbon cable connector (pack of 10)
HM64RIB20-xx	20-way HART signal cable xx = 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 4.5, 6.0 (metres)
HM64RIB16-xx	16-way backplane linking cable xx = 0.5, 1.0, 2.0 (metres)

† See Notes



MTL4500 Series backplanes

CPH-SC16M	16ch backplane, primary
CPH-SC16MR	16ch backplane, (250Ω conditioning resistor)
CPH-SC16S	16ch backplane, secondary
CPH-SC16SR	16ch backplane, (250Ω conditioning resistor)

Backplane accessories for MTL4500 Series

DMK01	DIN-rail mounting kit, T- or G-section (pack of 40)
SMS01	Surface mounting kit (pack of 40) 16-way backplanes require 6
ERK18	Earth rail kit
TSK18	Tagging strip kit
FUS2.5ATE5	Fuse kit, pack of 10, 2.5A

Literature

INM4851	MTL4851 Instruction manual
INA485x	ATEX safety instructions

Notes:

no suffix	No parallel resistor, 0Ω link in series - for use with current inputs with 250Ω input impedance or HART compatible outputs
-P250	250Ω parallel resistor, 0Ω link in series - for use with 1-5V system inputs
-S150	150Ω series link, no parallel resistor - for use with current inputs with 100Ω input conditioning
-S200	200Ω series link, no parallel resistor - for use with current inputs with 50Ω or 63.5Ω input conditioning
-S240	240Ω series link, no parallel resistor - for use with isolators connected to field terminals.

Zener Barriers

Our range of shunt-diode safety barriers are the simplest type of IS interface for protecting electrical circuits in hazardous areas. The compact and inexpensive units are mounted and earthed in one operation, ensuring the safest possible installation with ultra-high reliability.

The MTL7700 Series has an impressive pedigree and the user will benefit from the exceptional application knowledge that MTL has developed in this field.

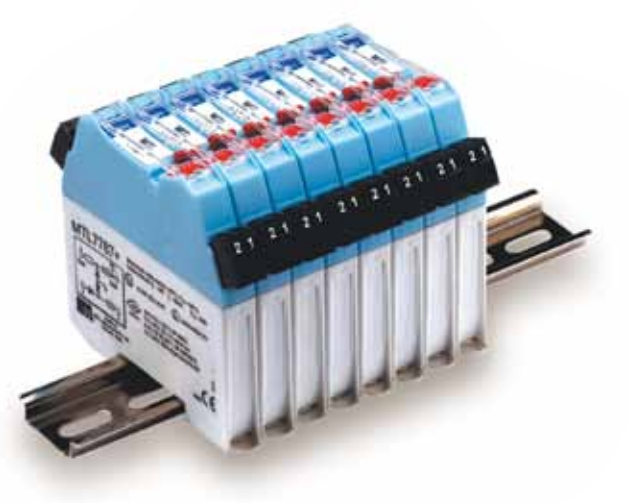
Note that the well known MTL700 Series of busbar mounted safety barriers continues to be available. For details and specification sheets please visit our web site at www.mtl-inst.com

Intrinsic Safety Zener Barriers from MTL, a simple yet highly flexible form of IS safety interface, compact and inexpensive

MTL7700 Series

DIN-rail mounting safety barriers

- **Removable terminals**
- **Bussed power feed to other modules**
- **Relay and solid state switch modules**
- **Dual channel variants – 6.3mm per channel**
- **Proximity detector inputs**
- **Electronic fusing**
- **Direct replacement for MTL700 Series barriers**
- **Compatible terminal numbering and safety descriptions**



Since its introduction in 1984 the MTL700 Series barrier has established itself as the worldwide standard for safety barriers. Known for its quality and reliability, the MTL700 Series is widely used in applications all over the world.

The MTL7700 Series follows closely in the footsteps of the MTL700, but as a DIN rail mounting barrier, providing quick and easy installation without the need for special hardware.

Removable terminals are used for ease of installation, maintenance and for providing a loop disconnect by simply unplugging the terminals from the side of the module. Wire entry is also angled to assist wiring within limited space enclosures.

MTL7700 barriers clamp simply and securely onto standard T-section DIN rail, simultaneously making a reliable IS earth connection.

For applications where field power is required for switch inputs or 2-wire transmitters, the MTL7700 Series provides a bussed power feed facility. When used in conjunction with the MTL7798 power feed module the user has a fully protected, electronically fused supply to many barriers with no additional wiring required.

MTL7700 active modules are protected with an electronic fuse for the majority of applications. The MTL7798 active fused, power feed module can protect up to 40 other modules using the bussed power facility and provides a clear indication of a trip condition via a red LED.

The MTL774X range of barriers offer a NAMUR compatible input and a choice of relay or solid state output. The solid state outputs are floating so switching to ground or from a power rail into an input is also possible. The solid state interface also provides a high frequency transfer for use in flow or rotation applications.

Dual channel relay or solid state modules offer the highest packing density with only 6.3mm per channel and when used in conjunction with the power bus, offer users the minimum of wiring with the maximum packing density and the lowest cost per channel.

SPECIFICATIONS
'Key' barriers shown in blue

For notes 1 to 7 see 'Terminology' (later in this section)

Model No.	Safety description [1]			Polarities available [2]			Application	Basic circuit	Max. end-to-end resistance [3]	Vwkg at [4] 10µA or (1µA)	Vmax [5]	Fuse [6] rating
MTL	V	Ω	mA	+	–	ac		Hazardous Safe	Ω	V	V	mA
7706+	28	300	93	✓			Transmitters	See 'HOW THEY WORK' and 'ACTIVE / ELECTRONICALLY PROTECTED BARRIERS'	See additional specification		35	50
7707+	28	300	93	✓			Switches				35	50
	28	diode									35	50
7707P+	28	164	171	✓			Transmitters, switches, controller outputs IIB				35	50
	28	diode	–								35	50
7710+	10	50	200	✓			6V dc & 4V ac systems		75	6.0	7.0	50
7715+	15	100	150	✓			12V systems		119	12.0	13.1	100
7715P+	15	50	291	✓			12V dc systems		64	12.6	13.7	100
7722+	22	150	147	✓			18V dc systems		174	19.6	20.2	50
7728+	28	300	93	✓			Controller outputs, solenoids		333	25.9	26.5	50
7728-	28	300	93		✓		Transmitters		333	25.9	26.5	50
7728ac	28	300	93			✓	Controller outputs, solenoid valves		333	25.0	25.9	50
7728P+	28	234	119	✓			Controller outputs, solenoid valves IIB		252	24.9	25.9	100
7729P+	28	164	170	✓					184	24.9	25.9	100
774X	10	—	19				Prox sw input, solid state output and line fault detect	See 'ACTIVE / ELECTRONICALLY PROTECTED BARRIERS'	—	—	30/35	50
7755ac	3	10	300			✓	2- or 3- Wire RTDs (floating bridge)		19.0	(1)	3.4	250
	3	10	300			✓			19.0	(1)	3.4	250
7756ac	3	10	300			✓	3- Wire RTDs (grounded bridge)		19.0	(0.7)	2.7	250
	3	10	300			✓			19.0	(0.7)	2.7	250
	3	10	300			✓			19.0	(0.7)	2.7	250
7758+/-	7.5	10	750	✓	✓		Gas detectors		17	6.0	7.3	200
	7.5	10	750						17	6.0	7.3	200
7761ac	9	90	100			✓			107	6.0	7.0	100
	9	90	100						107	6.0	7.0	100
7761Pac	9	350	26			✓	Strain-gauge bridges		378	6.8	7.5	50
	9	350	26						378	6.8	7.5	50
7764+/ac	12	1k	12	✓		✓	Strain-gauge bridges		1050	10.0	10.9	50
	12	1k	12						1050	10.0	10.9	50
7766ac	12	150	80			✓			174	10.0	10.6	50
	12	150	80						174	10.0	10.6	50
7766Pac	12	75	157			✓	Strain-gauge bridges		92	9.6	10.5	100
	12	75	157				Strain-gauge bridges		92	9.6	10.5	100
7767+	15	100	150	✓			12V dc systems		119	12.0	13.1	100
	15	100	150				12V dc systems		119	12.0	13.1	100
7779+	28	300	93	✓			Controller outputs	requires channels separate in IIC	333	25.9	26.5	50
	28	300	93				Controller outputs		333	25.9	26.5	50
7796+	26	300	87	✓			Vibration probes		333	23.9	24.5	50
	20	390	51						428	18.3	18.9	50
7796-	26	300	87		✓		Vibration probes		333	23.9	24.5	50
	20	390	51						428	18.3	18.9	50
7760ac	10	50	200			✓	Active dc & ac sensors Thermocouples		75	6.0	6.7	50
	10	50	200						75	6.0	6.7	50
7765ac	15	100	150			✓			124	12.0	12.5	50
	15	100	150						124	12.0	12.5	50
7778ac	28	600	47			✓			651	24.0	25.4	50
	28	600	47						651	24.0	25.4	50
7789+	28	300	93[a]	✓			Switch inputs / Signal returns		651	26.6	27.2	50
									651	26.6	27.2	50
	28	diode	—						0.9V+26Ω	26.6	27.2	50
	28	diode	—						0.9V+26Ω	26.6	27.2	50
7787+/-	28	300	93	✓	✓		Transmitters Controller outputs, switches		333	26.6	27.2	50
	28	diode	—						0.9V+21Ω	26.6	27.2	50
7787P+	28	234	119	✓					253	26.4	27.2	80
	28	diode	—						0.9V+21Ω	26.4	27.2	80
7788+	28	300	93	✓			Transmitters		333	25.9	26.5	50
	10	50	200	✓					75	6.0	7.0	50
7788R+	28	300	93	✓					333	25.9	26.5	50
	10	50	200	✓					75	6.0	7.0	50

[a] Terminals 3 & 7 connected together

* Diagrams show positive versions. All diodes reversed on negative versions. Additional diodes fitted on ac versions.

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HOW THEY WORK

All MTL7700 Series barriers are based on the same simple principle. Each channel contains two stages of pulse-tested Zener or forward-connected diodes and an 'infallible' terminating resistor. In the event of an electrical fault in the safe area, the diodes limit the voltage that can reach the hazardous area and the resistor limits the current. A fuse protects the diodes, and the two stages of voltage limitation ensure continued safety if either stage should fail. No active output-current limiting circuits are employed. All models are certified 'ia' for all zones and 'IIC' for all explosive atmospheres (except MTL7707P+ and MTL7729P+, 'ia' 'IIB').

TERMINOLOGY

1. Safety description

The safety description of a barrier, eg '10V 50Ω 200mA', refers to the maximum voltage of the terminating Zener or forward diode while the fuse is blowing, the minimum value of the terminating resistor, and the corresponding maximum short-circuit current. It is an indication of the fault energy that can be developed in the hazardous area, and not of the working voltage or end-to-end resistance.

2. Polarity

Barriers may be polarised + or –, or non-polarised ('ac'). Polarised barriers accept and/or deliver safe-area voltages of the specified polarity only. Non-polarised barriers support voltages of either polarity applied at either end.

3. End-to-end resistance

The resistance between the two ends of a barrier channel at 20°C, i.e. of the resistors and the fuse. If diodes or transistors are present, their voltage drop (transistors ON) is quoted in addition.

4. Working voltage (Vwkg)

The greatest steady voltage, of appropriate polarity, that can be applied between the safe-area terminal of a 'basic' barrier channel and earth at 20°C for the specified leakage current, with the hazardous-area terminal open circuit.

5. Maximum voltage (Vmax)

The greatest steady voltage, of appropriate polarity, that can be applied continuously between the safe-area terminal of any barrier channel and earth at 20°C without blowing the fuse. For 'basic' barriers, it is specified with the hazardous-area terminal open circuit; if current is drawn in the hazardous area, the maximum voltage for these barriers is reduced. The 'ac' channels of 'basic' barriers and most channels of overvolt-protected barriers withstand voltages of the opposite polarity also – see circuit diagrams.

6. Fuse rating

The greatest current that can be passed continuously (for 1000 hours at 35°C) through the fuse.

7. Star connection

In star-connected barriers, the two channels are interlocked such that the voltage between them cannot exceed the working voltage, Vwkg: this allows for higher cable capacitance or inductance.

8. Maximum safe-area voltage (U_m)

The maximum permissible safe-area voltage (U_m) for MTL7700 Series barriers is 250V ac/dc.

GENERAL SPECIFICATION

Ambient temperature and humidity limits

–20 to +60°C continuous working
–40 to +80°C storage
5–95% RH

Leakage current

For 'basic' barriers with a working voltage of 5V or more, the leakage current decreases by at least one decade per volt reduction in applied voltage below the working voltage, over two decades. For the MTL7755ac/7756ac it decreases by at least one decade for a 0.4V reduction in applied voltage.

Terminations

Removable terminals accommodate conductors up to 2.5mm² (13AWG). Hazardous-area terminals are identified by blue labels. Removal force >15N

Colour coding of barrier label

Grey: non-polarised
Red: positive polarity (MTL7706 negative to transmitter)
Black: negative polarity
White: dummy barrier, MTL7799

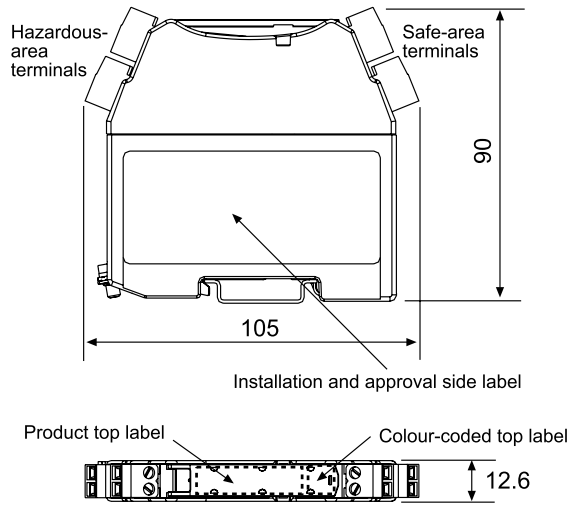
Weight

140g approx

Mounting and earthing

By 35mm Top Hat DIN rail

DIMENSIONS (mm)



MTL7700 SERIES KEY BARRIERS SUMMARISED

TYPE	APPLICATION	KEY BARRIER
Analogue input (low-level)	Resistance temperature detectors Thermocouples, ac sensors	7756ac 7760ac
Analogue input (high-level)	Transmitters, 2-wire, 4/20mA	7706+ 7787+
Analogue output	Controller outputs, one line earthed Controller outputs, neither line earthed	7728+ 7787+
Digital (on/off) input	Switches	7787+ 7741/3
Digital (on/off) output	Solenoids, alarms, LEDs	7728

ACTIVE / ELECTRONICALLY PROTECTED BARRIERS

ACTIVE / ELECTRONICALLY PROTECTED BARRIERS

The following barriers have built-in overvolt protection, allowing their use with unregulated power supplies. In many applications, eg, sensor inputs or controller outputs, there is insufficient power available to blow the barrier fuse and this additional protection is not necessary. However, where the barrier is connected to a power supply, eg, for energising transmitters, switches, solenoids or local alarms, overvolt protection allows the barriers to be used with unregulated supplies and also gives protection against faulty wiring during commissioning.

MTL7706+ for 'smart' 2-wire 4/20mA transmitters

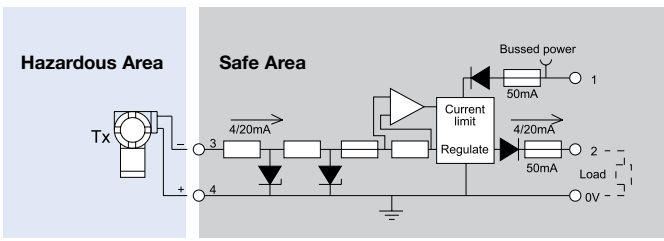
The MTL7706+ is a 1-channel shunt-diode safety barrier, with built-in electronic overvolt protection, for energising a 2-wire, 4/20mA transmitter in a hazardous area. It is powered from a positive supply of 20–35V dc and delivers a 4/20mA signal into an earthed load in the safe area. It is proof against short circuits in the field and in the safe area and is extremely accurate. The MTL7706+ will pass incoming communication signals up to 10kHz from a 'smart' transmitter, while in the outgoing direction it will pass signals of any frequency likely to be encountered.

Since the MTL7706+ has no return channel for energising the load, the entire output of the single '28V' channel is available to power the transmitter, providing high output capability. This channel is negatively polarised, and the safe-area signal is in fact the very current that returns through it from the hazardous area, the novel circuit being energised by a built-in floating dc supply derived from the external dc source of power.

To prevent any leakage through the zener diodes and maximise the output voltage available at 20mA, the floating supply is given a rising voltage/current characteristic. A separate circuit limits the current to protect the fuse in the event of a short circuit in the hazardous area.

With a 20V supply, the barrier will deliver 16.2V minimum at 20mA for the transmitter and lines and consumes typically 45mA at 24V operation.

BASIC CIRCUIT



ADDITIONAL SPECIFICATION

Safety description
28V 300Ω 93mA
Supply voltage
20 to 35V dc w.r.t earth
Output current
4 to 20 mA
Voltage available to transmitter and lines
16.2V @ 20mA with 250Ω load (negative w.r.t. earth)
11.0V @ 20mA with 500Ω load (negative w.r.t. earth)
Accuracy
±2µA under all conditions
Safe-area load resistance
0 to 500Ω
Supply current
45mA typical at 20mA and 24V supply
60mA maximum at 20mA and 20V supply

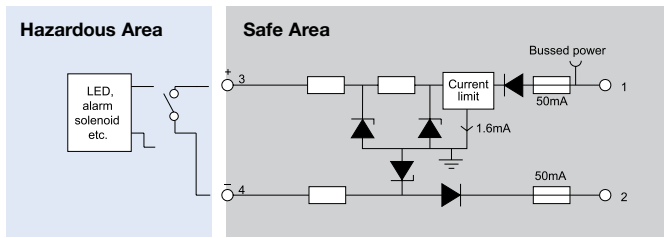
MTL7707+ for switch inputs and switched outputs

The MTL7707+ is a 2-channel shunt-diode safety barrier similar to the MTL7787+ but with built-in electronic overvolt protection. It is intended primarily for safeguarding a hazardous-area switch controlling a relay, opto-coupler or other safe-area load from an unregulated dc supply in the safe area.

The outgoing channel accepts supply voltages up to +35V and is protected against reverse voltages: the return channel is unaffected by voltages up to +250V.

In normal operation the protection circuit introduces only a small voltage drop and shunts less than 1mA to earth, so its overall effect is minimal. If the supply voltage exceeds about 27V, however, causing the Zener diodes to conduct – or if the safe-area load has a very low resistance – the supply current is limited automatically to 50mA, protecting the fuse and power supply and enabling the loop to continue working.

BASIC CIRCUIT



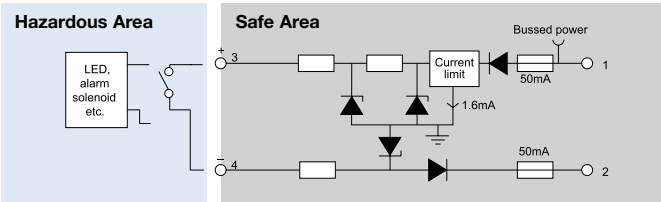
ADDITIONAL SPECIFICATION

Safety description
28V 300Ω 93mA, terminals 1 to 3
28V Diode, terminals 2 -4
Supply voltage
10 to 35V dc with respect to earth
Output current
Up to 35mA available
Maximum voltage drop
(at 20°C, current not limited)
Iout x 345Ω + 0.3V, terminals 1 to 3
Iout x 25Ω + 0.9V, terminals 4 to 2
Supply current
Iout + 1.6mA, supply <26V
Limited to 50mA, supply >28V or low load resistance

MTL7707P+ for switch inputs and switched outputs, 2W Transmitters (IIB gases)

The MTL7707P+ is a two-channel shunt-diode safety barrier similar to the MTL7787P+, but is designed for use with group IIB gases and features built-in electronic overvolt protection allowing use with unregulated power supplies up to 35V dc. It is intended primarily as a low cost solution for driving IIB certified 2-wire 4/20mA transmitters, but can also be used with controller outputs with current monitoring, solenoid valves and switches. To protect the fuse and enable the loop to continue working, the supply current is limited automatically at 50mA should the output be short-circuited or excess voltage applied.

BASIC CIRCUIT



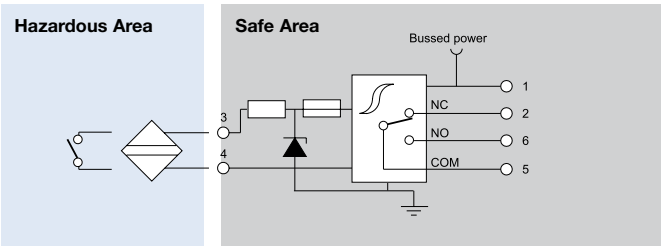
ADDITIONAL SPECIFICATION

Safety description
28V 164Ω 171mA, terminals 1 to 3
28V Diode, terminals 4 to 2
Supply voltage
10 to 35V dc with respect to earth
Output current
Up to 35mA available
Maximum voltage drop
(at 20°C, current not limited)
Iout x 218Ω + 0.3V, terminals 1 to 3
Iout x 20.1Ω + 0.9V, terminals 4 to 2
Supply current
Iout + 1.6mA, supply <26V
Limited to 50mA, supply >28V or low load resistance

MTL7741 proximity sensor or switch input and relay output

The MTL7741 is a single channel switch/prox input barrier with changeover relay contacts acting as the safe area interface. Relay contacts provide a universal interface capable of switching a wide range of signals including ac, low level and high level voltages. Phase reversal is achieved by connecting the normally open or normally closed contacts as required. The power bus terminal may be used to connect the module to a power source.

BASIC CIRCUIT



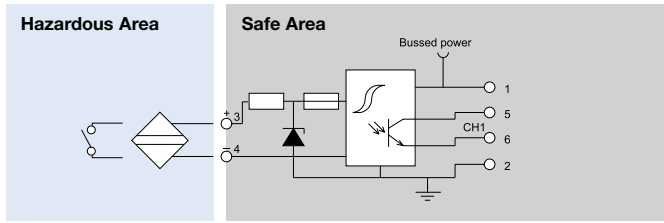
ADDITIONAL SPECIFICATION

Safety description
10V 19mA
Supply voltage
22.9 to 30V dc with respect to earth
Input characteristics
Relay energised if input >2.1mA(<2kΩ)
Relay de-energised if input <1.2mA(>10kΩ)
Relay Contacts
50V ac 0.5A. Resistive
30V dc, 1A. Resistive
Supply current
26mA maximum @ 24V
Response time
<10ms

MTL7742 proximity sensor or switch input with solid state output

The MTL7742 is a single channel switch/prox input barrier with an open collector solid state interface to the safe area equipment. The solid state switch is especially useful for high frequency switching apparatus including pulse and rotational sensors. The power bus terminal can be used to connect power to the module and the input power supply range makes the module suitable for use with unregulated supplies.

BASIC CIRCUIT



ADDITIONAL SPECIFICATION

Safety description
10V 19mA
Supply voltage
20 to 35V dc with respect to earth
Input characteristics
Output energised if input >2.1mA(<2kΩ)
Output de-energised if input <1.2mA(>10kΩ)
Output characteristics

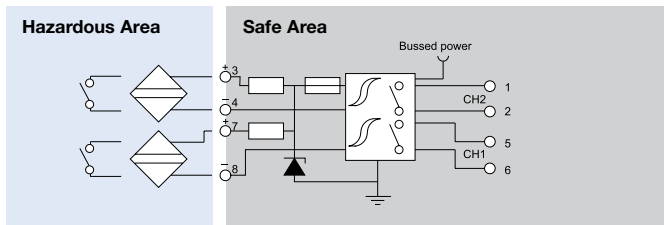
Operating frequency	dc to 2.5kHz
Max off-state voltage	35V
Max off-state leakage	10µA
Max on-state voltage drop	<1.41V @ 50mA, <1.22V @ 2mA typically <1V
Max on-state current	50mA

Supply current
20mA maximum @ 24V

MTL7743 2 channel proximity sensor or switch input and relay outputs

The MTL7743 is a dual channel switch/prox sensor input barrier with a relay interface. This module is ideal for applications where high channel packing densities are required for digital inputs. Power is connected using the power bus terminal.

BASIC CIRCUIT



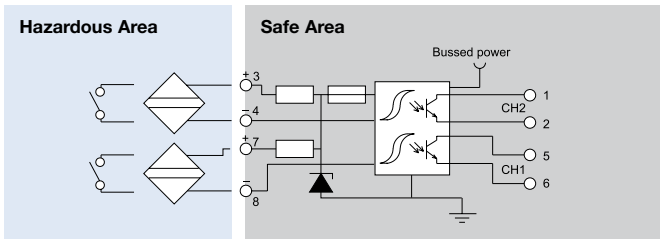
ADDITIONAL SPECIFICATION

Safety description
10V 19mA
Supply voltage
22.9 to 30V dc with respect to earth
Input characteristics
Relay energised if input >2.1mA(<2kΩ)
Relay de-energised if input <1.2mA(>10kΩ)
Relay Contacts
AC 50V, 0.5A. resistive; DC 30V, 1A. resistive
Supply current
45mA maximum @ 24V
Response time
<10ms

MTL7744 2 channel proximity sensor or switch inputs with solid state outputs

A dual channel version of the MTL7742. This module provides two solid state interfaces for prox/switch inputs. Power is connected via the power bus.

BASIC CIRCUIT



ADDITIONAL SPECIFICATION

Safety description
10V 19mA
10V 19mA
Supply voltage
20 to 35V dc with respect to earth
Input characteristics
Output energised if input >2.1mA(<2kΩ)
Output de-energised if input <1.2mA(>10k)
Output characteristics

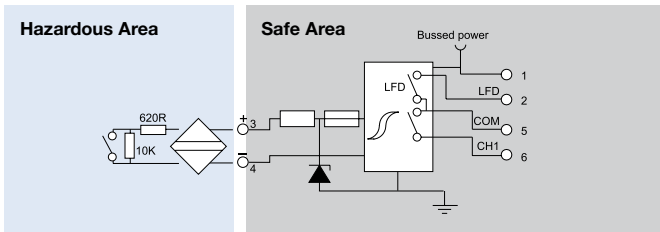
Operating frequency	dc to 2.5kHz
Max off-state voltage	35V
Max off-state leakage	10µA
Max on-state voltage drop	1.41V @ 50mA, 1.22V @ 2mA typically <1V
Max on-state current	50mA

Supply current
29mA maximum @ 24V

MTL7745 proximity sensor or switch input with relay output and line fault detect

The MTL7745 is a single channel switch/prox input barrier providing line fault detection. Proximity detectors or switches fitted with end-of-line resistors may be connected. Short circuit or open ciruit conditions in the field wiring will generate an alarm condition. The LFD relay contacts close when a fault is detected allowing the contacts to be connected in parallel to provide a common alarm. The power bus terminal can be used to connect power to this module.

BASIC CIRCUIT



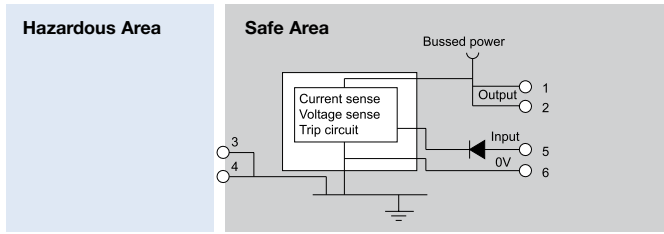
ADDITIONAL SPECIFICATION

Safety description
10V 19mA
Supply voltage
22.9 to 30V dc with respect to earth
Input characteristics
Output energised if input >2.1mA(<2kΩ)
Output de-energised if input <1.2mA(>10kΩ)
LFD relay + Red LED
Energised if input <50µA or <100Ω
Relay contacts
50V ac 0.5A. Resistive
30V dc, 1A. Resistive
Supply current
38mA maximum @ 24V
Response time
<10ms

MTL7798 Power feed and protection module

The MTL7798 power feed module incorporates both voltage and current sense mechanisms to protect barrier circuits by activating a solid state trip mechanism when fault or overload conditions occur in the power source circuit. Resetting the module after tripping is achieved by interupting the supply to the unit. A red LED indicates a circuit trip condition and a green LED the availability of power at the outputs. Bussed power for other modules is sourced from the top of the unit using the Bus Power Link BPL7700 or via terminals 1 and 2.

BASIC CIRCUIT



ADDITIONAL SPECIFICATION

Input voltage range (terminals 5&6)
20 to 26.8V
Maximum input voltage capability
45V
Power source requirements
>1.8A
Trip mechanism
Minimum trip 26.8V @ 20°C (+18mV/°C)
Output current range
0 to 800mA
Maximum voltage drop
20mV @ 0mA, 1.0V @ 800mA load

MTL7700 SERIES
BARRIER APPLICATIONS

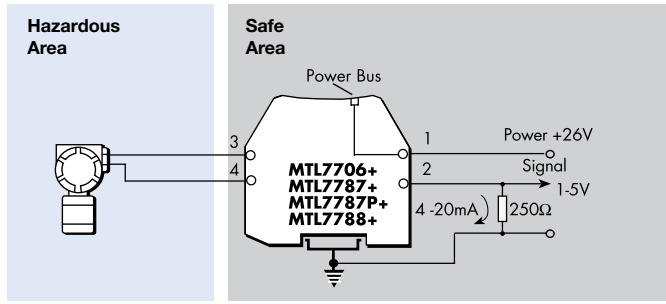
MTL7700 Series barriers protect devices located in all normally occurring explosive atmospheres, including air/flammable gas mixtures, dusts and fibres. Applications covered include the protection of installations incorporating uncertified devices ('simple apparatus') such as thermocouples, switches and resistive sensors, or separately certified 'energy storing' (or 'voltage producing') apparatus including ac sensors, transmitters and current-to-pneumatic (I/P) converters. Recommended choices for specific applications are discussed briefly in the following pages.

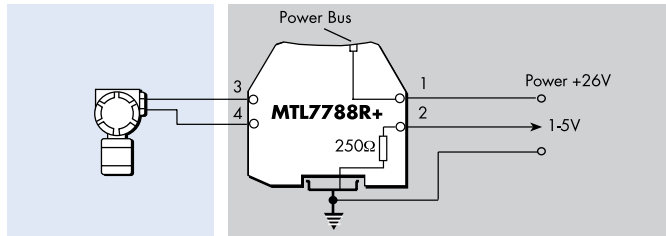
ANALOGUE INPUTS (HIGH LEVEL)

2-wire transmitters, 4/20mA, conventional and smart

The recommended barrier for use with 'conventional' and 'smart' 4/20mA transmitters (fed by a 26V regulated supply) is the MTL7787+. This provides up to 12.9V (14.6V for MTL7787P+) at Vwkg and 20mA for a transmitter and its lines as well as 5V for the typical 250Ω load. This application and this barrier is suitable for use with the optional power bus facility.

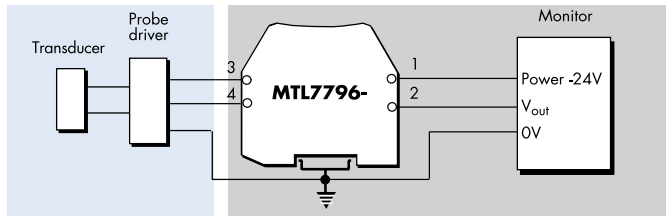
The MTL7706+ is recommended for applications where an unregulated supply of up to 35V is used. It provides 16.0V for conventional and Smart transmitters at 20mA, as well as 5V for a typical 250Ω load. With the MTL7706+ terminal 3 is negative with respect to earth, so the connections to terminals 3 and 4 should be reversed.





Vibration probes

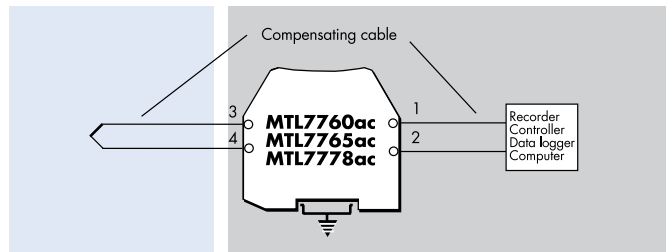
The 3-wire transmitters used with vibration monitoring equipment are invariably supplied by a –24V dc power supply – hence the recommended barrier choice is the negatively-polarised MTL7796–.



ANALOGUE INPUTS (LOW-LEVEL)

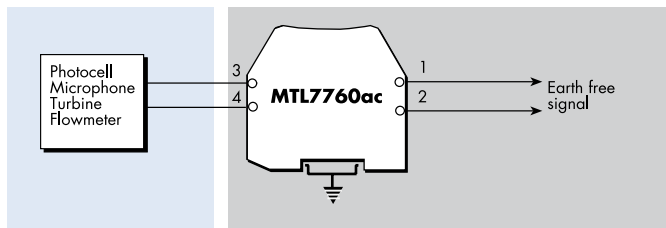
Thermocouples and mV sources

The recommended barrier for thermocouples and mV sources is the MTL7760ac. This 2-channel non-polarised barrier retains the 'earth-free' nature of the signal and, providing the receiver's input 'floats', rejects common-mode ac and dc interference up to at least 7V and is unaffected by earth faults on the primary element.



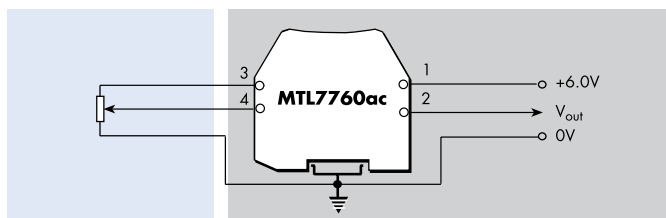
AC sensors, photocells, microphones and turbine flowmeters

The MTL7760ac is the recommended choice for these devices. While many of these are designated 'simple apparatus' and thus do not need certification, note that some ac sensors may be subject to a significant level of inductance and will therefore need to be designed and certified for hazardous-area locations.



Slidewire displacement transducers

The simplest choice is the MTL7760ac. This barrier supplies power and brings back a unipolar signal.



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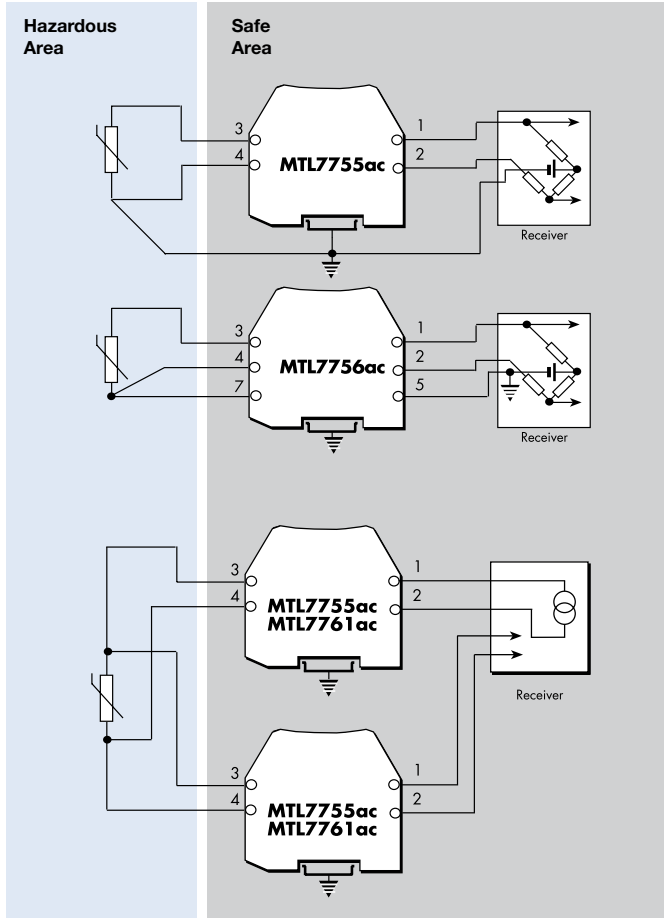
RTDs
For 3-wire RTDs, a single MTL7755ac barrier is the most economical choice. This is suitable for use with a floating bridge – the two leads from the bridge arms are protected by the barrier with the third (supply) lead being earthed through the barrier. The barrier has a low end-to-end resistance of only 19Ω/channel to minimise span changes and its channels track within 0.15Ω (between –20°C and +60°C) to minimise zero shift with temperature.

If the bridge circuit is already earthed, the third barrier channel provided by an MTL7756ac is needed. For extreme accuracy, 3 channels and an earth-free bridge can be used, a configuration that cancels out the small errors due to barrier leakage.

Channels 1 and 2 (those between terminals 1 & 2 and 3 & 4 respectively) track to within 0.15Ω (between –20°C and 60°C).

4-wire constant-current circuits do not need matched barrier resistances and can be protected by two MTL7761ac barriers. If the increase in loop resistance is too great, use two MTL7755ac barriers instead.

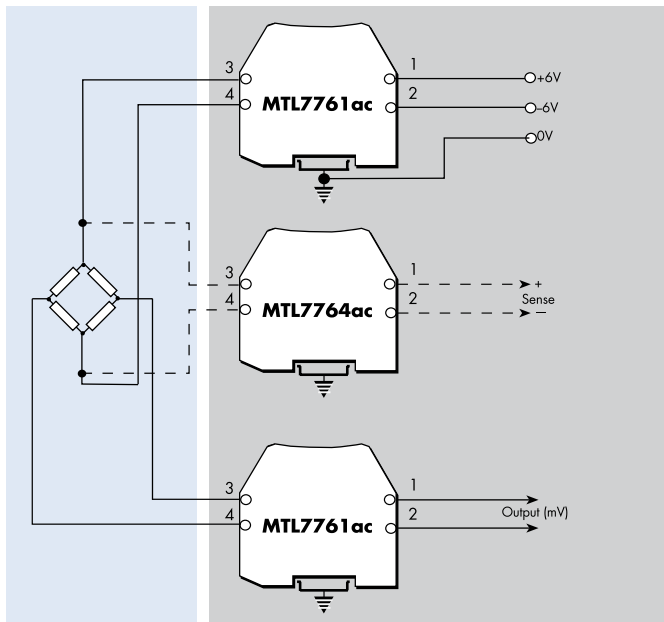


STRAIN-GAUGE BRIDGES

Single strain-gauge bridges
This shows an arrangement using two or three barriers, which is safe in IIC gases. With the MTL7761ac, the circuit is powered from a 12V (±6V), 214Ω (107Ω + 107Ω) source. If the resistive bridge elements are 230Ω, then the voltage applied to the bridge will be 6.2V, and if the bridge resistances are 350Ω, then the bridge's applied voltage will be 7.4V.

An MTL7764ac can be used to sense the bridge supply voltage.

An MTL7761ac is used here for the mV output.



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STRAIN-GAUGE BRIDGES (cont)

Double strain-gauge bridges

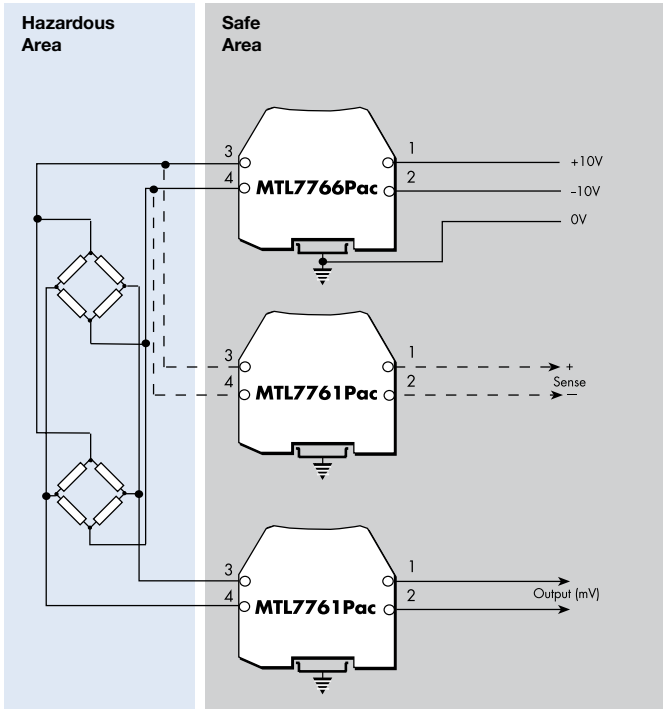
Quite frequently there is a demand to monitor two load cells, and a possible circuit, safe in IIC, is shown.

Here, the lower voltage drop of the MTL7766Pac is an advantage.

The MTL7766Pac supplies power to the bridge(s) while two MTL7761Pac barriers interface with the sense and pick-off circuits.

Using 350Ω bridge systems, the following voltages are available from an MTL7766Pac with a ±10V supply:

1 bridge:	13.11V
2 bridges:	9.75V



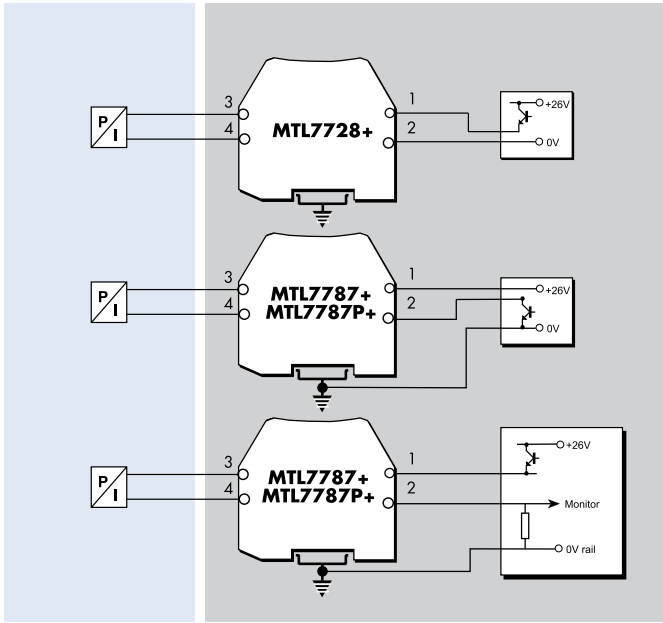
ANALOGUE OUTPUTS

Controller outputs (I/P converters)

The single-channel MTL7728+ with a voltage drop of 6.66V at 20mA is the recommended choice for most controller outputs. Higher-power versions are available: the MTL7728P+ (5.1V drop) is suitable for IIC applications; the MTL7729P+ (3.68V drop) for IIB applications.

For controllers with an output circuit separated from the 0V rail by the control transistor, the 2-channel MTL7787+ is the preferred choice as the return channel can handle up to 26.6V allowing the control signal to be turned off completely. The voltage drop is 8.1V at 20mA. A higher-power version of the latter, the MTL7787P+, is also available. The return channel of these barriers handle up to 26.4V and the maximum voltage drop is only 6.38V.

The MTL7787+ and MTL7787P+ are also suitable for controllers containing a resistor which enables the return current to be monitored for high-integrity operation.



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DIGITAL (ON/OFF) INPUTS

Switches

The normal choice is the MTL7787+/7787P+ with a regulated supply. The MTL774X modules are recommended for applications where an unregulated supply of up to 30V for relay output modules, or 35V for solid state output modules, is used.

The MTL7789+ offers a dual channel passive barrier for switch inputs where the input current for each channel is <10mA.

Switches / Proximity detectors

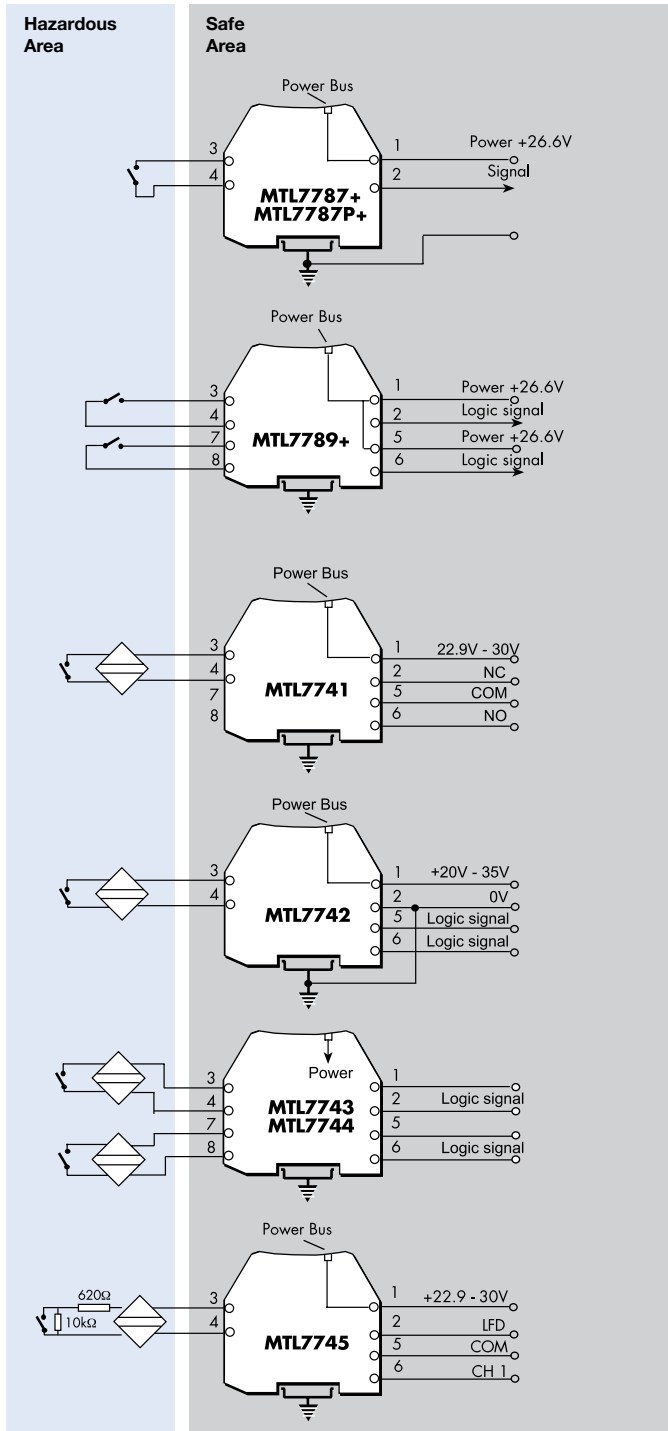
MTL's range of new switch/prox input barriers provide the user with a choice of relay and solid state outputs in single and dual channel versions.

The MTL7741 is single channel with a changeover relay output.

The MTL7742 has a single channel solid state switch that can be configured to switch from a power rail or down to ground. This is also ideal for high switching frequency applications.

The MTL7743 and MTL7744 are dual channel versions affording very high packing densities. Power must be provided to these modules using the power bus facility.

The MTL7745 is a single channel proximity input (or switch input if 'end of lines' resistors are fitted) with relay contacts providing switch and line fault status. The LFD relay contacts close when a fault is detected.



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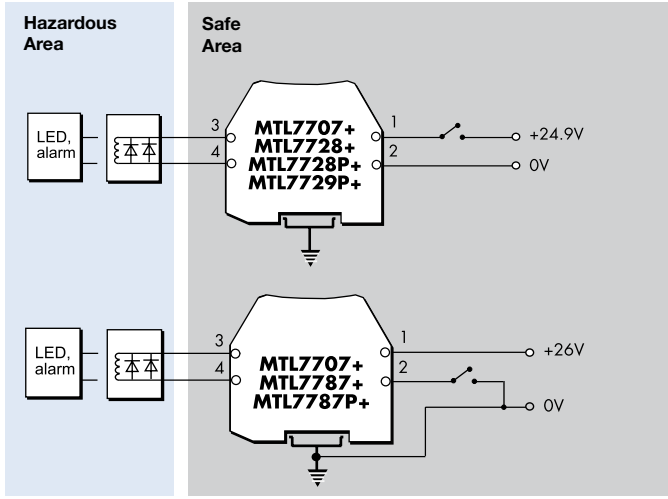
DIGITAL (ON/OFF) OUTPUTS

Alarms, LEDs, solenoids valves, etc
For these applications, the MTL7728+ is recommended. Higher-powered versions are available: the MTL7728P+ is suitable for IIC applications; the MTL7729P+ for IIB applications.

If the control switch is to earth, then the 2-channel MTL7787+ barrier should be used, or, alternatively, the MTL7787P+ higher-power version. If the supply is poorly regulated use the MTL7707+.

The MTL7707+ is recommended for applications where an unregulated supply of up to 35V is used.

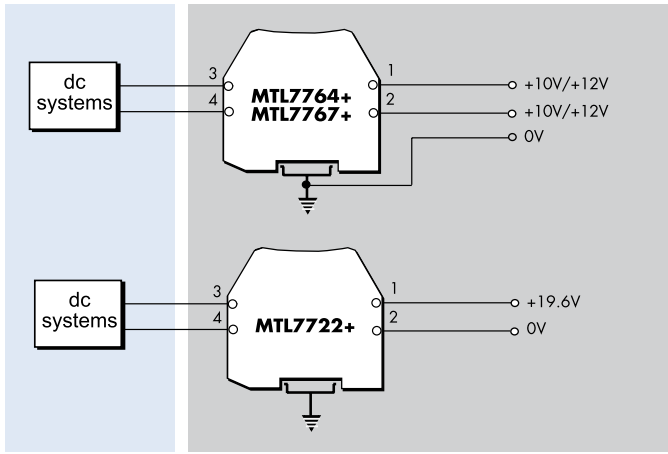


POSITIVE DC SYSTEMS

Low-level to 12V dc systems
The two channels of the MTL7764+ and MTL7767+ can be combined safely in IIC.

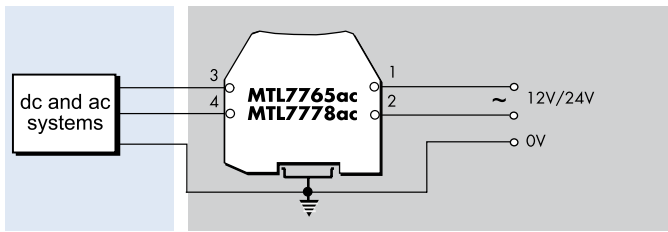
The MTL7764+ can be used for low-level logic return signals whilst the MTL7767+ is used for 6V dc and 12V dc systems.

18V dc systems
The single-channel MTL7722+ is recommended for 18V dc systems.



AC AND DC SYSTEMS

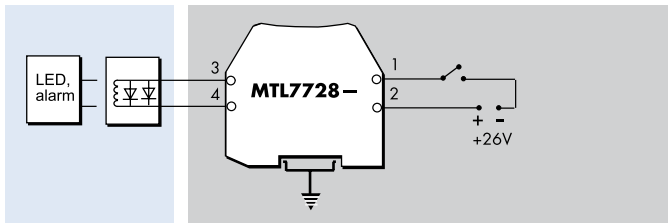
High-level ac and dc systems
The versatile star-connected MTL7765ac and MTL7778ac allow Vwkg to be developed from each channel to ground but only allow Vwkg to be developed between channels. This provides some common-mode voltage capability and can allow higher cable parameters to be used.



NEGATIVE AND FLOATING POWER SUPPLIES

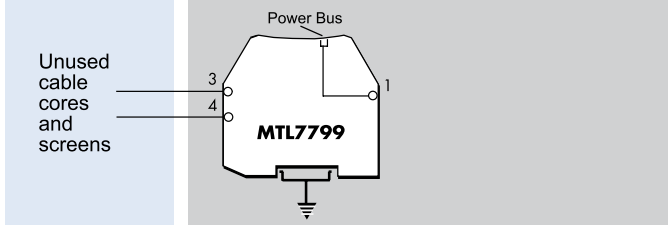
Digital (on/off) outputs
The MTL7728– is used with a negative power supply and positive earth. Typically used for digital inputs or outputs, as shown.

The MTL7728-- can also be used with floating power supplies, for transmitters.



SPARE CABLE CORES AND SCREENS

The MTL7799 dummy barrier is used primarily for securing and earthing unused cables and screen connections. Hazardous area terminals 3 and 4 are internally connected to the DIN-rail mounting/earth connection. It also provides a power bus connection for direct connection of power for modules such as the MTL7743 and MTL7744 where no power supply screw terminal is provided.



POWER BUS APPLICATIONS

The PB7700 power bus is invaluable for saving installation time and wiring when connecting a 24V dc power source to a number of barriers.

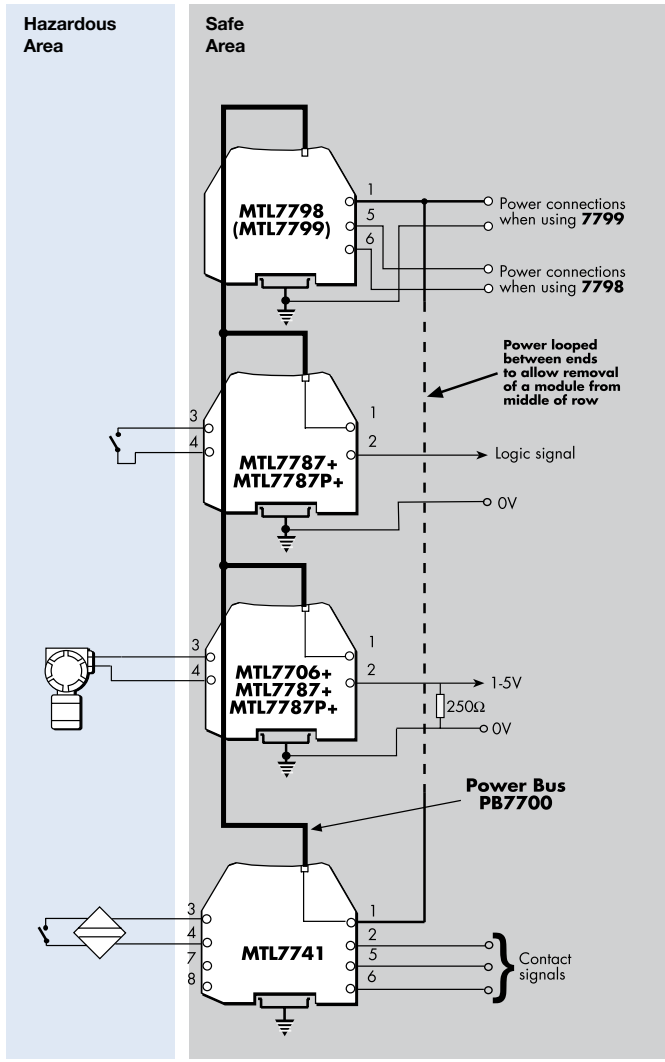
Typical applications include hazardous-area switches, 4/20mA transmitters and proximity detectors. The diagram illustrates the configuration for 4 barriers but up to 40 barriers can be served by this method.

The MTL7798 power feed module would normally be used with standard barriers such as MTL7787+ and MTL7787P+ because the current/voltage trip protection mechanism of the MTL7798 protects the fuses in the barriers.

The MTL7799 dummy barrier can be used instead of the MTL7798 for direct 'feed-through' connection of a 24V dc supply onto the power bus. Looping the power feed to each end of the bussed power allows the removal of individual barriers without loss of power to others in the chain.

Other units that can use the power bus facility:

- MTL7706
- MTL7707+
- MTL7707P+
- MTL7741
- MTL7742
- MTL7743
- MTL7744
- MTL7745
- MTL7787+
- MTL7787P+
- MTL7788+
- MTL7788R+
- MTL7789+



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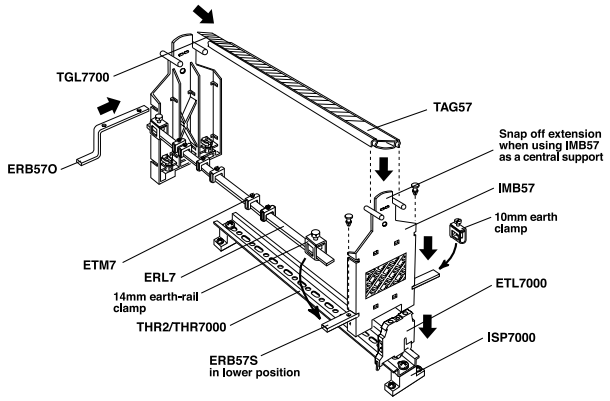
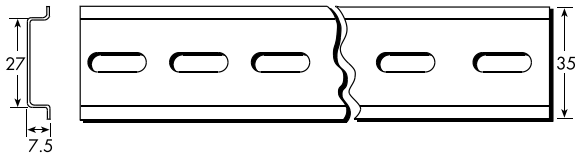
MTL7700 SERIES
ACCESSORIES



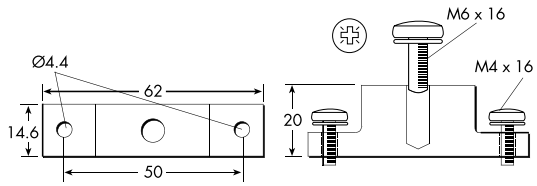
MOUNTING/EARTHING ACCESSORIES

MTL7700 Series barriers mount easily and quickly onto standard DIN rail which also acts as the intrinsically safe earth.

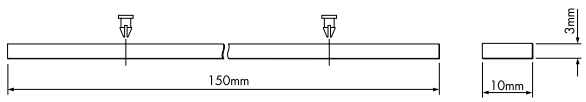
THR2 standard DIN rail
THR7000 plated rail
Specially nickel-plated T-section (35mm x 7.5mm) DIN rail for use in potentially corrosive atmospheres. Supplied in 1meter lengths.



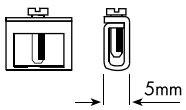
ISP7000 insulating spacers
Attached to the base of a DIN rail at either end or at intervals (depending upon DIN rail length) to isolate the IS earth from a structural earth.



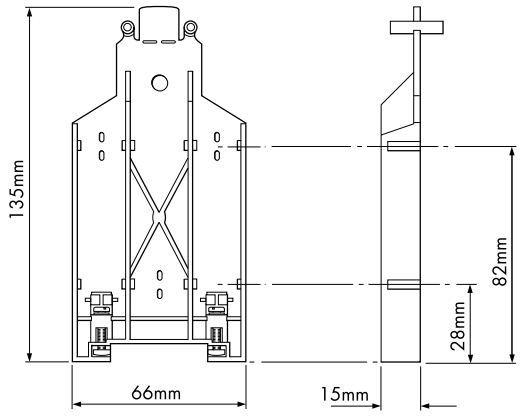
ERB57S Earth-rail bracket, straight
Nickel-plated; supplied with two push fasteners, one 14mm earth-rail clamp and one 10mm earth clamp for cables ≤16mm² (See ERB570).



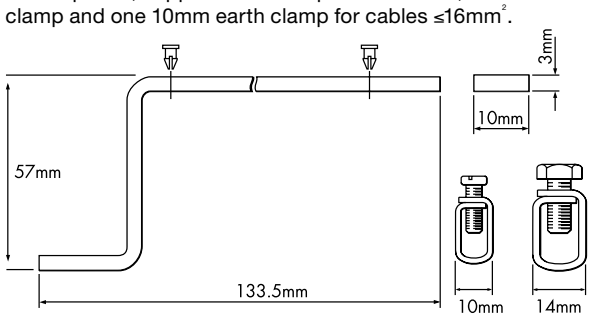
ETM7 earth terminal
For terminating cable screens and 0V earth returns and securing spare cores to the earth rail. A maximum of two ETM7s per barrier can be accommodated.



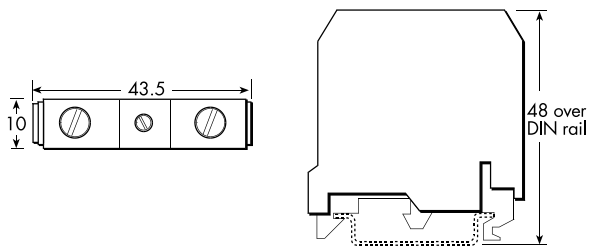
IMB57 Insulating mounting block
One required at each end of a tagging strip/earth rail. Suitable for low-profile (7.5mm) and high-profile (15mm) symmetrical DIN rail.



ERB57O Earth-rail bracket, offset
Nickel-plated; supplied with two push fasteners, one 14mm earth-rail clamp and one 10mm earth clamp for cables ≤16mm².



ETL7000 earth terminal
Provides connection for routing the IS earth from the DIN rail to an appropriate plant earth. Maximum cable cross-section is 10mm². Two recommended per discrete length of DIN rail. See instruction manual INM7700 for more details.



BPL7700 Power Bus link
When a number of barriers use a common power supply, the optional power link (BPL7700) can be used. Typical applications include hazardous area switches, solenoids and 4–20mA transmitters. The barriers it can be used with are the MTL7706, MTL7707+, MTL7787+, MTL7787P+, MTL7789P+ and MTL774X.

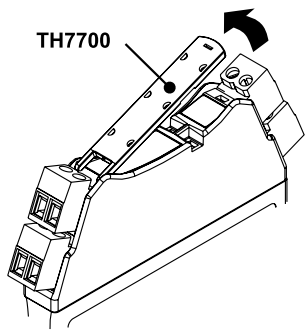
TAGGING ACCESSORIES

Two methods of tagging are available which can be used separately or together:

1) Individual barrier identification

TH7700 barrier identifiers

TH7700 barrier identifiers are supplied clipped on to the tops of individual barriers to provide transparent holders for identification labels.



2) Tagging strip method

TAG57 Tagging strip, 1m length

Cut to size. Supplied with reversible tagging strip label suitable for either MTL5000 or MTL7000 Series module spacing.

TGL7700 Tagging strip labels, set of 10 x 0.5m

For use with TAG57 tagging strip. Tags are reversible - one side for MTL7700, the other for MTL700.

HOW TO ORDER

MTL7700 barriers
Select by barrier number and polarity,
e.g. MTL7728+

Mounting accessories

THR2	Standard DIN-rail, 35 x 7.5mm
THR7000	T-section DIN-rail, specially-plated, 35 x 7.5mm, 1m length
ISP7000	Insulating spacer

Standard earthing/earth-rail accessories

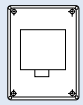
ETL7000	Earth terminal, DIN-rail mounted
IMB57	Insulating mounting block
ERB57S	Earth-rail bracket, straight
ERB57O	Earth-rail bracket, offset
ERL7	Earth rail, 1m length
ETM7	Earth terminal, pack of 50

Standard tagging accessories

TAG57	Tagging strip, 1m length
TGL7700	Tagging strip labels, set of 10 x 0.5m

Bussed power links

BPL7700	Pack of 100

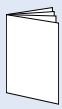


Enclosures

DX070	Enclosure, for MTL7700 x 5
DX170	Enclosure, for MTL7700 x 13
DX430	Enclosure, for MTL7700 x 33

Spares (all in packs of 10)

SAF7712	Safe-area terminals 1 & 2
HAZ7734	Hazardous area terminals 3 & 4
SAF7756	Safe-area terminals 5 & 6
HAZ7778	Hazardous area terminals 7 & 8
TH7700	Tag holder



INM7700	Instruction manual, MTL7700 Series
INA7700	ATEX information, MTL7700 Series
INM57ENC	Instruction manual, MTL5000/7000 Series Enclosures
CD7700...	Customer drawings

For the latest certificate information see
www.mtl-inst.com/resources/datasheets

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CORRELATION BETWEEN MTL7700 — MTL7000 — MTL700 BARRIERS (IIC)

Module No.	Bussed Power	MTL7000 Equivalent	MTL7000 Original Certificate Number(s)	MTL7000 ATEX Certificate Number(s)	MTL700 equivalent	MTL700 Original Certificate Number(s)	MTL700 ATEX Certificate Number(s)	Typical Application
MTL7710+	No	Half of MTL7162+	Ex95C2261	BAS99ATEX7285	MTL710+	Ex832452	BAS01ATEX7202	4/6V Systems
MTL7715+	No	N/A	N/A	N/A	MTL715+	Ex832452	BAS01ATEX7202	12V Systems
MTL7715P+	No	N/A	N/A	N/A	MTL715P+	Ex92C2373	BAS01ATEX7202	12V Systems
MTL7722+	No	MTL7122+	Ex95C2261	BAS99ATEX7285	MTL722+	Ex832452	BAS01ATEX7202	General Purpose
MTL7728+/-	No	MTL7028+/- MTL7128+/-	Ex95C2261	BAS99ATEX7285	MTL728+/-	Ex832452	BAS01ATEX7202	Analogue / Digital
MTL7728ac	No	N/A	N/A	N/A	MTL728ac	Ex832452	BAS01ATEX7202	General Purpose
MTL7728P+	No	MTL7128P+	Ex95C2261	BAS99ATEX7285	MTL728P+	Ex92C2373	BAS01ATEX7202	Analogue / Digital
MTL7755ac	No	MTL7055ac	Ex95C2261	BAS99ATEX7285	MTL755ac	Ex832452	BAS01ATEX7202	RTD, Grounded
MTL7756ac	No	MTL7056ac	Ex95C2261	BAS99ATEX7285	N/A	N/A	N/A	RTD, Grounded
MTL7758+/-	No	N/A	N/A	N/A	MTL758	Ex83453	BAS01ATEX7217	Active sensors,
MTL7760ac	No	N/A	N/A	N/A	MTL760ac	Ex832452	BAS01ATEX7202	Active sensors, Thermocouples
MTL7761ac	No	MTL7261ac	Ex95C2261	BAS99ATEX7285	MTL761ac	Ex832452	BAS01ATEX7202	Strain Gauges
MTL7761Pac	No	MTL7061Pac MTL7161Pac	Ex95C2261	BAS99ATEX7285	MTL761Pac	Ex92C2373	BAS01ATEX7202	Load cell
MTL7764+	No	MTL7164+	Ex95C2261	BAS99ATEX7285	MTL764+	Ex832452	BAS01ATEX7202	High resistance
MTL7764ac	No	MTL7264ac	Ex95C2261	BAS99ATEX7285	MTL764ac	Ex832452	BAS01ATEX7202	Strain / Level Gauges
MTL7765ac	No	N/A	N/A	N/A	MTL765ac	Ex832452	BAS01ATEX7202	General Purpose
MTL7766ac	No	N/A	N/A	N/A	MTL766ac	Ex832452	BAS01ATEX7202	Strain Gauges
MTL7766Pac	No	MTL7066Pac MTL7166Pac	Ex95C2261	BAS99ATEX7285	MTL766Pac	Ex92C2373	BAS01ATEX7202	Strain Gauges
MTL7767+	No	MTL7167+	Ex95C2261	BAS99ATEX7285	MTL767+	Ex832452	BAS01ATEX7202	Dual MTL715
MTL7779+	No	N/A	N/A	N/A	MTL779+	Ex832452	BAS01ATEX7202	Dual MTL728
MTL7787+/-	Yes	MTL7087+ MTL7187+	Ex95C2261	BAS99ATEX7285	MTL787S+	Ex832452	BAS01ATEX7202	Analogue / Digital
MTL7787P+	Yes	MTL7087P+ MTL7187P+	Ex95C2261	BAS99ATEX7285	MTL787SP+	Ex92C2373	BAS01ATEX7202	Analogue / Digital
MTL7788+	Yes	N/A	N/A	N/A	MTL788+	Ex832452	BAS01ATEX7202	Transmitters
MTL7788R+	Yes	N/A	N/A	N/A	MTL788R+	Ex832452	BAS01ATEX7202	1—5V systems
MTL7796+/-	No	MTL7096- MTL7196-	Ex95C2261	BAS99ATEX7285	MTL796+/-	Ex832452	BAS01ATEX7202	Vibration sensors

MTL700 Series

for safe measurement and control in hazardous areas

- **1 or 2 channels in same package**
- **Electronic protection prevents blown fuses**
- **Higher-power barriers for group IIC and IIB gases**
- **All models short-circuit proof**
- **Fixed tagging & cable-screen earthing accessories**
- **Certified to worldwide standards**

MTL700 Series shunt-diode safety barriers are 1- or 2-channel devices which pass an electrical signal in either direction without shunting it, but limit the transfer of energy to a level that cannot ignite explosive atmospheres. Connected in series with the signal transmission lines on a process plant, they protect hazardous-area wiring and equipment against faults occurring in the safe area, and enable a wide range of measurement and control operations to be carried out simply and inexpensively by intrinsically safe techniques.

Applications include the protection of installations containing 'simple' uncertified devices such as thermocouples, switches, and resistive sensors, or separately certified 'energy storing' or 'voltage producing' apparatus, for example ac sensors, transmitters, and current-to-pneumatic (I/P) converters.

Essential features of the MTL700 Series are the self checking 'as-you-mount-it' earthing via two studs directly to nickel-plated brass or copper busbar. The earth connection is on top of the unit, allowing easy inspection, installation and removal. The shape of the barrier has been designed for easy wiring, while the common (14.5 mm) space requirement of both 1- and 2-channel units simplifies planning or alteration of installations of all sizes. The busbar is insulated for separate earthing, to eliminate the danger of invasion by fault currents.

MTL700P shunt-diode safety barriers deliver more power into hazardous areas. Because of the higher power levels available, it is important when considering the use of MTL700P barriers to check the compatibility of the electrical safety parameters of the field equipment (such as transmitters and solenoid valves) with those of the barriers to make sure the combination is safe. In addition, with the barriers designed for IIB gas group applications, the overall gas classification of the system also needs checking

References. The following documents are available for further information on MTL700 Series barriers:

AN9007 A user's guide to shunt-diode safety barriers.

INM700 The MTL700 Series Instruction Manual.

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SPECIFICATIONS

'Key' barriers shown in blue

Model No.	Safety description			Polarities available			Application	Basic circuit	Max. end-to-end resistance	V_{wkg} at 10 (1) µA	$V_{max.}$	Fuse rating
MTL	V	Ω	mA	+	–	ac		Hazardous Safe	Ω	V	V	mA
706	28	300	93	✓			Transmitters	See "HOW THEY WORK" and "OVERVOLT-PROTECTED BARRIERS"	–	–	35	See
707	28	300	93	✓			Switches		–	–	35	'How
	28	diode	–				Transmitters, switches,		See additional specification		50	they
707P†	28	164	170	✓			controller outputs				35	50
	15	diode	–				Solenoids, alarms, LEDs,				–	–
708	28	300	93	✓					–	–	35	–
710	10	50	200	✓	✓	✓	6V dc & 4V ac systems		85	6.0	6.9 [c]	50
710P	10	33	300	✓	✓		8V dc systems		42	8.0	9.2	200
715	15	100	150	✓	✓		12V systems		155	12.0	13.0	100
715P	15	50	291	✓			12V dc systems		60	12.5	13.8	200
722	22	150	147	✓	✓		18V dc systems		185	19.0	20.2	50
722P	22	101	213	✓			18V dc systems		121	18.5	20.0	100
728	28	300	93	✓			Controller outputs, solenoids		340	25.5	26.6	50
	28	300	93		✓	✓	Transmitters		340	25.5[b]	26.6[d]	50
728P	28	234	119	✓			Controller outputs, solenoid valves		253	24.5	26.0	100
729P†	28	164	170	✓			Controller outputs, solenoid valves		184	24.5	26.0	100
751	1	10	100			✓	Active dc & ac sensors		20	0.3	2.0	250
	1	10	100				(low impedance receivers)		20	0.3	2.0	250
755	3	10	300			✓	Resistance temperature		18.0[a]	(0.6)	3.6	250
	3	10	300				detectors		18.0[a]	(0.6)	3.6	250
758	7.5	10	750	✓	✓		Gas detectors		18	6.0	7.0	200
	7.5	10	750						18	6.0	7.0	200
761	9	90	100			✓			145	6.0	7.5	100
	9	90	100						145	6.0	7.5	100
761P	9	350	25			✓	Strain-gauge		384	7.0	8.1	50
	9	350	25				bridges		384	7.0	8.1	50
764	12	1k	12	✓	✓	✓	Strain-gauge bridges		1075	10.0	10.7 [e]	50
	12	1k	12						1075	10.0	10.7 [e]	50
766	12	150	80			✓			185	10.0	11.2	50
	12	150	80						185	10.0	11.2	50
766P	12	75	157			✓	Strain-gauge		93	9.8	11.3	100
	12	75	157				bridges		93	9.8	11.3	100
767	15	100	150	✓	✓		12V dc systems		155	12.0	13.0	100
	15	100	150						155	12.0	13.0	100
768	22	150	147	✓	✓		18V dc systems	(768 & 769 require channels separate in IIC)	185	19.0	20.2	50
	22	150	147						185	19.0	20.2	50
779	28	300	93	✓	✓		Controller outputs		340	25.5	26.6	50
	28	300	93						340	25.5	26.6	50
796	26	300	87	✓	✓				340	23.5	24.6	50
	20	390	51				Vibration probes (MTL796 negative)		435	17.5	18.7	50
760	10	50	200			✓	Active dc & ac sensors		85	6.0	7.4	50
	10	50	200				Thermocouples		85	6.0	7.4	50
765	15	100	150			✓			135	12.0	13.2	50
	15	100	150						135	12.0	13.2	50
772	22	300	73			✓			340	18.0	19.7	50
	22	300	73						340	18.0	19.7	50
778	28	600	47			✓	2-wire dc & ac systems		665	24.0	25.7	50
	28	600	47						665	24.0	25.7	50
786	28	diode	–	✓	✓				2.2V+30Ω	25.5	26.6	50
	28	diode	–				Signal returns		2.2V+30Ω	25.5	26.6	50
787	28	300	93	✓	✓		Controller outputs,		340	25.5	26.6	50
	28	diode	–				switches		2.2V+30Ω	25.5	26.6	50
787S	28	300	93	✓			Transmitters		340	25.5	26.6	50
	28	diode	–				Controller outputs, switches		0.9V+20Ω	25.5	26.6	50
787SP	28	234	119	✓					258	24.5	26.5	80
	28	diode	–				Transmitters, controller outputs switches		0.9V+16Ω	24.5	26.5	80
788	28	300	93	✓	✓				340	25.5	26.6	50
	10	50	200						85	6.0	6.9	50
788R	28	300	93	✓	✓				85	6.0	6.9	50
	10	50	200									
791	11	51	216	✓			31.25kbit/s fieldbus		62.6	10V (at 50uA)	10.5	100
	11	51	216		✓		installations		62.6	-10V (at 50uA)	-10.5	100
799	Dummy barrier for securing cables for future installations - takes hazardous-area circuits to earth.											

a: Tolerance ±0.15Ω at 20°C, channels track within 0.15Ω from –20 to +60°C.
b: ac version 24.5V.
c: ac version 7.4V.
d: ac version 26.1V.
e: ac version 11.2V.
†: Gas group IIB (CENELEC), C (N America).
*Diagrams show positive versions. All diodes reversed on negative versions. Additional diodes fitted on ac versions.
Patents for MTL787S: UK Patent No. 2210522, USA Patent No. 4860151; Patents for MTL707P: UK Patent Nos. 2210521, 2210522; USA Patent No. 4860151;
Patents for MTL787SP: UK Patent No. 2210522; USA Patent No. 4860151

HOW THEY WORK

All MTL700 Series barriers are based on the same simple principle. Each channel contains two stages of pulse-tested Zener or forward-connected diodes and an 'infallible' terminating resistor. In the event of an electrical fault in the safe area, the diodes limit the voltage that can reach the hazardous area and the resistor limits the current. A fuse protects the diodes, and the two stages of voltage limitation ensure continued safety if either stage should fail. No active output-current limiting circuits are employed. All models are certified 'ia' for all zones and 'IIC' for all explosive atmospheres (except MTL707P+ and MTL729P+, 'ia' 'IIB').

TERMINOLOGY

1. Safety description

The safety description of a barrier, eg '10V 50Ω 200mA', refers to the maximum voltage of the terminating Zener or forward diode while the fuse is blowing, the minimum value of the terminating resistor, and the corresponding maximum short-circuit current. It is an indication of the fault energy that can be developed in the hazardous area, and not of the working voltage or end-to-end resistance.

2. Polarity

Barriers may be polarised + or –, or non-polarised ('ac'). Polarised barriers accept and/or deliver safe-area voltages of the specified polarity only. Non-polarised barriers support voltages of either polarity applied at either end. An exception to this is the MTL791 Fieldbus barrier which has one positive and one negative channel.

3. End-to-end resistance

The resistance between the two ends of a barrier channel at 20°C, ie of the resistors and the fuse. If diodes or transistors are present, their voltage drop (transistors ON) is quoted in addition.

4. Working voltage (Vwkg)

The greatest steady voltage, of appropriate polarity, that can be applied between the safe-area terminal of a 'basic' barrier channel and earth at 20°C for the specified leakage current, with the hazardous-area terminal open circuit.

5. Maximum voltage (Vmax)

The greatest steady voltage, of appropriate polarity, that can be applied continuously between the safe-area terminal of any barrier channel and earth at 20°C without blowing the fuse. For 'basic' barriers, it is specified with the hazardous-area terminal open circuit; if current is drawn in the hazardous area, the maximum voltage for these barriers is reduced. The 'ac' channels of 'basic' barriers and most channels of overvolt-protected barriers withstand voltages of the opposite polarity also – see circuit diagrams.

6. Fuse rating

The greatest current that can be passed continuously (for 1000 hours at 35°C) through the fuse.

7. Star connection

In star-connected barriers, the two channels are interlocked such that the voltage between them cannot exceed the working voltage, Vwkg: this allows for higher cable capacitance or inductance.

8. Maximum safe-area voltage (Um)

The maximum permissible safe-area voltage (Um) for MTL700 Series barriers is 250V ac/dc.

GENERAL SPECIFICATION

KEY BARRIER

Ambient temperature and humidity limits
–20 to +60°C continuous working
–40 to +80°C storage
5–95% RH

Leakage current
For 'basic' barriers with a working voltage of 5V or more, the leakage current decreases by at least one decade per volt reduction in applied voltage below the working voltage, over two decades. For the MTL755 it decreases by at least one decade for a 0.4V reduction in applied voltage.

Terminations
Terminals accommodate conductors up to 4mm2 (12AWG)
Hazardous-area terminals are identified by blue labels.

Colour coding of barrier top

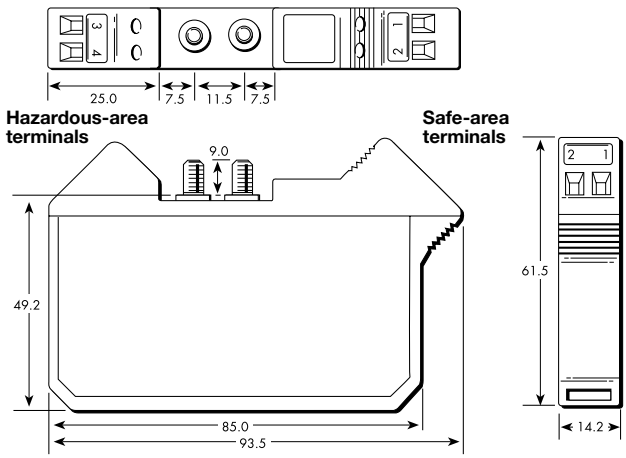
Grey:	non-polarised
Red:	positive polarity
Black:	negative polarity
Black	(red label for safe-area terminals): positive supply, negative to transmitter (MTL706)
White:	dummy barrier, MTL799

Weight
125g approx

Mounting and earthing
By two integral M4 x 9 tin-lead plated steel fixing studs and stainless steel self-locking nuts (provided).

EMC compliance
EN 50081-2/EN 50 082-2, generic emission/immunity standards. These rtefer to appropriate IEC/CISPR standards.
(MTL707P+ is not CE marked)

DIMENSIONS (mm)



MTL700 SERIES KEY BARRIERS SUMMARISED

TYPE	APPLICATION	KEY BARRIER	
Analogue input (low-level)	Resistance temperature detectors Thermocouples, ac sensors	**755ac 760ac**	
Analogue output	Controller outputs, one line earthed. Controller outputs, neither line earthed.	**728+ 787S+**	
		dc power supply	
		26.0V	20-35V
Analogue input (high-level)	Transmitters, 2-wire, 4/20mA	**787S+**	**706+**
Digital (on/off) input	Switches	**787S+**	**707+**
Digital (on/off) output	Solenoids, alaarms, LEDs	**728+**	**708+**

Patents for MTL706+, 707+, 708+, 787S+

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MTL700 SERIES
ACCESSORIES

- Mounting kits for up to 20 barriers
- Busbar, earth terminals and insulating mounting blocks for separate connection to IS earth
- Earth terminal rail for cable screens and earth returns
- Integral tagging system to display barrier loop data

DO-IT-YOURSELF MOUNTING ARRANGEMENT

Barriers are carried on lightweight plated busbar, which can be mounted on 'top hat' or G-profile rail or any flat surface with the busbar insulated for separate earthing. It is recommended that twin earth cables should be used for maximum security and easy testing. Each barrier is clamped to the busbar and thereby earthed in a single operation, making it virtually impossible to forget the earth connection, so easily left untightened or untested if there are scores of individual earth wires. Robust soft-plated double fixing studs on the top of each barrier ensure permanent 'gas-tight' joints, which are immune to vibration and corrosion yet allow barriers to be installed, inspected and removed easily.

The accessories system also provides a convenient row of terminals for terminating earth returns and cable screens, which remains in place to keep these safely earthed should any barrier be extracted: a dummy barrier is available as an alternative for the same purpose. With similar attention to users' needs, a unique lift-up tagging facility provides permanent identification of circuits and barrier types to guide installation, fault-finding and inspection, and to ensure correct replacement of any barrier for long-term safety.

ACCESSORIES

EBB7 earth busbar, nickel-plated brass and ready drilled in one metre lengths.

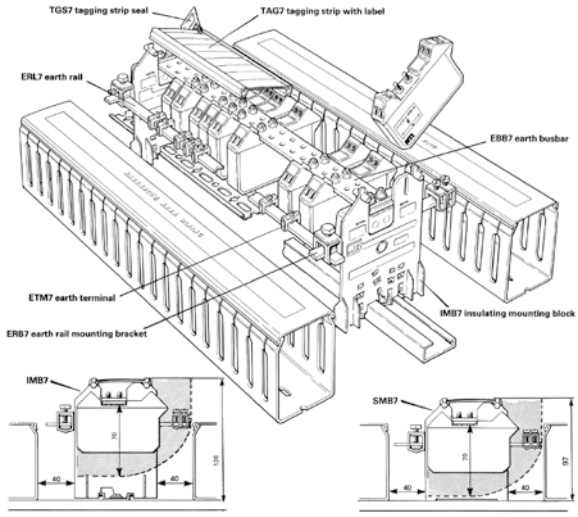
IMB7 & SMB7 insulating mounting blocks are a convenient method of supporting the busbar. They are supplied complete with fixing screws and are ready for mounting on any flat surface. IMB7 will also mount on top hat or G-profile DIN-rail. T-section DIN-rail **THR2** is available in 1 metre lengths.

TAG7 tagging strips clip onto the mounting blocks to positively identify each location and provide space for the user to note details of barrier type, loop identification etc. Access to barrier mounting studs is not impaired; just unclip one edge and swing the strip 'open' or, if the optional plastic seal (**TGS7**) has not been fitted, unclip both edges and lift it right off. **TGL7** replacement labels for the tagging strips are also available.

ERL7 earth rail is a nickel-plated 3 x 10mm rail that attaches to the mounting blocks via an **ERB7** earth rail mounting bracket. It will accommodate up to 2.5 **ETM7** earth terminals per barrier location for terminating earth returns and cable screens from the hazardous area.

ERB7 earth rail mounting bracket mounts directly over either type of mounting block; for a rigid earth rail an **ERB7** on each mounting block is recommended. One end carries a bolt-down fitting for the rail – enabling easy removal for adding extra **ETM7** terminals – the other end carries a 16mm2 terminal. When installed these 16mm2 terminals provide connections for the high-integrity IS earth, for linking between sections of busbar, and for a common earth return from the safe area.

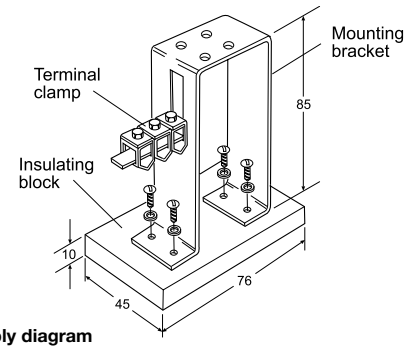
Other accessories available are the **TQS7** torque spanner for safe tightening of the vibration-proof self-locking nuts on the barrier earthing studs; **SMC7** surface mounting clips for mounting a single barrier on a flat surface; and **ISL3** or **ISL7** self adhesive 'Take Care' intrinsic safety warning labels.



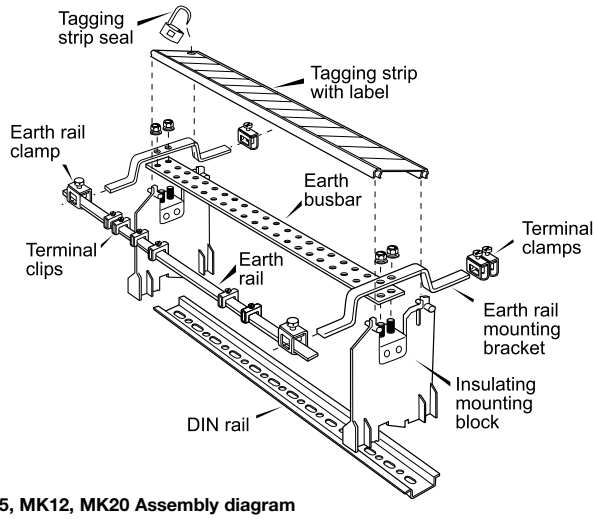
End elevations with recommended spacing. Shaded portions show areas swept by barrier during installation and removal.

MOUNTING KITS

Mounting kits provide all the necessary parts for installing up to a specific number of MTL700 or MTL700P Series barriers. The kits available are the MK02 (2 barriers), MK05 (5 barriers), MK12 (12 barriers), and MK20 (20 barriers). Each kit provides facilities for mounting and earthing the barriers, connecting the IS earth cable, terminating cable screens and noting tagging information (except the MK02 kit which does not provide tagging facilities). Instruction Sheet INS701 includes full assembly instructions.



MK02 Assembly diagram



MK05, MK12, MK20 Assembly diagram

Note: MK05 has no earth rail, but does have terminal clamps on earth rail mounting brackets

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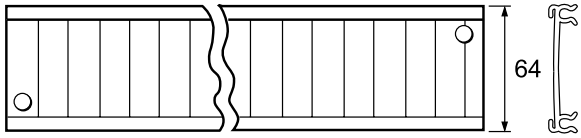
DIMENSIONS (mm)

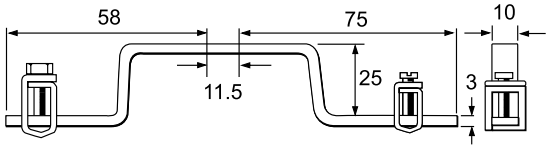
TAG7 tagging strip with label and 6 'clic' rivets – 1 metre lengths



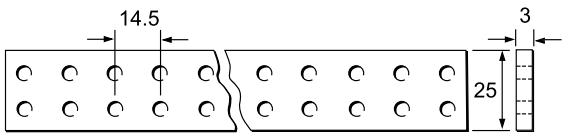
TGL7 tagging strip label only – packs of 10 x 0.5 metre lengths

ERL7 earth rail – 10 x 3mm - sold in 1 metre lengths. Unplated rail available as 'SSch 10 x 3mm brass busbar', from Klippon Electricals Ltd.

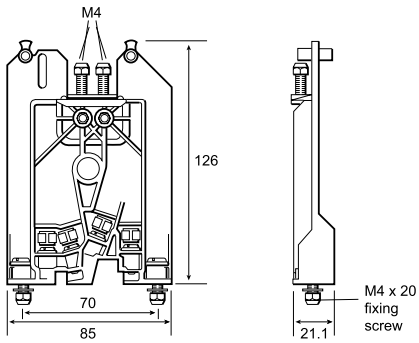
ERB7 earth rail mounting bracket – with earth rail bolt-down fitting and terminal for cable 16mm²



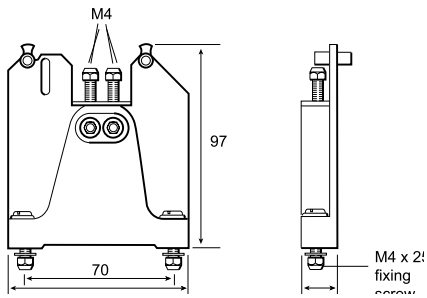
EBB7 earth busbar – 1 metre lengths. Mounts up to 64 barriers.



IMB7 insulating mounting block mounts on a flat surface or top hat rail (to EN 50 022 – 35 x 7.5; BS 5584; 35 x 27 x 7.3 DIN 46277) or G-profile rail (to EN 50035 – G32; BS 5825; 32 DIN 46277). Recommended maximum number of barriers between blocks is 25.



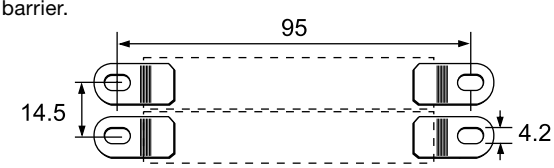
SMB7 insulating mounting block mounts on a flat surface and provides minimum overall installation height. Recommended maximum number of barriers between blocks is 25.



TGS7 tagging strip seal – sold in bags of 10

ETM7 earth terminal – sold in bags of 50. For cable 4mm². Also available as 'ZB4' from Klippon Electricals Ltd.

SMC7 surface mounting clip – sold in bags of 10. Two clips needed per barrier.



TQS7 torque spanner – preset to 2.3Nm torque. Complete with 7mm A/F socket.

ISL3 or ISL7 'Take Care' intrinsic safety label –

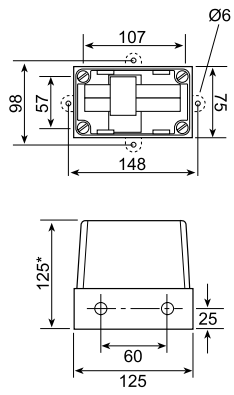
ISL3 adhesive back, metal

*ISL7 adhesive front, plastic

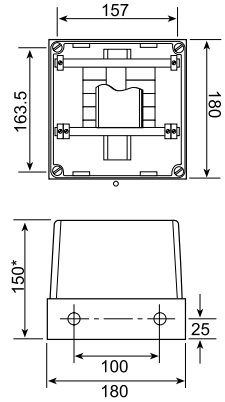
DRK700 adaptor kit
allows MTL700 Series barriers to be mounted directly on DIN-rail.

ENCLOSURE OPTIONS
Dimensions (mm)

MT02

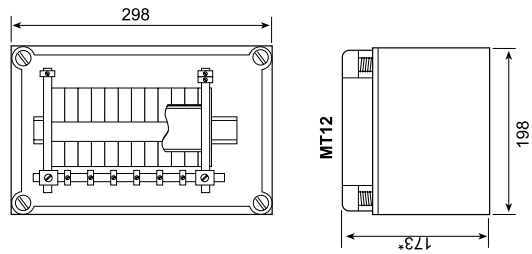


MT05



**Add 5mm to depth if fixing lugs are used.*

MT12



Fixing lugs for MT12
On these models the screw-on fixing lugs can be positioned as shown.

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MTL600 Series Displays

MTL's range of IS displays come in both panel and field mounting options. In addition to the user configurable loop powered indicators, are 'mini HMI' text and graphic displays that provide operator input and control via a host computer.

Display process information in the hazardous area

MTL660 Displays

Loop-powered indicators for hazardous areas

- **Loop powered 4-20mA**
- **Field and panel mounting**
- **Environmental protection to IP67**
- **Easy to configure**
- **Number of displayed digits configurable**
- **Backlight options**
- **Zone 2 mounting**

The MTL661, MTL662, MTL663 and MTL665 digital indicators enable process variables to be displayed locally in hazardous and general purpose plant areas. A typical example would be the re-transmission of mass/flow computations from the safe area, through a suitable MTL IS interface to the indicator in the hazardous area.

The displays are loop powered from the 4-20mA process signal and their low voltage drop allows them to be installed in almost any 2-wire, 4–20mA transmitter loop.

All units can indicate measured values in a linear or a square root extraction mode; the latter being used, for example, to display flow from differential pressure measurement devices such as orifice plates, Dall tubes, or venturi.

The MTL661 Field mounting unit is housed in a tough aluminium enclosure, suitable for wall or pipe mounting. For corrosive atmospheres use the **MTL663** - the plastic case provides excellent resistance to harmful contaminents.

The MTL665 is the panel mounted version and is IP65, IP66, IP67 and NEMA4 rated.

MTL66x IS indicators are classified as 'non-energy storing' simple apparatus so they can be inserted into any IS loop without recertification.

For Zone 2 mounting, without the need for an IS barrier or isolator, the MTL661-NA and MTL662-NA are available.

MTL661, MTL662 & MTL663
I.S. INDICATORS
loop powered + backlight 'B' option

The MTL66x range offers a variety of field and panel mounting IS indicators to display the current flowing in a 4–20mA loop. The small voltage drop of <1V allows the loop powered display to be installed in almost any 4–20mA loop. The -NA versions permit mounting in Zone 2 without an IS barrier or isolator.

Configuration is carried out using the front panel switches (which can be password protected). Range units, upper and lower limits, decimal point positioning and number of digits displayed are all configured via the front panel.

SPECIFICATION

Unit location
Zone 0, IIC, T4 hazardous area

Display
5½ digits - 26mm height (process value)
Eleven 8mm digits (process units & current)

Voltage requirements under all conditions
<1V, loop powered

Ambient Temperature
Operating: –25°C to +70°C
Storage: –40°C to +80°C

Humidity
5-99%RH

Input range
4-20mA

Over-range
200mA maximum without damage

Display Range
–99999 to 199999 (Configurable)
Number of digits after decimal point configurable

Zero and span
Setting: anywhere in range

Scale direction
Normal or reverse: software selected.

Out of range indication
"----- RANGE ERROR" displayed between 3.5 - 3.75mA
"99999 RANGE ERROR" displayed at current >22mA

Operating modes
Linear or square root extraction is software selectable.

Accuracy at 20°C
± 0.01mA

Effects of temperature on accuracy
Zero: ± 0.0025% of span /°C
Span: ± 0.01% of span /°C

Ripple rejection
<0.01mA error with 1mA peak to peak ripple at 50Hz

Electrical safety
The input circuit of the indicator is designed such that it does not influence the intrinsically safe circuit to which it is connected. (In the USA the application is covered by the entity concept.)
Input circuit (terminals 4 & 5) in type of explosion protection intrinsically safe Ex ia IIC, with the following parameters:
Ui=30V, Ii=200mA, Pi=1.2W, Ci=0nF, Li=0mH only for connection to a certified intrinsically safe circuit not exceeding these values.

Backlight (see Ordering Information & final page for details)
Separately powered backlight from an IS power source
(U_o = 28V, I_o = 200mA, P_o = 0.96W max.)

Dimensions
See page 114

Showing backlight

ORDERING INFORMATION

When ordering a MTL661, MTL662 or MTL663, use one of the following order codes to uniquely specify your requirement.

Order code	Type	Backlight	Case material	Weight (nom.)	Case style
MTL661	Field	No	Aluminium	825g	A
MTL661B	Field	Yes	Aluminium	825g	A
MTL661-NA	Field	No	Aluminium	825g	A
MTL661B-NA	Field	Yes	Aluminium	825g	A
MTL662	Panel	No	Aluminium	425g	B
MTL662B	Panel	Yes	Aluminium	425g	B
MTL662-NA	Panel	No	Aluminium	425g	B
MTL662B-NA	Panel	Yes	Aluminium	425g	B
MTL663	Field	No	GRP	500g	A
MTL663B	Field	Yes	GRP	500g	A

MTL665
I.S. INDICATOR
loop powered + backlight 'B' option

The MTL665 is a DIN-standard, panel mounting, IS indicator to display the current flowing in a 4–20mA loop. The small voltage drop of <1V allows the loop powered display to be installed in almost any 4–20mA loop.

Configuration is carried out using the front panel switches (which can be password protected). Range units, upper and lower limits, decimal point positioning and number of digits displayed are all configured via the front panel.

SPECIFICATION

Unit location
Zone 0, IIC, T4 hazardous area

Display
5½ digits - 26mm height (process value)
Eleven 8mm digits (process units & current)

Voltage requirements under all conditions
<1V, loop powered

Ambient Temperature
Operating: –25°C to +70°C
Storage: –40°C to +80°C

Humidity
5-99%RH

Input range
4-20mA

Over-range
200mA maximum without damage

Display Range
–99999 to 199999 (Configurable)
Number of digits after decimal point configurable

Zero and span
Setting: anywhere in range

Scale direction
Normal or reverse: software selected.

Out of range indication
"----- RANGE ERROR" displayed between 3.5 - 3.75mA
"99999 RANGE ERROR" displayed at current >22mA

Operating modes
Linear or square root extraction is software selectable.

Accuracy at 20°C
± 0.01mA

Effects of temperature on accuracy
Zero: ± 0.0025% of span /°C
Span: ± 0.01% of span /°C

Ripple rejection
<0.01mA error with 1mA peak to peak ripple at 50Hz

Electrical safety
The input circuit of the indicator is designed such that it does not influence the intrinsically safe circuit to which it is connected. (In the USA the application is covered by the entity concept.)
Input circuit (terminals 4 & 5) in type of explosion protection intrinsically safe Ex ia IIC, with the following parameters: Ui=30V, Ii=200mA, Pi=1.2W, Ci=0nF, Li=0mH only for connection to a certified intrinsically safe circuit not exceeding these values.

Backlight (see Ordering Information & final page for details)
Separately powered backlight from an IS power source (U_o = 28V, I_o = 200mA, P_o = 0.96W max.)

Dimensions
See page 114

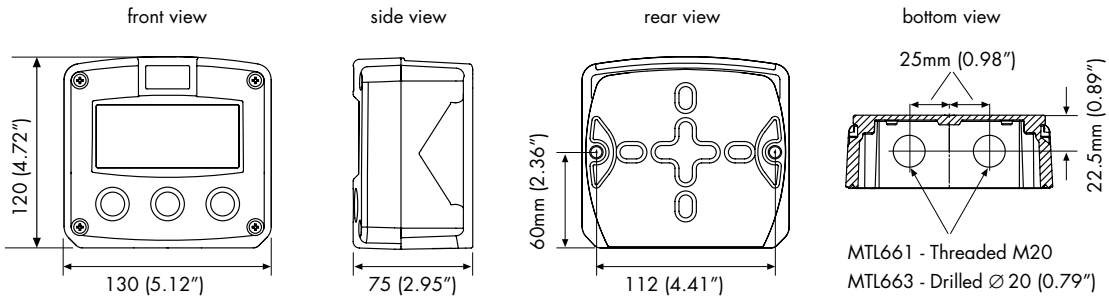
ORDERING INFORMATION

When ordering a MTL665 use one of the following order codes to uniquely specify your requirement.

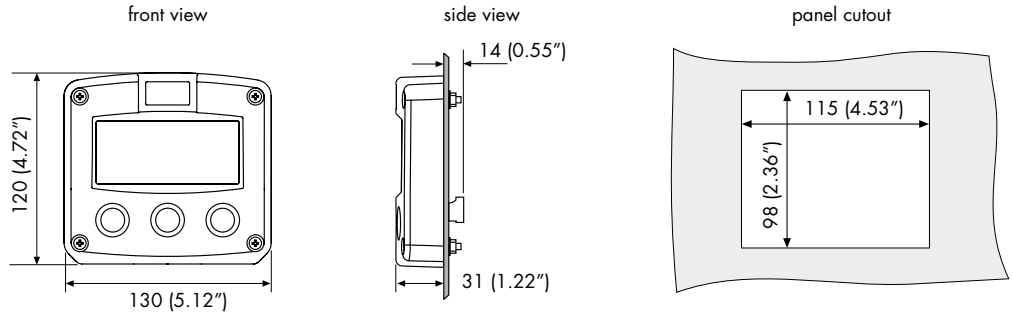
Order code	Type	Backlight	Case material	Weight (nom.)	Case style
MTL665	Panel	No	Aluminium	300g	C
MTL665B	Panel	Yes	Aluminium	300g	C

CASE DIMENSIONS (mm)

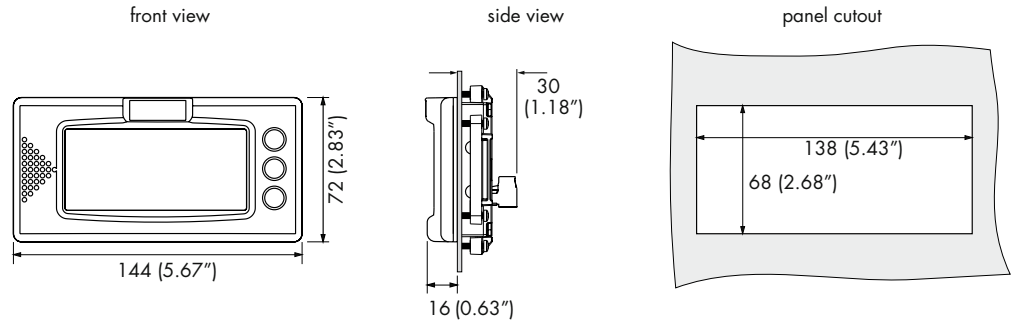
Style 'A'



Style 'B'



Style 'C'



ACCESSORIES

Order code	Description	Used with
WMP66	Wall mounting plate	MTL661/663
PMA66	Pipe mounting adaptor used with WMP66	MTL661/663
PIP66	Pipe mounting kit	MTL661/663
GAS660	Spare gaskets - pk of 10	MTL661/663
GAS665	Spare gaskets - pk of 10	MTL665

Recommended IS interfaces for powering display

- Input circuits (in series with transmitter)
  MTL5541, MTL4541, MTL7787+
- Output circuits (direct connected or in series with field device)
  MTL4546Y, MTL5546Y, MTL7728P+
- Recommended IS interfaces for powering backlight
  MTL5521, MTL4521, MTL7728P+

EPS660 RevH 160713

MTL646/647 Displays

Intrinsically safe text displays for hazardous areas

- **IS display certified to ATEX**
- **High contrast LCD with backlight**
- **Communication from a safe area via a galvanic isolator**
- **Operator push-buttons or external switch inputs**
- **Two switch outputs**
- **IP65 front panel**

The MTL646/647 Serial Text Displays are intrinsically safe instruments that can display text and simple graphics in a hazardous area. Having a number of push-buttons and two solid-state switched outputs, they provide a low cost operator interface ideal for simple machine and process control applications. In addition to new installations, the legacy protocol enables existing MTL643/644 display systems to be easily upgraded.

Data and power are normally supplied by a 2-wire serial data link from an MTL5051 isolator in the safe area. This isolator, which can power and communicate with up to two MTL646/647 serial text displays, has a bi-directional RS232 or RS422 safe area port. Alternatively, a 3 wire system may be used to communicate with up to four MTL646/647 text displays. The high contrast LCD incorporates a green backlight that is powered by the serial data link. Brightness and contrast are adjustable enabling the display to be read in all lighting conditions from full sunlight to total darkness.

Six push-buttons on the front panel of the MTL646 (four on the MTL647) may be used for operator acknowledgments or controls. If larger industrial switches are required, these may be connected to the text display rear (MTL647–internal) terminals. When the remote switches are activated, the front panel push-buttons are disabled automatically.

Two isolated switch outputs, which can control certified hazardous area loads such as sounders, lamps and valves, are included.

The MTL646/647 text displays are normally controlled and interrogated by a safe area process computer or by a dedicated instrument such as a PLC or weighing system. The text displays may be used singly but up to four instruments can be multidropped on a hazardous area network. At a data rate of 9600 bps, the cable between the safe area galvanic isolator and the MTL646/647 text display may be up to 100m long. The protocol, which uses ASCII characters, enables text to be written anywhere on the screen in five different font sizes, together with lines, boxes and bargraphs. Simple bitmap graphics may be downloaded to the display and all characters can be reversed or flashed. Information can also be written to a hidden screen which may be displayed when required.

Five different operational modes are selectable, allowing the user to choose the appropriate level of communications security for each application. These range from immediate execution of a command with no message acknowledgement, to a 16 bit CRC. The communications speed, number of stop bits and polarity of the parity bit can also be defined.

The legacy protocol enables the MTL646 or MTL647 to replace an MTL643 or MTL644, in order to provide certification to ATEX and a display backlight. No software or galvanic isolator changes are required and the MTL646 will fit into the existing panel cut-out. If required, simple modifications to the driver software will allow the enhanced features of the MTL646/647 to be used.

EPS646_647 RevC 020807

SPECIFICATIONS

Location

Zone 0, 1 or 2

DISPLAY

Type

120 x 64 pixel liquid crystal.

Display Size

86.5mm x 45mm.

Backlight

Powered from serial link.

Characters

ASCII character set, 5 font sizes each with 4 computer definable soft characters.

Hidden screen

May be written to at any time and displayed when required.

Switch cable length

5m max.

OUTPUTS

Two software controlled switch outputs.

Contacts

Isolated single pole solid state switch (certified as simple apparatus).

R_{on} less than 5Ω + 0.7V

R_{off} greater than 1MΩ

I.S. parameters

Ui = 28Vdc, Ii = 200mA, Pi = 0.85W

DATA

Transmission Speed

0.3, 0.6, 1.2, 2.4, 4.8, 9.6 or 19.2k bps.*

Cable length between isolator(s) & MTL646/647

100m max at Baud rate of 9.6k bps*

*Depends upon configuration & type of cable - see instruction manual.

Format

1 or 2 stop bits; odd, even or no parity bit; 7 or 8 data bits.

Protocol

MTL646/647 or MTL643/644.

CONTROLS

Front panel

MTL646: 6 push-buttons which can be software interrogated.

MTL647: 4 push-buttons which can be software interrogated.

Each button function may be displayed on the screen. Buttons may be disabled.

External switches

Control may be transferred to six external switches; front panel buttons are inhibited.

ENVIRONMENTAL

Operating temp

–20°C to +60°C (certified for use at –40°C)

Humidity

To 95% @ 40°C

Enclosure

Front IP65

Rear IP20

MECHANICAL

Terminals

Removable with screw clamp for 0.5 to 1.5mm 2 cable.

Weight

MTL646	0.7kg
MTL647	1.6kg

ACCESSORIES

Tag number

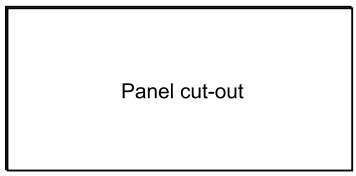
Thermally printed strip on rear of instrument.

Programming guide

May be downloaded from http://www.mtl-inst.com

EPS646_647 RevC 020807

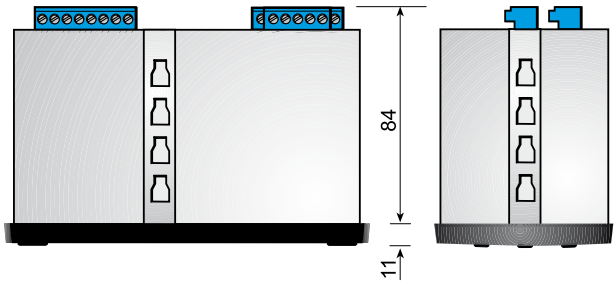
MTL646
DIMENSIONS (mm)

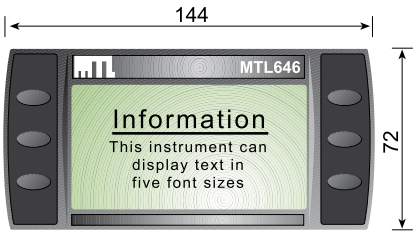


Recommended panel cut-out

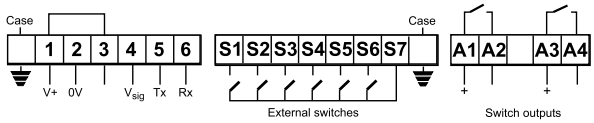
DIN 43 700
138.0 +1.0/ -0.0 x 68.0 +0.7/ -0.0

To achieve an IP65 seal between the instrument and the panel
136.0 +0.5/-0.0 x 66.2 +0.5/-0.0
Four panel mounting clips must be used

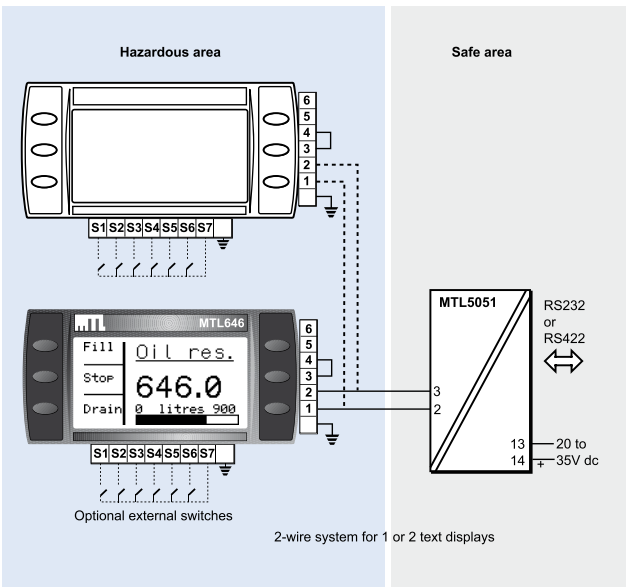




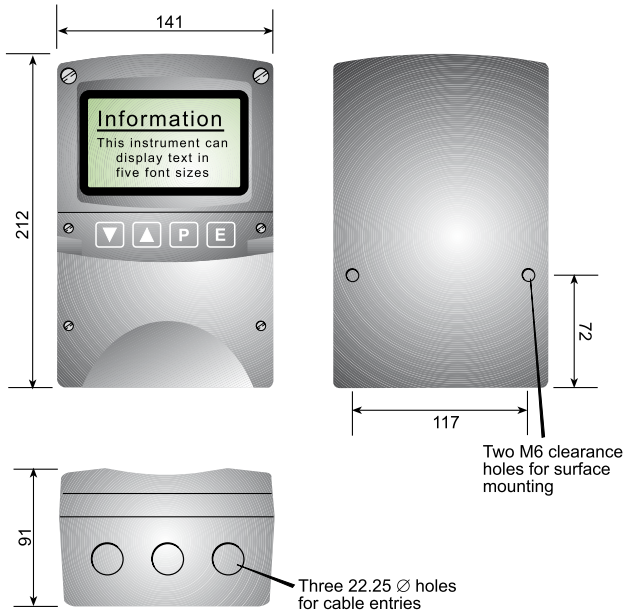
TERMINAL CONNECTIONS



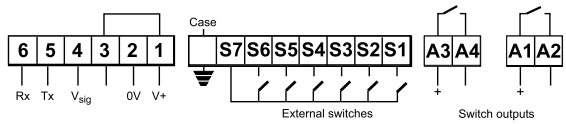
CONNECTIONS



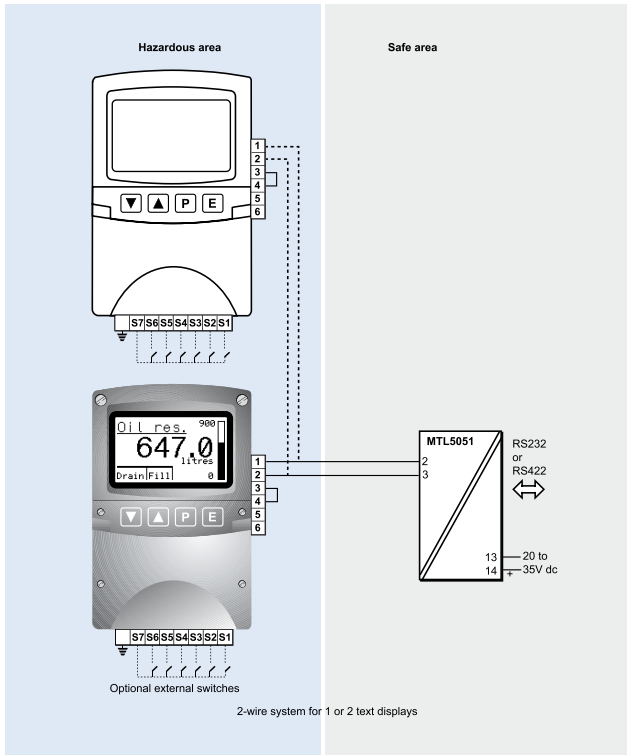
MTL647
DIMENSIONS (mm)



TERMINAL CONNECTIONS



CONNECTIONS



EPS646_647 RevC 020807

Notes:

Intrinsic safety concept simplifies circuits and permits live maintenance within the hazardous area

Eaton's Crouse-Hinds

The safety you rely on.

See the complete Intrinsic Safety product offering at **www.mtl-inst.com**

U.S. (Global Headquarters):
Eaton's Crouse-Hinds Business
1201 Wolf Street
Syracuse, NY 13208

(866) 764-5454
FAX: (315) 477-5179
FAX Orders Only:
(866) 653-0640

CrouseCustomerCTR@Eaton.com

For more information:
If further assistance is required, please contact an authorised MTL Distributor, Sales Office, or Customer Service Department

AUSTRALIA
MTL Instruments Pty Ltd,
205-209 Woodpark Road, Smithfield,
New South Wales 2164, Australia

Tel: + 61 1300 308 374 Fax: + 61 1300 308 463
E-mail: mtlsalesanz@eaton.com

BeNeLux
MTL Instruments BV
Terheijdenseweg 465, 4825 BK Breda
The Netherlands

Tel: +31 (0) 76 7505360 Fax: +31 (0) 76 7505370
E-mail: mtl.benelux@eaton.com

CHINA
Cooper Electric (Shanghai) Co. Ltd.
Room 2001, China Life Tower, 16 Chao Yang Men Wai Street,
Chao Yang District, Beijing, China 100020

Tel: + 86 10 5980 0231 Fax: + 86 10 8562 5725
E-mail: mtl-cn@eaton.com

FRANCE
MTL Instruments sarl,
7 rue des Rosiéristes, 69410 Champagne au Mont d'Or
France

Tel: + 33 (0)4 37 46 16 70 Fax: +33 (0)4 37 46 17 20
E-mail: mtlfrance@eaton.com

GERMANY
MTL Instruments GmbH,
Heinrich-Hertz-Str. 12, 50170 Kerpen, Germany

Tel: + 49 (0)22 73 98 12 - 0 Fax: + 49 (0)22 73 98 12 - 2 00
E-mail: mtlgmbh@eaton.com

INDIA
MTL India,
No.36, Nehru Street, Off Old Mahabalipuram Road
Sholinganallur, Chennai - 600 119, India

Tel: + 91 (0) 44 24501660 /24501857 Fax: + 91 (0) 44 24501463
E-mail: mtlindiasales@eaton.com

ITALY
MTL Italia srl,
Via A. Meucci, 10, I-20094 Corsico (MI), Italy

Tel: + 39 (0)2 61802011 Fax: + 39 (0)2 61294560
E-mail: chmninfo@eaton.com

JAPAN
Cooper Crouse-Hinds Japan KK,
MT Building 3F, 2-7-5 Shiba Daimon, Minato-ku,
Tokyo, Japan 105-0012

Tel: + 81 (0)3 6430 3128 Fax: + 81 (0)3 6430 3129
E-mail: mtl-jp@eaton.com

NORWAY
Norex AS
Fekjan 7c, Postboks 147,
N-1378 Nesbru, Norway

Tel: +47 66 77 43 80 Fax: +47 66 84 55 33
E-mail: info@norex.no

SINGAPORE
Cooper Crouse-Hinds Pte Ltd
No 2 Serangoon North Avenue 5, #06-01 Fu Yu Building
Singapore 554911

Tel: + 65 6 645 9888 Fax: + 65 6 487 7997
E-mail: sales.mtlsing@eaton.com

SOUTH KOREA
Cooper Crouse-Hinds Korea
12F, Vision Tower, 707-2 Yeoksam-Dong Gangnam-Gu,
Seoul 135-080, South Korea.

Tel: +82 2 538 3481 Fax: +82 2 538 3505
E-mail: mtl-korea@eaton.com

UNITED ARAB EMIRATES
Cooper Industries/Eaton Corporation
Office 205/206, 2nd Floor SJ Towers, off. Old Airport Road,
Abu Dhabi, United Arab Emirates

Tel: +971 2 44 66 840 Fax: +971 2 44 66 841
E-mail: mtlgulf@eaton.com

UNITED KINGDOM
Measurement Technology Limited,
Great Marlings, Butterfield, Luton
Beds LU2 8DL

Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283
E-mail: mtlenquiry@eaton.com

AMERICAS
Cooper Crouse-Hinds MTL Inc.
3413 N. Sam Houston Parkway W.
Suite 210, Houston TX 77086, USA

Tel: + 1 281-571-8065 Fax: + 1 281-571-8069
E-mail: mtl-us-info@eaton.com

Measurement Technology Limited
Great Marlings, Butterfield, Luton
Beds LU2 8DL, UK.
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283
E-mail: mtlenquiry@eaton.com

www.mtl-inst.com

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Measurement Technology Limited
Great Marlings, Butterfield, Luton
Beds LU2 8DL, UK.
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283
E-mail: mtlenquiry@eaton.com
www.mtl-inst.com