

MTL intrinsic safety solutions

**CROUSE-HINDS**  
SERIES



Safe, reliable and  
trusted intrinsic  
safety solutions

**EATON**

*Powering Business Worldwide*



# The safety you rely on

## Only Eaton can deliver...

- Protection and safety of people and assets around the world
- 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
- More than 40 years of process automation industry knowledge and expertise



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

## More protection. More technology. Expect more.

Eaton has 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.

For over forty years Eaton's MTL intrinsic safety interface product range has been at the forefront of the market, producing barriers, isolators and integrated IS to help prevent explosions in process industries.

Whatever the application, our products help to protect investments in hazardous areas.

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.

## Contents

<b>Introduction</b>	5 - 6
<b>Functional Safety Management</b>	7 - 8
<b>MTL intrinsic safety isolators</b>	9
MTL4500/MTL5500 range	11 - 72
MTL4600 range	62
Common specifications and accessories	63
<b>MTL HART® multiplexers</b>	74
MTL4850/4854	76 - 79
MTL4851/4852	80 - 87
<b>MTL zener barriers</b>	88
MTL7700 range	90 - 104
<b>MTL600 range of displays</b>	105
MTL660 displays	107 - 110
MTL646/647 displays	111 - 113
<b>MTL services and support</b>	114 - 115



# Safe, reliable protection of intrinsically safe apparatus in hazardous areas





# De-risk by design

## MTL intrinsic safety solutions

Minimising risk. Maximising efficiency.

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

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.

# Intrinsic safety interfacing

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

## MTL intrinsically safe isolating interfaces for every application

Eaton's 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. We offer 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 range is the latest generation of backplane mounting products, building upon the heritage of MTL4000 and introducing many key application benefits. The MTL5500 range sets an industry standard for DIN-rail mounted products, ideally suited to a wide variety of interface tasks for process instrumentation.

<b>Intrinsic safety</b>	International	IECEX	IEC 60079-11
	Europe	ATEX (SGS Baseefa)	EN60079-11
	North America	FM	FM3600, 3610, 3810, ANSI/ISA 60079-11
FM (Canada)		CAN/CSA E60079-11, C22.2 No.157	
<b>Zone 2, division 2 mount</b>	UL	UL 60079-11	
	International	IECEX	IEC 60079-15
	Europe	ATEX Cat3	EN60079-15
<b>Functional safety</b>	North America	FM	FM3611, ANSI/ISA 12.12.02
		FM (Canada)	CAN/CSA E60079-15
		UL	ANSI/ISA 12.12.01
		SGS Baseefa SIRA MTL	IEC 61508 IEC 61511

**Note:** Refer to the MTL website for approvals held by specific models

In most applications MTL4500 modules can directly replace MTL4000 models but check with your local Eaton MTL sales office if you have any concerns. Similarly, MTL5500 replaces the MTL5000 range 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 our website, [www.mtl-inst.com](http://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.

## MTL 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

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

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 that you, as 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, but it does require proof of dependability and suitability for the application. A 'SIL certificate' alone may not give the designer sufficient information to design the safety loop. This information is provided in the safety manual, which is the essential document for correct design of safety loops.

'Expert Status' isn't the same as 'Functional Safety Management'

Functional safety Management (FSM) is more than the presence of a certified expert. FSM covers everyone involved in the safety life-cycle, and the procedures that govern all related activities.

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 elements in the loop. Eaton 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 Eaton's MTL product line 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. Eaton supply MTL products and documents fully compliant with the current edition of the international standards.

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"



For more information on Functional Safety Management please visit [www.mtl-inst.com/fsm](http://www.mtl-inst.com/fsm)

# Our FSM product range

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

## MTL intrinsically safe interfaces

MTL4500 range and MTL5500 range of intrinsically safe isolators and the MTL7700 range of DIN-rail mounted zener-diode barriers



## MTL alarm annunciator equipment

RTK SIL725 safety annunciator



## MTL signal surge protection

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



## MTL asset management instrumentation

MTL4850 HART® SIL 3 multiplexer for use with safety systems



Certificate No. CASS 00015/03



Certified by Sira as a Functional Safety Management (FSM) company since 2011

# MTL intrinsic safety isolators

Eaton 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

# MTL4500/5500 range

## Intrinsically safe galvanic isolators

- **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 monitoring**
- **Compatible with preceding MTL isolator range for pluggable replacements**
- **Various models assessed for use in Functional Safety applications**



Eaton's latest generation of MTL 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 range 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 range 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, simplifying installation and maintenance and reducing time, cost, and the risk of errors.

The DIN-rail mounting MTL5500 range 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 ranges have been designed for compatibility with earlier models. The MTL4500 range provides plug-replacements for the earlier MTL4000 units, while the MTL5500 range can easily replace MTL5000 units. Each offer the latest in modern technology and efficiency without compromise.

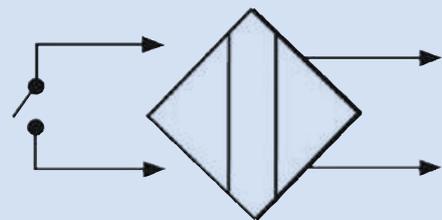
In addition to their use in IS circuits, specific models within the MTL4500 and MTL5500 range have been assessed and approved for use in Functional Safety applications. These have been verified under the certified Functional Safety Management (FSM) programme implemented by our MTL product line.



## 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
MTL4514N	-	1	Switched resistors for LFD passthrough	Switch/proximity detector
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 1k $\Omega$

#### Input/output characteristics

Input value in sensor circuits	Fail-safe output	Operation	LFD contacts
$2.9\text{mA} < I_s < 3.9\text{mA}$	ON	Normal	CLOSED
$I_s < 1.9\text{mA} \ \& \ I_s > 5.1\text{mA}$	OFF	Normal	CLOSED
$I_s < 50\mu\text{A}$	OFF	Broken line	OPEN
$R_s < 100\Omega$	OFF	Shorted line	OPEN

Note:  $I_s$  = sensor current

#### Fail-safe electronic output

Output on: 24V nominal  
Output off: 0V dc, max < 5V dc  
Load: 750 $\Omega$  to 10k $\Omega$   
Maximum on-state current: 25mA (at 750 $\Omega$ )  
Short-circuit current: 30mA

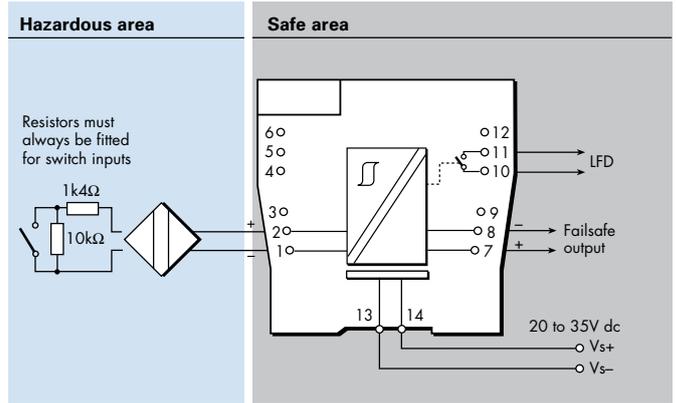
#### Line fault detection (LFD)

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

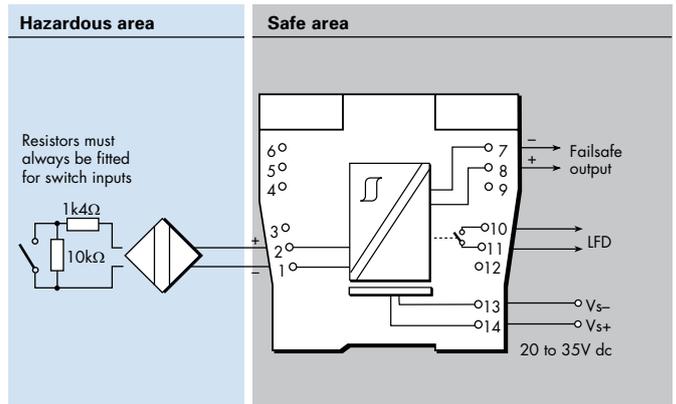
#### LED indicators

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

### MTL4501-SR



### MTL5501-SR



#### Power requirements, $V_s$

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

#### Power dissipation within unit

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

#### Safety description

$U_o = \pm 9.7\text{V}$ ,  $I_o = 30\text{mA}$ ,  $P_o = 0.07\text{W}$ ,  $C_i = 0\text{nF}$ ,  $L_i = 0\text{mH}$   
 $U_m = 253\text{V}$



#### SIL capable

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.

# 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 Eaton 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  $1k\Omega \pm 10\%$

#### Input/output characteristics

Normal phase

Outputs closed if input  $> 2.1mA$  ( $< 2k\Omega$  in input circuit)

Outputs open if input  $< 1.2mA$  ( $> 10k\Omega$  in input circuit)

Hysteresis:  $200\mu A$  ( $650\Omega$ ) 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  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact

input

$500\Omega$  to  $1k\Omega$  in series with switch

$20k\Omega$  to  $25k\Omega$  in parallel with switch

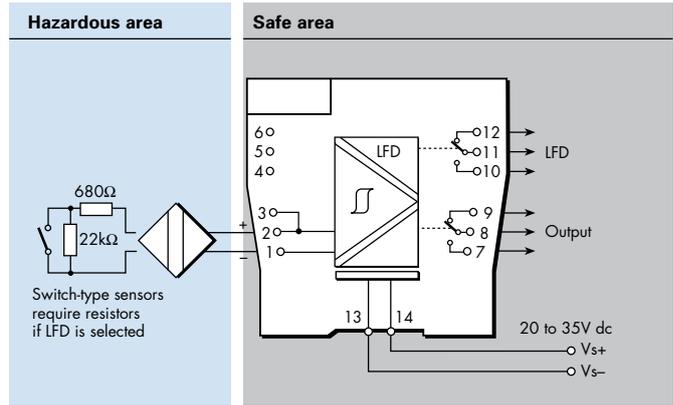
#### Safe-area output

Channel: Single pole relay with changeover contacts

LFD: Single pole relay with changeover contacts

Note: reactive loads must be adequately suppressed

### MTL4504



### Relay characteristics

#### MTL4504

Response time: 10ms maximum

Contact rating (Safe Area): 10W, 0.5A, 35V dc

Contact rating (Zone 2): 10W, 0.5A, 35V dc

### 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

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  $1k\Omega \pm 10\%$

#### Input/output characteristics

Normal phase

Outputs closed if input  $> 2.1mA$  ( $< 2k\Omega$  in input circuit)

Outputs open if input  $< 1.2mA$  ( $> 10k\Omega$  in input circuit)

Hysteresis:  $200\mu A$  ( $650\Omega$ ) nominal

#### Line fault detection (LFD) (when selected)

User-selectable via switches on the side of the unit.

Open-circuit alarm on if  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact input

$500\Omega$  to  $1k\Omega$  in series with switch

$20k\Omega$  to  $25k\Omega$  in parallel with switch

#### Safe-area outputs

Floating solid-state outputs compatible with logic circuits

Operating frequency: dc to 500Hz

Max. off-state voltage:  $\pm 35V$

Max. off-state leakage current:  $\pm 50\mu A$

Max. on-state resistance:  $25\Omega$

Max. on-state current:  $\pm 50mA$

#### 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)

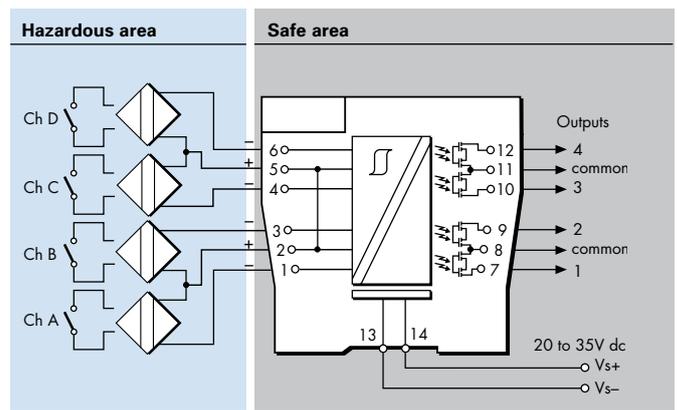
#### Power dissipation within unit

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

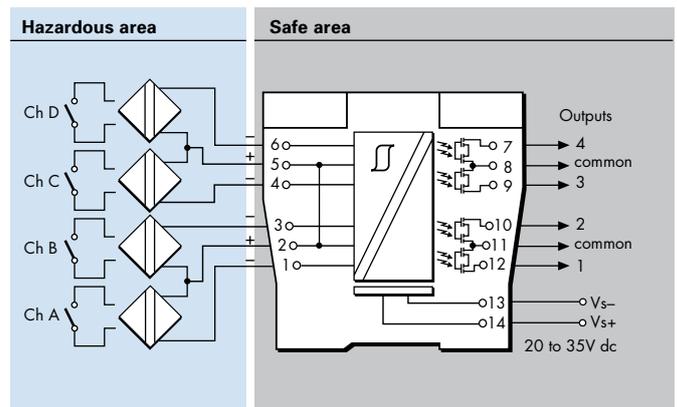


Table 1 - Mode options

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.	prox. detector + LFD
8	chA	chB	chC	chD	
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.

# 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  $1k\Omega \pm 10\%$

#### Input/output characteristics

Normal phase

Outputs closed if input  $> 2.1mA$  ( $< 2k\Omega$  in input circuit)

Outputs open if input  $< 1.2mA$  ( $> 10k\Omega$  in input circuit)

Hysteresis:  $200\mu A$  ( $650\Omega$ ) nominal

#### Line fault detection (LFD) (when selected)

User-selectable via switches on the side of the unit.

Open-circuit alarm on if  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact input

$500\Omega$  to  $1k\Omega$  in series with switch

$20k\Omega$  to  $25k\Omega$  in parallel with switch

#### Safe-area outputs

Floating solid-state outputs compatible with logic circuits

Operating frequency: dc to 500Hz

Max. off-state voltage:  $\pm 35V$

Max. off-state leakage current:  $\pm 50\mu A$

Max. on-state resistance:  $25\Omega$

Max. on-state current:  $\pm 50mA$

#### 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)

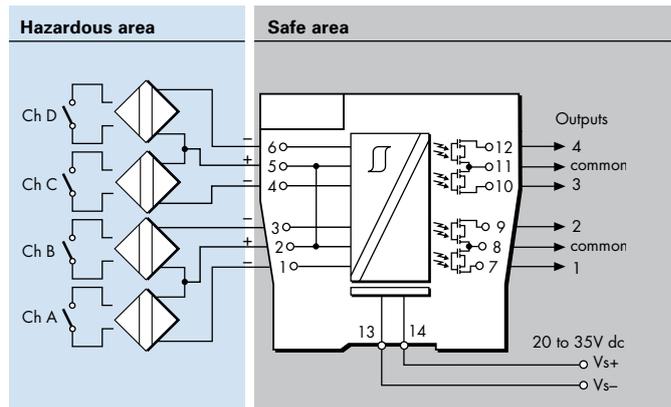
#### Power dissipation within unit

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

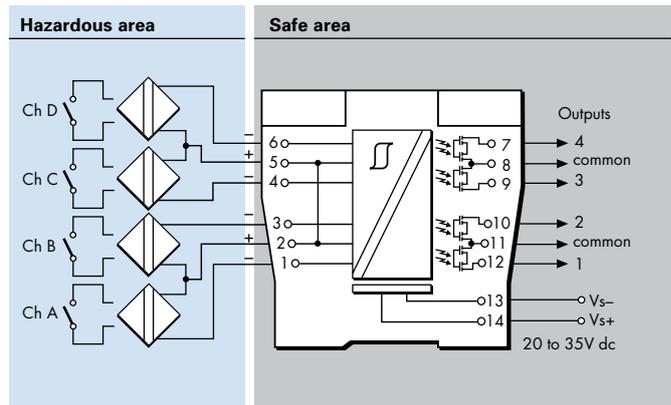


Table 1 - Mode options

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 reversed on all outputs	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	As mode 2 but with LFD enabled on both inputs	MTL4016
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  $1k\Omega \pm 10\%$

#### Input/output characteristics

Normal phase

Outputs closed if input  $> 2.1mA$  ( $< 2k\Omega$  in input circuit)

Outputs open if input  $< 1.2mA$  ( $> 10k\Omega$  in input circuit)

Hysteresis:  $200\mu A$  ( $650\Omega$ ) 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  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

*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

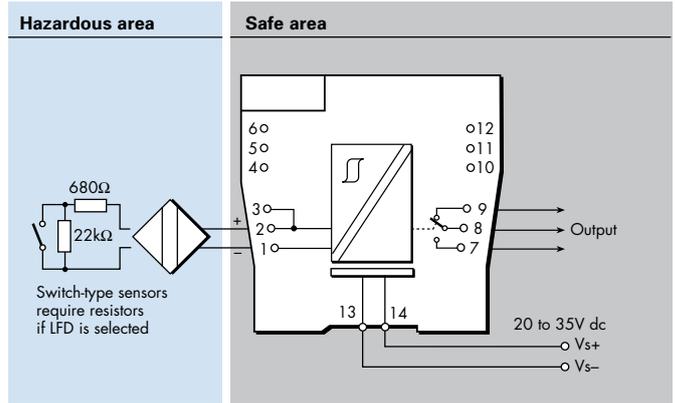
Single pole relay with changeover contacts

*Note: reactive loads must be adequately suppressed*

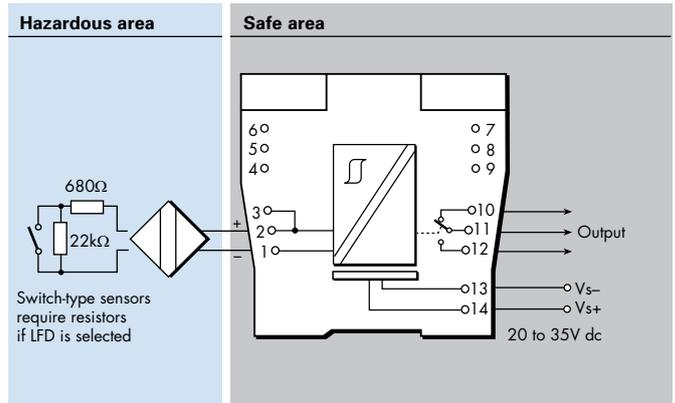
#### Relay characteristics

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

### MTL4511



### MTL5511



#### 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety

redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual.

# 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  $1k\Omega \pm 10\%$

#### Input/output characteristics

Normal phase

Outputs closed if input  $> 2.1mA$  ( $< 2k\Omega$  in input circuit)

Outputs open if input  $< 1.2mA$  ( $> 10k\Omega$  in input circuit)

Hysteresis:  $200\mu A$  ( $650\Omega$ ) 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  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact input

$500\Omega$  to  $1k\Omega$  in series with switch

$20k\Omega$  to  $25k\Omega$  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

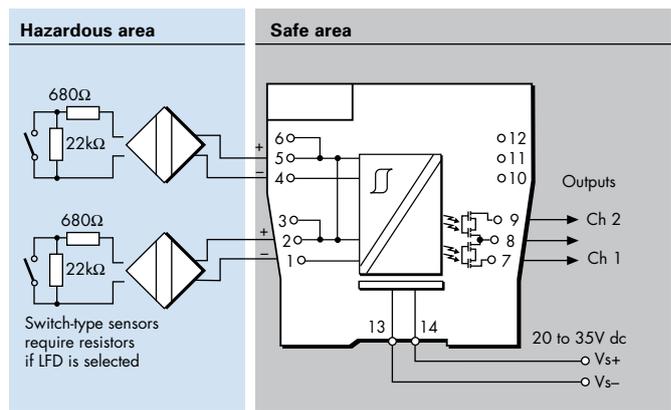
Max. off-state voltage:  $\pm 35V$

Max. off-state leakage current:  $\pm 50\mu A$

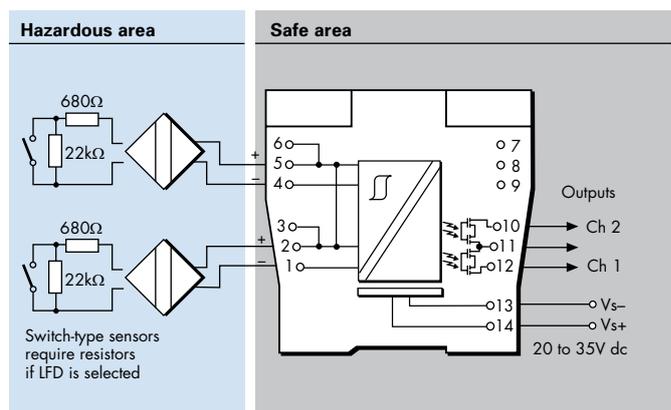
Max. on-state resistance:  $25\Omega$

Max. on-state current:  $\pm 50mA$

### MTL4513



### MTL5513



#### 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 1k $\Omega$   $\pm$ 10%

### Input/output characteristics

Normal phase

Outputs closed if input > 2.1mA (< 2k $\Omega$  in input circuit)

Outputs open if input < 1.2mA (> 10k $\Omega$  in input circuit)

Hysteresis: 200 $\mu$ A (650 $\Omega$ ) 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  $I_{in} < 50\mu$ A

Open-circuit alarm off if  $I_{in} > 250\mu$ A

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact input

500 $\Omega$  to 1k $\Omega$  in series with switch

20k $\Omega$  to 25k $\Omega$  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

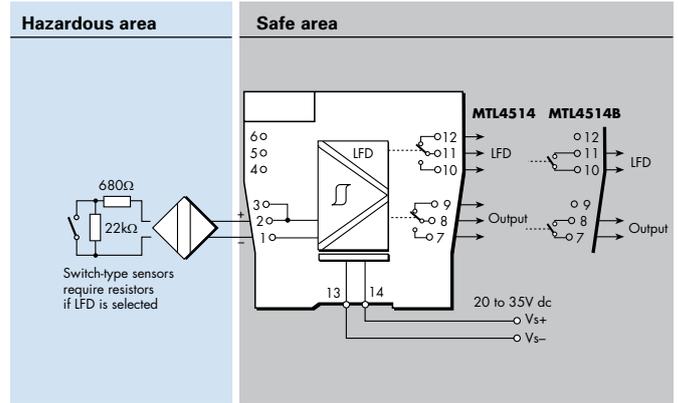
LFD: Single pole relay

Note: reactive loads must be adequately suppressed

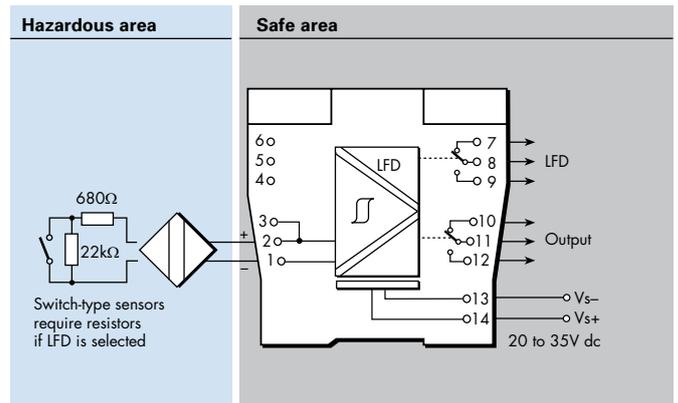
### Relay characteristics

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

## MTL4514/B



## MTL5514



### 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety

redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual.

# 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 EN 60947–5–6:2001 standards for proximity detectors (NAMUR)

#### Voltage applied to sensor

7 to 9V dc from  $1k\Omega \pm 10\%$

#### Input/output characteristics

Normal phase

Outputs closed if input  $> 2.1mA$  ( $< 2k\Omega$  in input circuit)

Outputs open if input  $< 1.2mA$  ( $> 10k\Omega$  in input circuit)

Hysteresis:  $200\mu A$  ( $650\Omega$ ) 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  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact input  
 $500\Omega$  to  $1k\Omega$  in series with switch  
 $20k\Omega$  to  $25k\Omega$  in parallel with switch

#### Safe-area output

MTL4514D: two, single pole relays with normally-open contacts

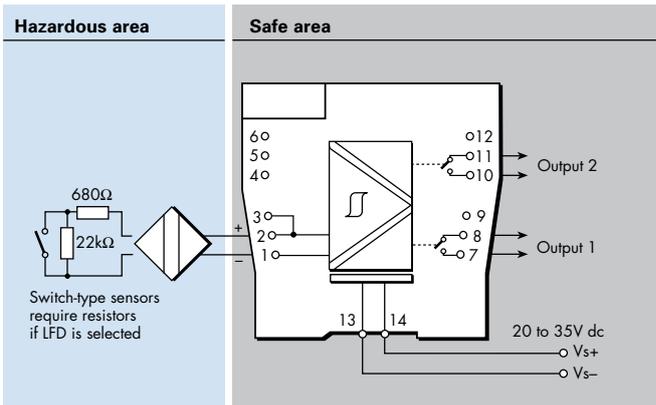
MTL5514D: two, single pole relays with changeover contacts

Note: reactive loads must be adequately suppressed

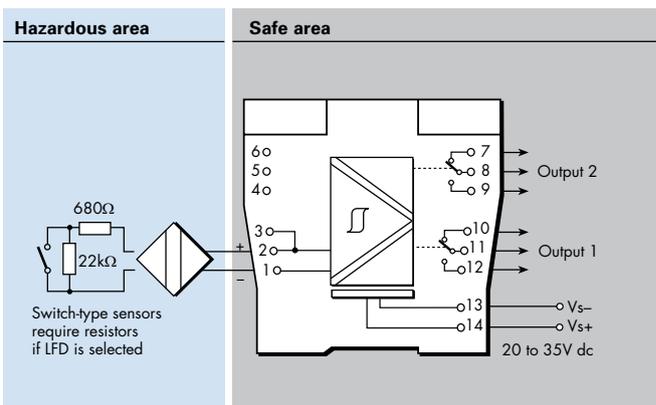
#### Relay characteristics

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

### MTL4514D



### MTL5514D



#### 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

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



#### SIL capable

These models have been assessed for use in IEC 61508 functional safety applications. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual

# MTL4514N

## SWITCH/ PROXIMITY DETECTOR INTERFACE

1-channel, line fault detection, phase reversal

The MTL4514N 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. Resistors, fitted in series with the relay contacts, and when connectors in parallel, permit LFD pass-through to the system input.

### 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 1k $\Omega$   $\pm$ 10%

#### Input/output characteristics

Normal phase

Outputs closed if input > 2.1mA (< 2k $\Omega$  in input circuit)

Outputs open if input < 1.2mA (> 10k $\Omega$  in input circuit)

Hysteresis: 200 $\mu$ A (650 $\Omega$ ) 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  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

*Note: Resistors must be fitted when using the LFD facility with a contact input  
500 $\Omega$  to 1k $\Omega$  in series with switch  
20k $\Omega$  to 25k $\Omega$  in parallel with switch*

#### Safe-area output

Channel: Single pole relay in series with 2k2 $\Omega$  resistor

LFD: Single pole relay in series with 15k $\Omega$  resistor

*Note: reactive loads must be adequately suppressed*

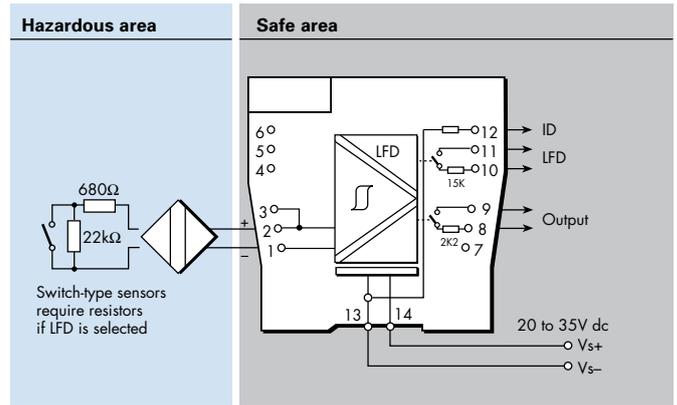
#### Relay characteristics

MTL4514N	
Response time:	10ms maximum
Contact rating (Safe Area):	10W, 0.5A, 35V dc
Contact rating (Zone 2):	10W, 0.5A, 35V dc

#### ID Resistor

18k $\Omega$

### MTL4514N



#### 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

*See data on MTL web site and refer to the safety manual.*

# 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 1k $\Omega$   $\pm$ 10%

#### Input/output characteristics

Normal phase

Outputs closed if input > 2.1mA (< 2k $\Omega$  in input circuit)

Outputs open if input < 1.2mA (> 10k $\Omega$  in input circuit)

Hysteresis: 200 $\mu$ A (650 $\Omega$ ) 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  $I_{in} < 50\mu$ A

Open-circuit alarm off if  $I_{in} > 250\mu$ A

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact

input

500 $\Omega$  to 1k $\Omega$  in series with switch

20k $\Omega$  to 25k $\Omega$  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, $\cos\phi > 0.7$ , 40V dc, 2A, resistive load
Contact rating (Zone 2):	10W, 0.5A, 35V dc	35V, 2A, 100VA.

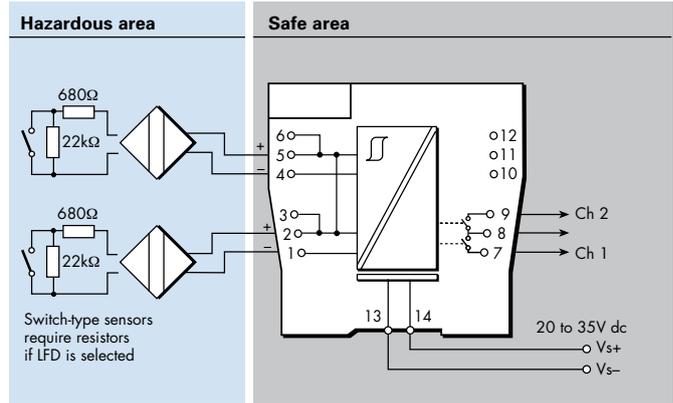
#### Maximum current consumption

35mA at 24V

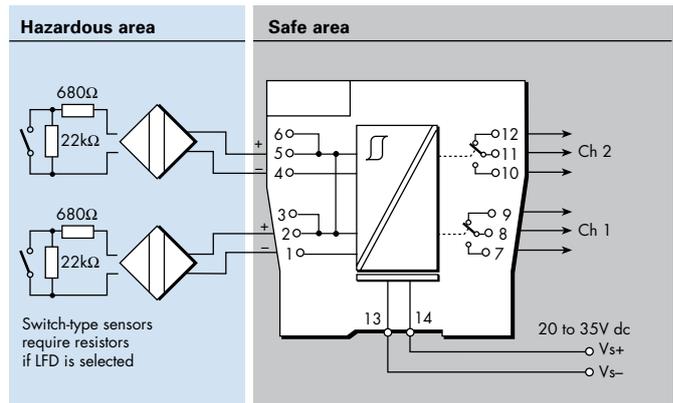
#### Power dissipation within unit

0.84W at 24V

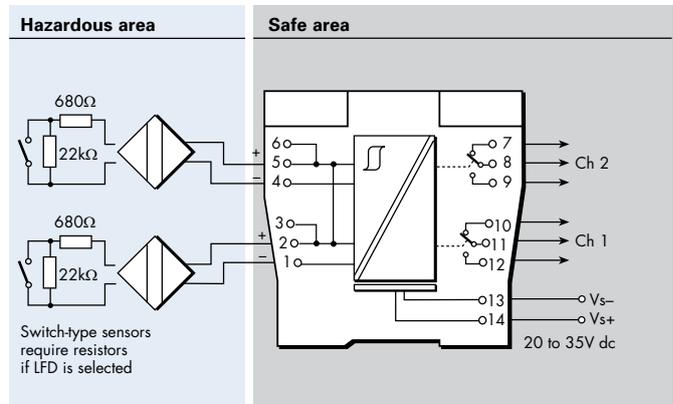
### MTL4516



### MTL4516C



### MTL5516C



#### 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. SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual

# 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  $1k\Omega \pm 10\%$

#### Input/output characteristics

Normal phase

Outputs closed if input  $> 2.1mA$  ( $< 2k\Omega$  in input circuit)

Outputs open if input  $< 1.2mA$  ( $> 10k\Omega$  in input circuit)

Hysteresis:  $200\mu A$  ( $650\Omega$ ) 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  $I_{in} < 50\mu A$

Open-circuit alarm off if  $I_{in} > 250\mu A$

Short-circuit alarm on if  $R_{in} < 100\Omega$

Short-circuit alarm off if  $R_{in} > 360\Omega$

Note: Resistors must be fitted when using the LFD facility with a contact input  
 $500\Omega$  to  $1k\Omega$  in series with switch  
 $20k\Omega$  to  $25k\Omega$  in parallel with switch

#### Safe-area output

Channel: Two single-pole relays with normally open contacts

LFD: Single pole relay with changeover contact (MTL4517)

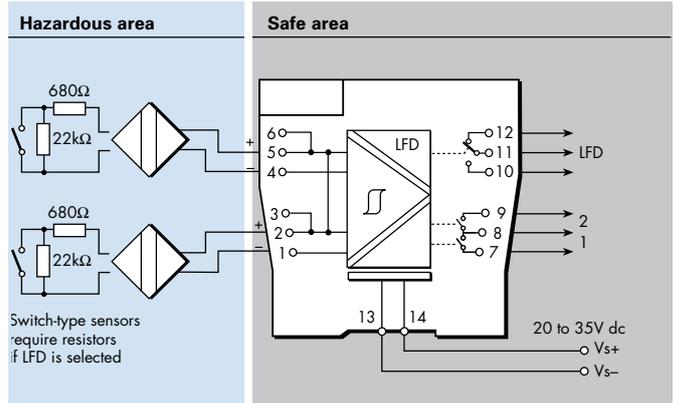
Single pole relay with normally open contact (MTL5517)

Note: reactive loads must be adequately suppressed

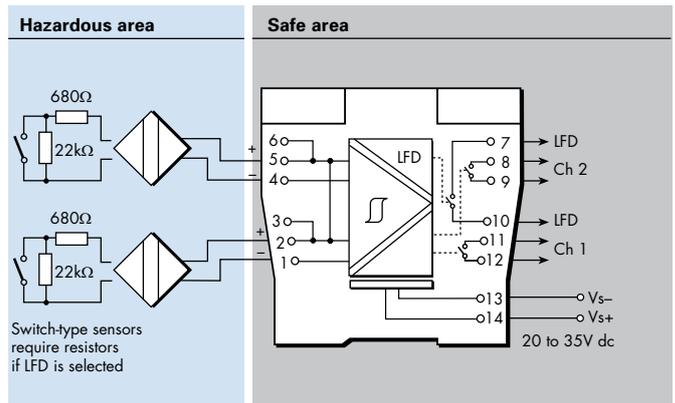
#### Relay characteristics

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

### MTL4517



### MTL5517



#### Maximum current consumption

35mA at 24V

#### Power dissipation within unit

0.84W at 24V

#### 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual.

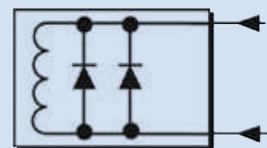
## Isolator applications

### 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 I <sub>max</sub> = 48mA	IIC gas groups, loop powered
-	MTL5522	1	9.9V<Vo<21.4V I <sub>max</sub> = 70mA	IIB gas groups, loop powered
MTL4523/R	MTL5523	1	12.8V<Vo<24V I <sub>max</sub> = 48mA	Independent LFD output
MTL4523L	-	1	12.8V<Vo<24V I <sub>max</sub> = 48mA	Loop powered, independent LFD output
MTL4523V/VL	MTL5523V/VL	1	12.8V<Vo<24V I <sub>max</sub> = 48mA	Solenoid/alarm driver with line fault detection
MTL4524	MTL5524	1	12.8V<Vo<24V I <sub>max</sub> = 48mA	Safety override feature, separately powered
MTL4524S	-	1	12.8V<Vo<24V I <sub>max</sub> = 48mA	Safety override feature, separately powered
MTL4525	MTL5525	1	7V<Vo<24V I <sub>max</sub> = 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 – MTL521

## 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



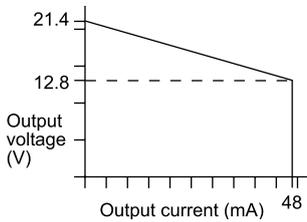
#### Number of channels

One

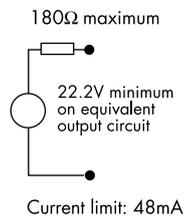
#### Location of load

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

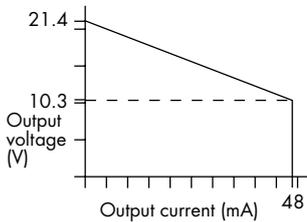
#### Minimum output voltage (MTLx521)



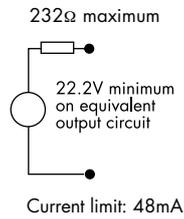
#### Equivalent output circuit



#### Minimum output voltage (MTL4521L)



#### Equivalent output circuit



#### Input voltage

20 to 35V dc

#### Hazardous-area output (MTLx521)

Minimum output voltage: 13.6V at 48mA  
Maximum output voltage: 24V from 180Ω  
Current limit: 48mA minimum

#### Hazardous-area output (MTL4521L)

Minimum output voltage: 11.1V at 48mA  
Maximum output voltage: 24V from 232Ω  
Current limit: 48mA minimum

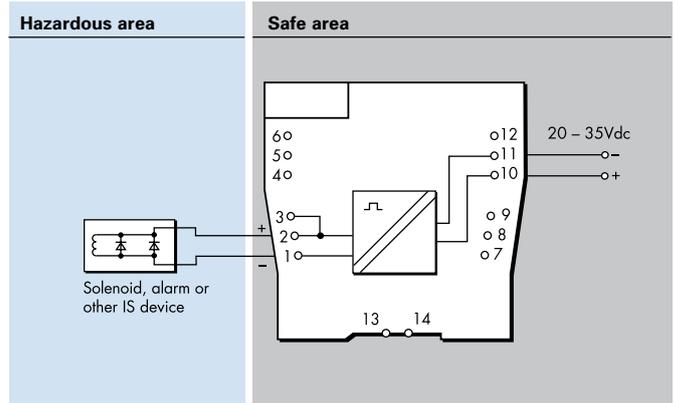
#### Output ripple

< 0.5% of maximum output, peak to peak

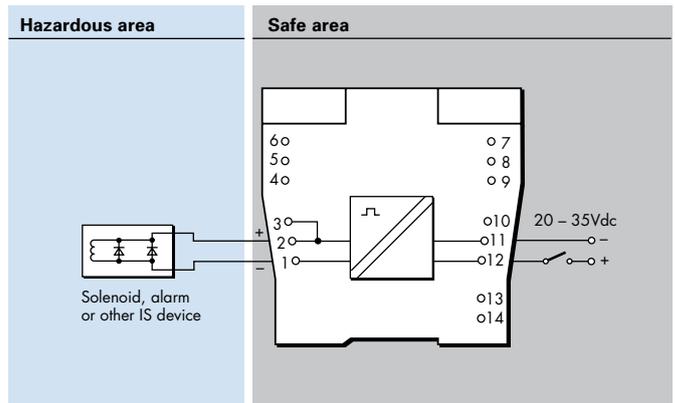
#### Response time

Output within 10% of final value within 100ms

### MTL4521 / MTL4521L



### MTL521



#### 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. SIL3 capable for a single device (HFT=0) when the required function is to de-energise the output.

SIL1 capable for a single device (HFT=0) when the required function is to energise the output.

See data on MTL web site and refer to the safety manual.

# 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



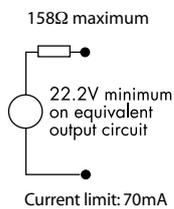
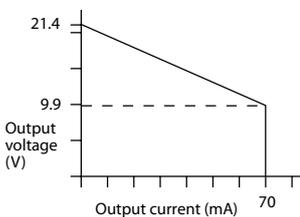
#### Number of channels

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: 10.7V at 70mA  
Maximum output voltage: 24V from 158Ω  
Current limit: 70mA minimum

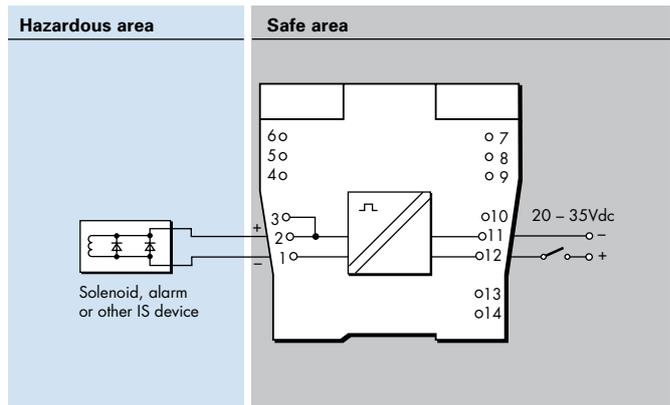
#### Output ripple

< 0.5% of maximum output, peak to peak

#### Response time

Output within 10% of final value within 100ms

### MTL5522



#### 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. SIL3 capable for a single device (HFT=0) when the required function is to de-energise the output. SIL1 capable for a single device (HFT=0) when the required function is to energise the output.

See data on MTL web site and refer to the safety manual.

# 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



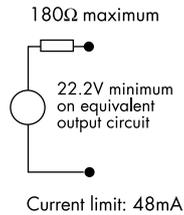
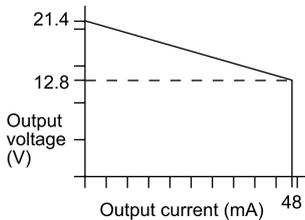
#### Number of channels

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: 13.6V at 48mA  
Maximum output voltage: 24V from 180Ω  
Maximum off-state output voltage: 4V from 180Ω  
Current limit: 48mA minimum

#### 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

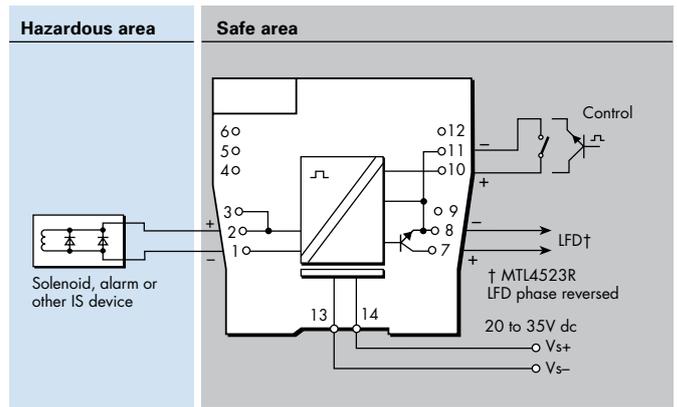
Output within 10% of final value within 100ms

#### Line fault detection (LFD)

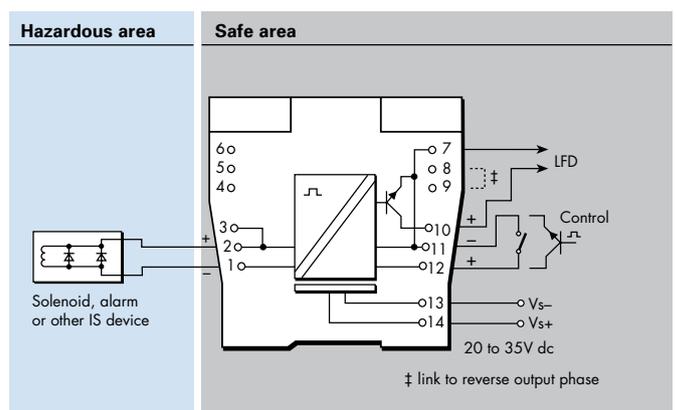
Open or short circuit in field cabling *de-energises*\* solid state line-fault signal.  
LFD transistor is switched *on*\*, provided that the field circuit impedance is > 55Ω and < 4kΩ.

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

### MTL4523 / MTL4523R



### MTL5523



#### 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

U<sub>o</sub>=25V I<sub>o</sub>=147mA P<sub>o</sub>=0.92W U<sub>m</sub>=253V rms or dc



#### SIL capable

These models have been assessed for use in IEC 61508 functional safety applications. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual.

# 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



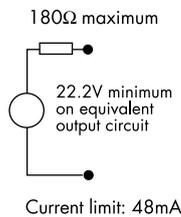
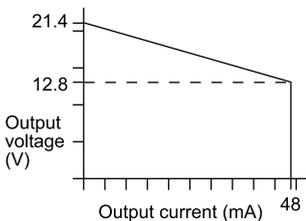
#### Number of channels

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: 13.6V at 48mA  
Maximum output voltage: 24V from 180Ω  
Current limit: 48mA minimum

#### Output ripple

< 0.5% of maximum output, peak to peak

#### Response time

Output within 10% of final value within 100ms

#### Line fault detection (LFD)

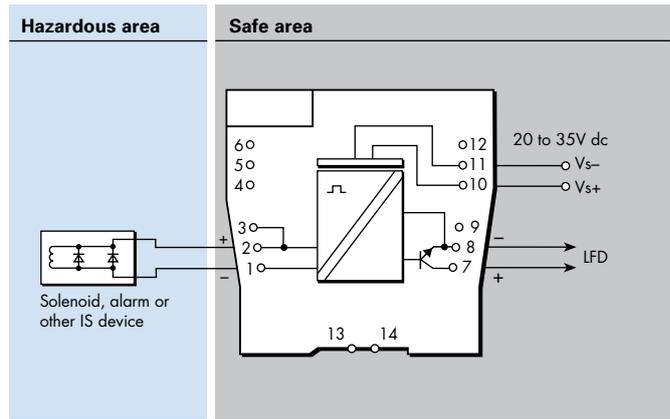
Open or short circuit in field cabling energises solid state line fault signal  
LFD transistor is switched on, provided that the field circuit impedance is > 55Ω and < 4kΩ.

#### 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



#### 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. SIL3 capable for a single device (HFT=0) when the required function is to de-energise the output. SIL1 capable for a single device (HFT=0) when the required function is to energise the output.  
See data on MTL web site and refer to the safety manual.

# 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



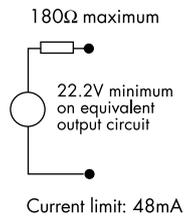
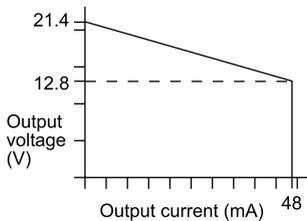
#### Number of channels

One

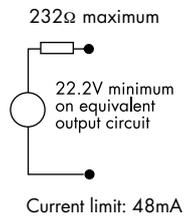
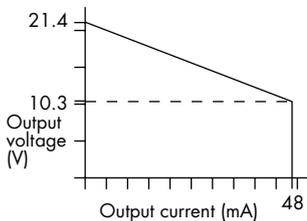
#### Location of load

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

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



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



#### Hazardous-area output (MTLx523V)

Minimum output voltage: 13.6V at 48mA  
Maximum output voltage: 24V from 180Ω  
Maximum off-state output voltage: 4V from 180Ω  
Current limit: 48mA minimum

#### Hazardous-area output (MTLx523VL)

Minimum output voltage: 11.1V at 48mA  
Maximum output voltage: 24V from 232Ω  
Maximum off-state output voltage: 4V from 232Ω  
Current limit: 48mA minimum

#### Output ripple

< 0.5% of maximum output, peak to peak

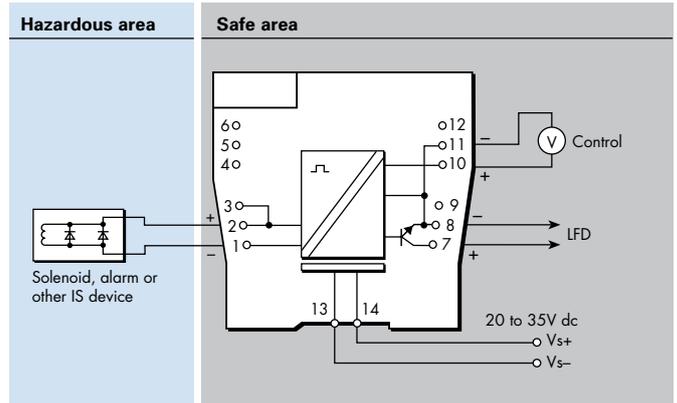
#### Control input

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

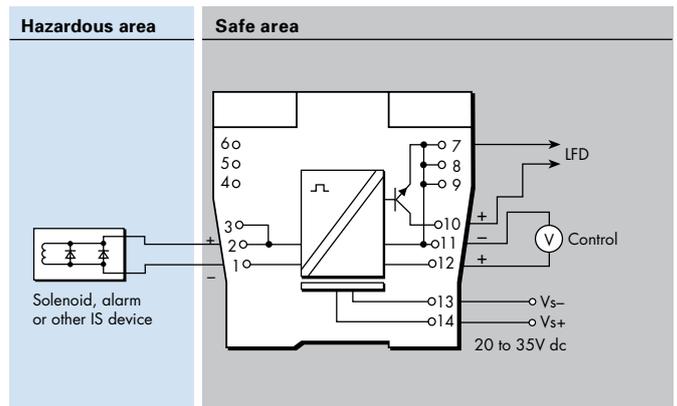
#### Response time

Output within 10% of final value within 100ms

### MTL4523V/MTL4523VL



### MTL5523V/MTL5523VL



#### 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. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual.

# 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



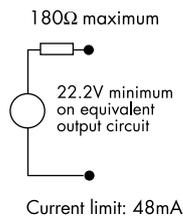
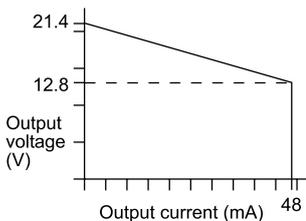
### Number of channels

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

Minimum output voltage: 13.6V at 48mA  
Maximum output voltage: 24V from 180Ω  
Maximum off-state output voltage: 4V from 180Ω  
Current limit: 48mA minimum

### 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

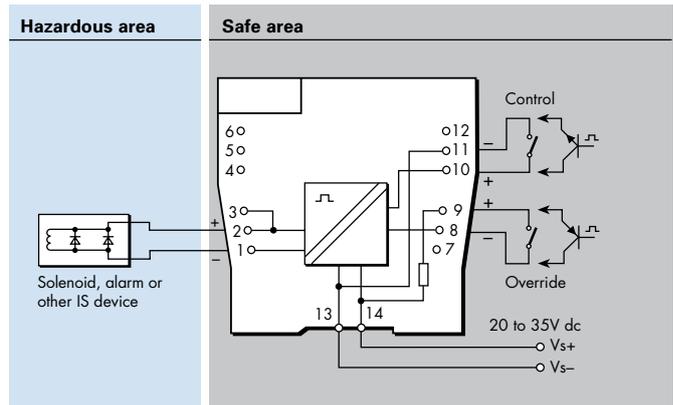
### Control and override inputs on MTL4524

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

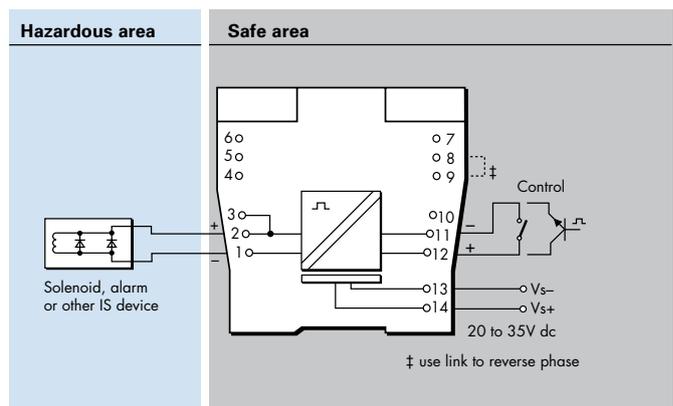
### Response time

Output within 10% of final value within 100ms

## MTL4524



## MTL5524



### 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. SIL2 capable for a single device (HFT=0)  
SIL3 capable for multiple devices in safety redundant configurations (HFT=1)  
See data on MTL web site and refer to the safety manual.

# 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

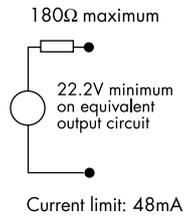
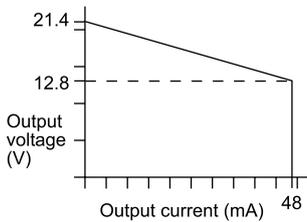
#### Number of channels

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: 13.6V at 48mA  
Maximum output voltage: 24V from 180Ω  
Maximum off-state output voltage: 4V from 180Ω  
Current limit: 48mA minimum

#### 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)

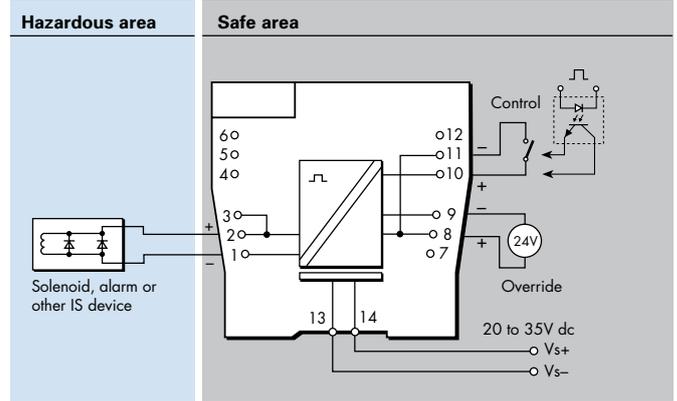
#### Control and override inputs

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



#### 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual.

# 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



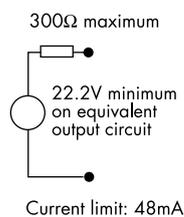
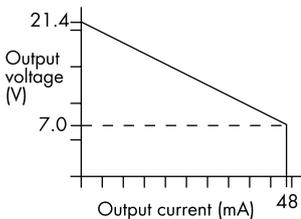
#### Number of channels

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

Minimum output voltage: 7.8V at 48mA  
Maximum output voltage: 24V from 300Ω  
Maximum off-state output voltage: 4V from 300Ω  
Current limit: 48mA minimum

#### 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

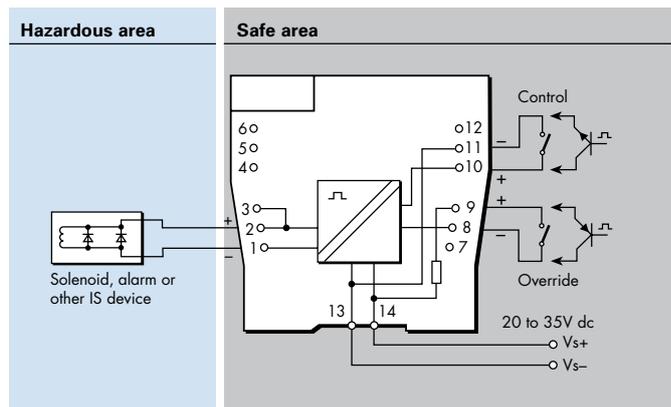
#### Control and override inputs on MTL4525

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

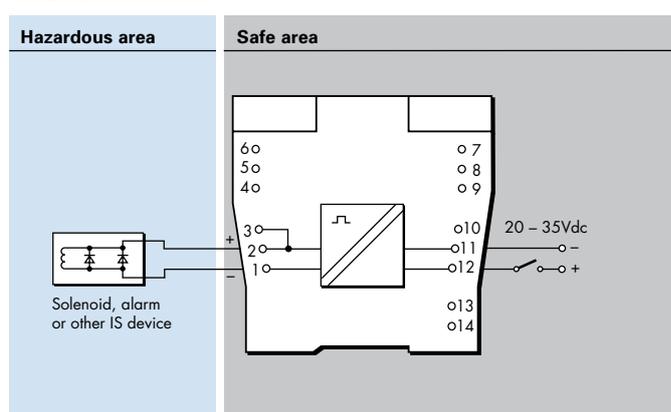
#### Response time

Output within 10% of final value within 100ms

### MTL4525



### MTL5525



#### 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.

SIL2 (SIL3 for MTL5525) capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual.

# 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  $< 450\Omega$  or  $< 1V$  applied

Relay de-energised if  $> 5k\Omega$  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 ac, limited to 40V dc for IS applications, 2A (reactive loads must be suppressed)

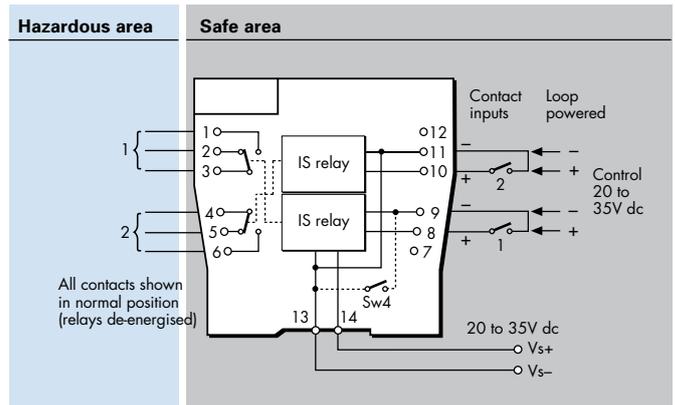
#### Contact life expectancy

$2 \times 10^7$  operations at maximum IS load

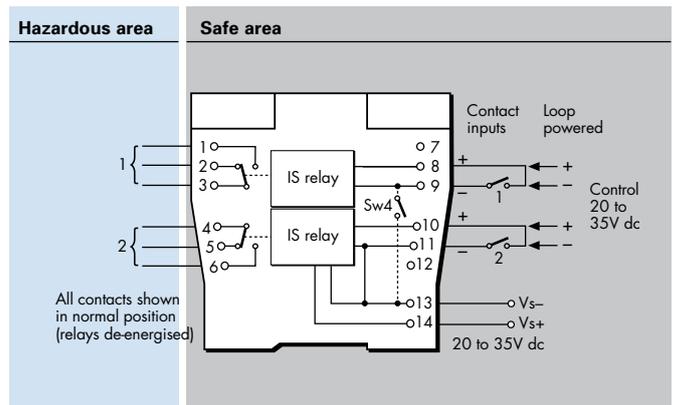
#### Relay drive (see switch setting table)

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, $V_s$

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

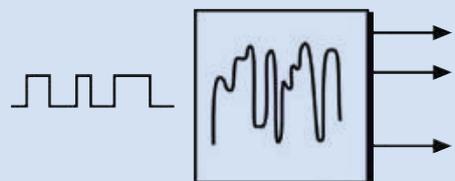
#### User switch settings for operating mode

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

## 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 pulse



# 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

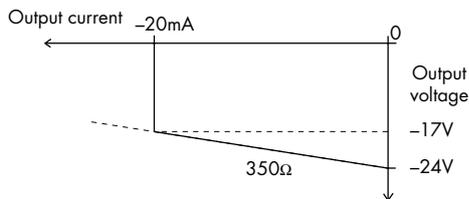
#### Location of signal source

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

#### Hazardous-area input

Input impedance  
(terminals 2 & 3): 10k $\Omega$

#### 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

$\leq \pm 50$ mV

#### AC transfer accuracy at 20°C

0Hz to 1kHz:  $\pm 1\%$   
1kHz to 10kHz: -5% to +1%  
10kHz to 20kHz: -10% to +1%

#### Temperature coefficient

$\pm 50$ ppm/ $^{\circ}$ C (10 to 65 $^{\circ}$ C)  
 $\pm 100$ ppm/ $^{\circ}$ C (-20 to 10 $^{\circ}$ C)

#### Voltage bandwidth

-3dB at 47kHz (typical)

#### Phase response

<14 $\mu$ s, equivalent to:  
-1 $^{\circ}$  at 200Hz  
-3 $^{\circ}$  at 600Hz  
-5 $^{\circ}$  at 1kHz  
-50 $^{\circ}$  at 10kHz  
-100 $^{\circ}$  at 20kHz

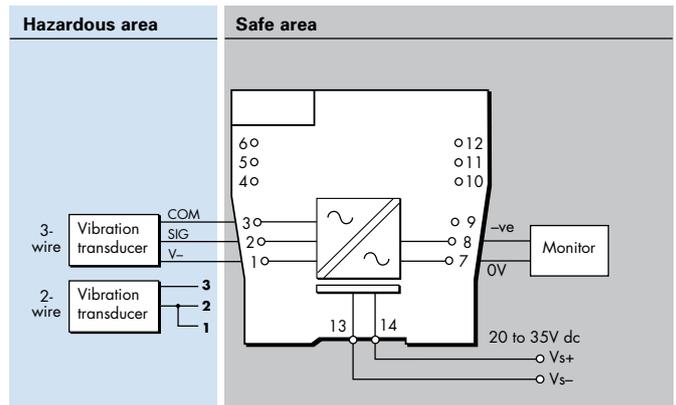
#### Safe-area output impedance

<20 $\Omega$

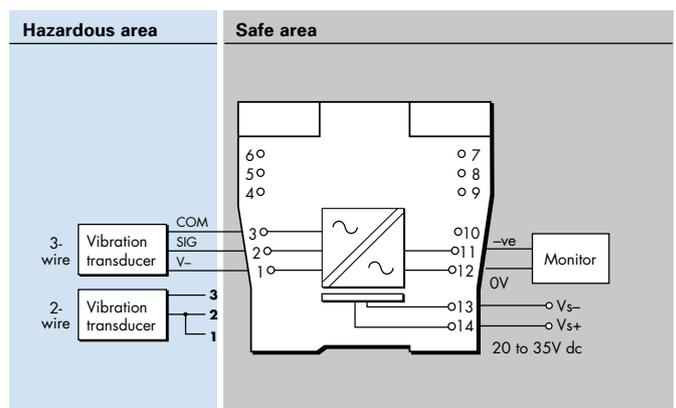
#### LED indicator

Green: power indication

### MTL4531



### MTL5531



#### Supply voltage

20 to 35V dc

#### Maximum current consumption (10mA transducer load)

65mA at 24V

#### Maximum power dissipation within unit

1.33W

#### Safety description

##### Terminals 3 to 1

$U_o = 26.6$ V  $I_o = 94$ mA  $P_o = 0.66$ W  $U_m = 253$ V rms or dc

##### Terminals 3 to 2

Non-energy-storing apparatus  $\leq 1.5$ V,  $\leq 0.1$ A and  $\leq 25$ mW



#### SIL capable

These models have been assessed for use in IEC 61508 functional safety applications. SIL1 capable for a single device (HFT=0) SIL2 capable for multiple devices in safety redundant configuration (HFT=1) See data on MTL web site and refer to the safety manual.

# 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 1k $\Omega$  nominal

Output ON if input > 2.1mA\* (< 2k $\Omega$ )

Output OFF if input < 1.2mA\* (> 10k $\Omega$ )

Switching hysteresis: 0.2mA (650 $\Omega$ ) nominal

\*NAMUR and BS EN 60947-5-6:2001 standards

#### 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: > 10k $\Omega$

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: 10 $\mu$ s

Maximum off-state voltage: 35V

Maximum off-state leakage current: 10 $\mu$ A

Maximum on-state resistance: 25 $\Omega$

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 450 $\Omega$  @20mA

Output resistance: >1M $\Omega$

Ripple: < 50 $\mu$ A peak-to-peak

Accuracy: better than 20 $\mu$ A at 20 $^{\circ}$ C

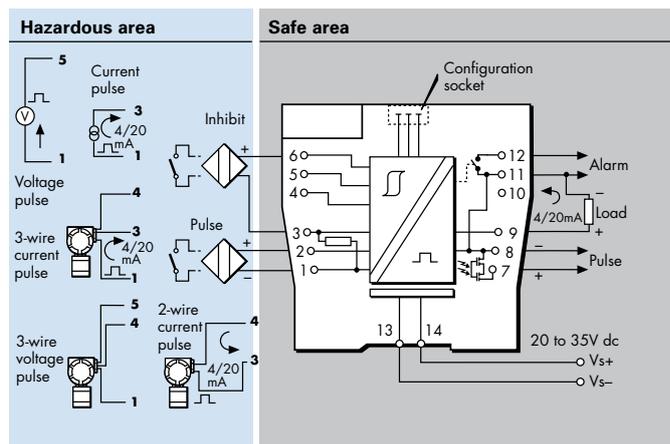
Temperature drift: < 1 $\mu$ A/ $^{\circ}$ C

Risetime (10% - 90%, after step change): 60 ms

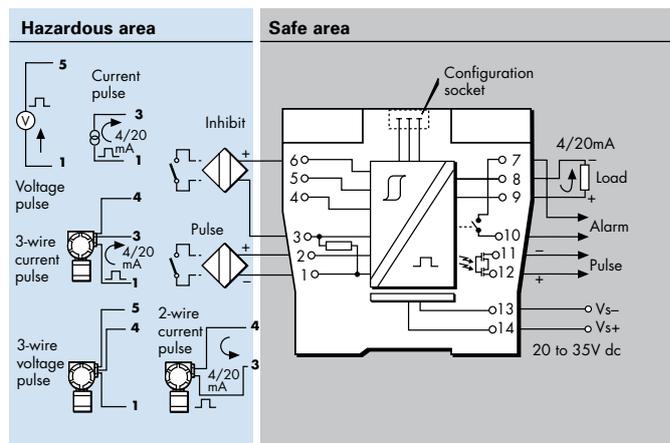
### Alarm output

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

## MTL4532



## MTL5532



### Pulse width

High: 10 $\mu$ s min

Low: 10 $\mu$ s 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  $\leq 1.5V$ ,  $\leq 0.1A$  and  $\leq 25mW$ ; can be connected without further certification into any IS loop with an open-circuit voltage <28V

#### Terminals 5 to 4 and 1

$V_{max} \leq 28V$ ,  $I_{max} \leq 94mA$ ,  $P_{max} \leq 0.66W$

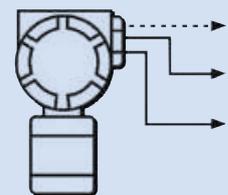
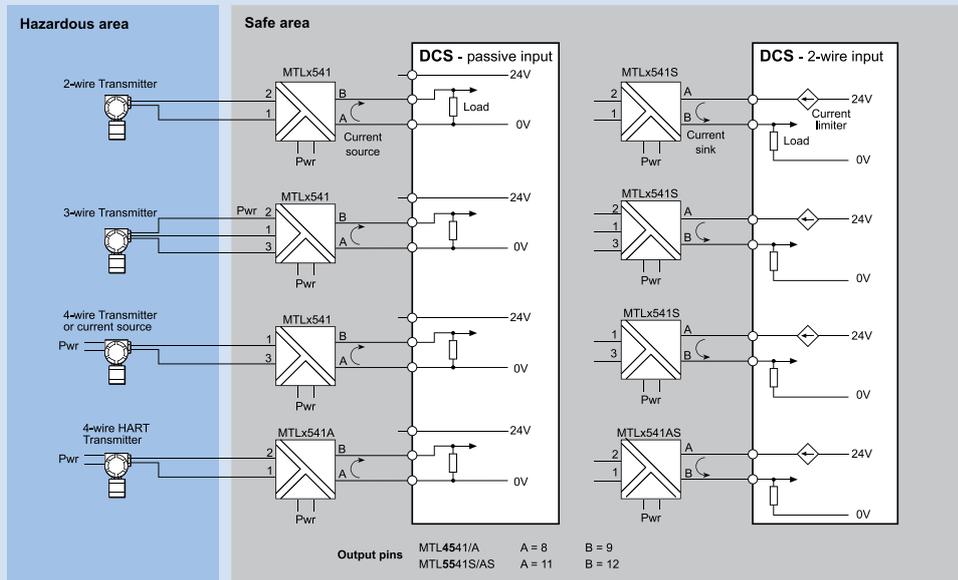
### Configurator

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

**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
MTL4541T	-	1	14V min @ 20mA	Alternative to MTL4541 for long field lines
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

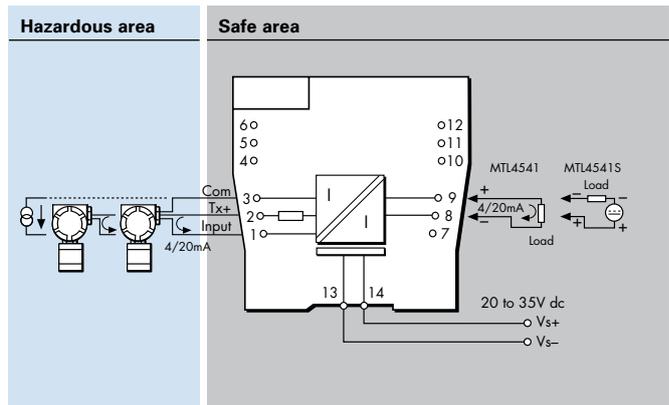
### Response time

Settles to within 10% of final value within 50μs

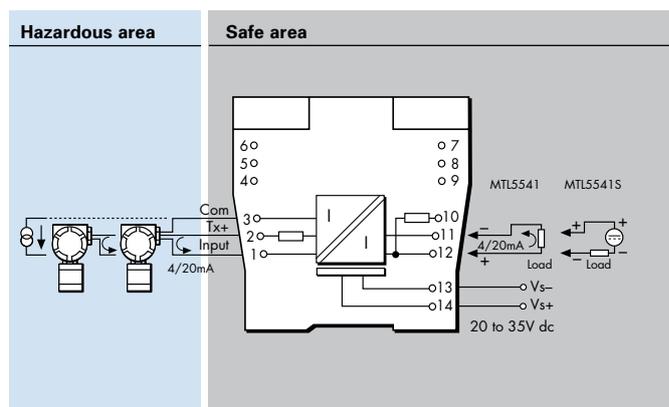
### Communications supported

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  $\leq 1.5V$ ,  $\leq 0.1A$  and  $\leq 25mW$ ; 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.  
SIL2 capable for a single device (HFT=0)  
SIL3 capable for multiple devices in safety redundant configurations (HFT=1)  
See data on MTL web site and refer to the safety manual.

# 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

### LED indicator

Green: power indication

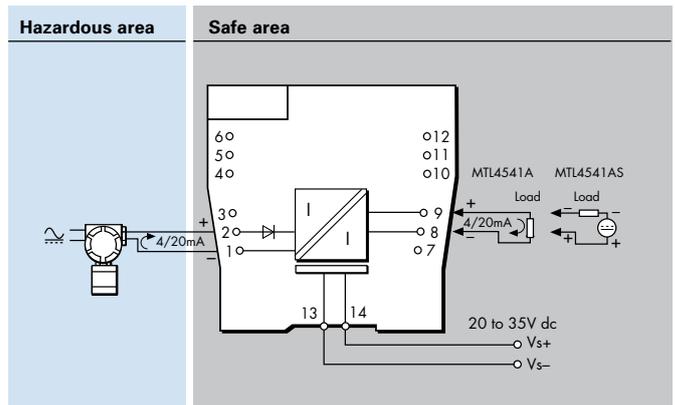
### Power requirement (with 20mA signal)

50mA at 20V

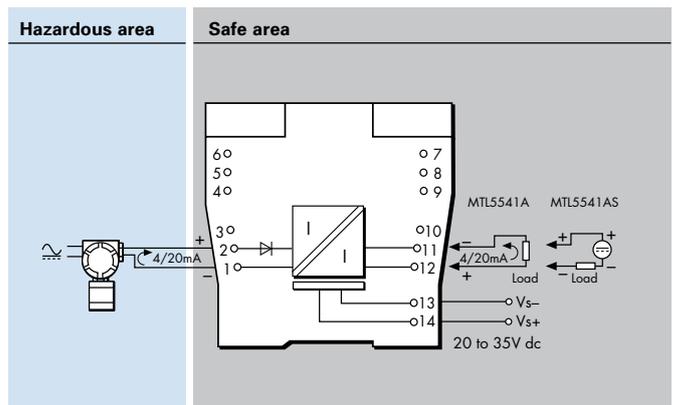
45mA at 24V

35mA at 35V

## MTL4541A / MTL4541AS



## MTL5541A / MTL5541AS



### 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  $\leq 1.5V$ ,  $\leq 0.1A$  and  $\leq 25mW$ ; 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual.

# MTL4541T

## REPEATER POWER SUPPLY

4/20mA, 2- or 3-wire transmitters using long field lines

The MTL4541T 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. Separately powered current sources, such as 4-wire transmitters, can be connected but will not support HART communication. The reduced maximum open-circuit voltage permits the use of longer field lines compared to MTL4541.

### 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 250Ω
@ 20mA:	0 to 325Ω

#### Safe-area circuit ripple

< 50μA peak-to-peak

#### Hazardous-area input

Signal range: 0 to 24mA (including over-range)  
Transmitter voltage: 14V at 20mA

#### Transfer accuracy at 20°C

Better than 15μA

#### Temperature drift

< 0.8μA/°C

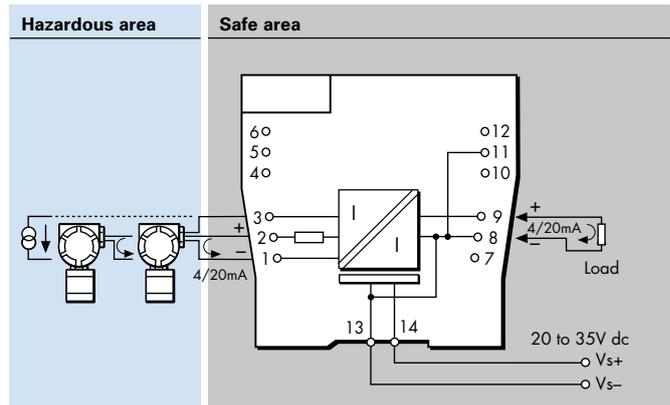
#### Response time

Settles to within 10% of final value within 50μs

#### Communications supported

HART (terminals 1 & 2 only)

### MTL4541T



#### LED indicator

Green: power indication

#### Maximum current consumption (with 20mA signal)

51mA at 24V

#### Power dissipation within unit (with 20mA signal)

0.7W @ 24V dc

#### Safety description

##### Terminals 2 to 1:

$V_s = 22V$   $I_s = 167mA$   $P_o = 920mW$   $U_m = 253V$  rms or dc

##### Terminals 3 to 1:

Simple apparatus  $\leq 1.5V$ ,  $\leq 0.1A$  and  $\leq 25mW$ ; can be connected without further certification into any IS loop with an open-circuit voltage < 28V

# 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

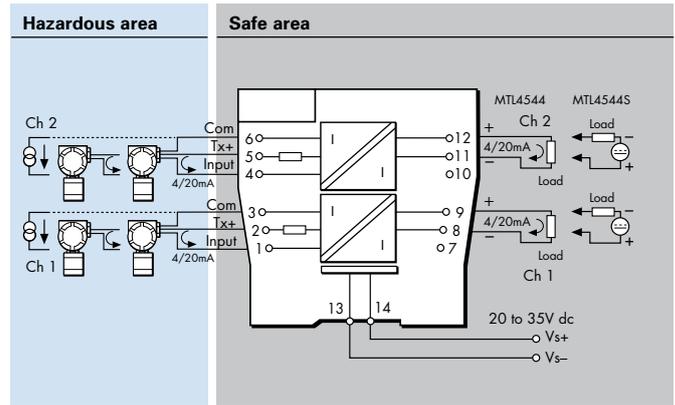
#### Response time

Settles to within 10% of final value within 50μs

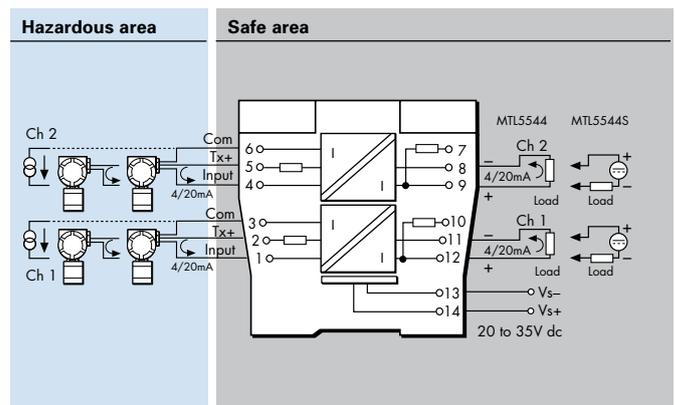
#### Communications supported

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  $\leq 1.5V$ ,  $\leq 0.1A$  and  $\leq 25mW$ ; 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. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual.

# 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 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 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

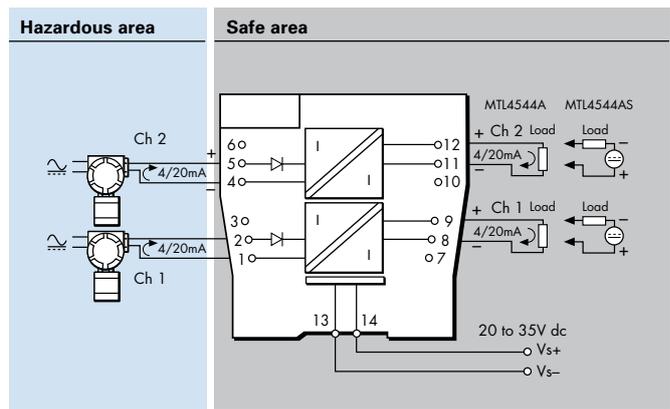
#### LED indicator

Green: power indication

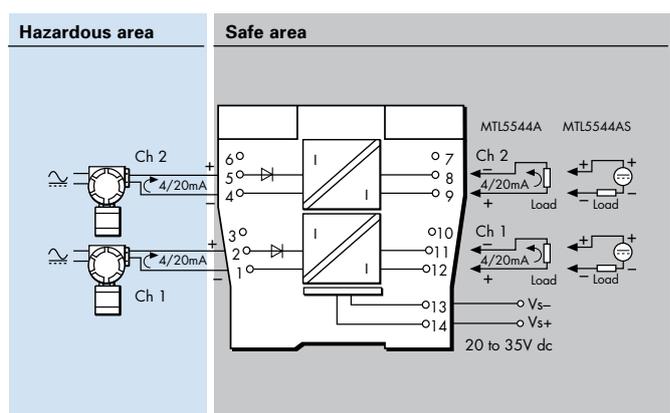
#### Power requirement (with 20mA signal)

70mA at 24V  
85mA at 20V  
50mA at 35V

### MTL4544A / MTL4544AS



### MTL5544A / MTL5544AS



#### 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  $\leq 1.5V$ ,  $\leq 0.1A$  and  $\leq 25mW$ ; 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.

SIL2 capable for a single device (HFT=0)

SIL3 capable for multiple devices in safety redundant configurations (HFT=1)

See data on MTL web site and refer to the safety manual.

# 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

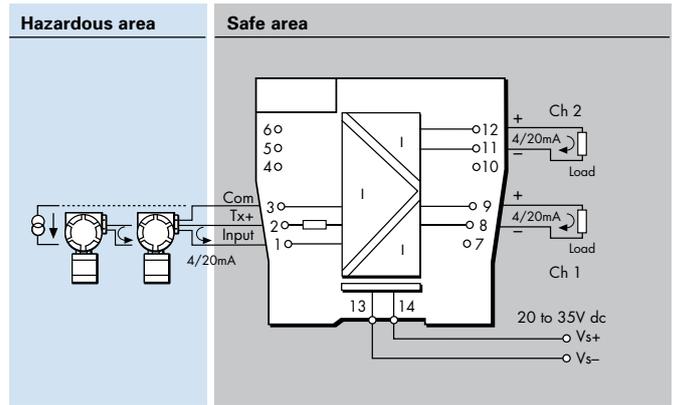
#### Response time

Settles to within 10% of final value within 50μs

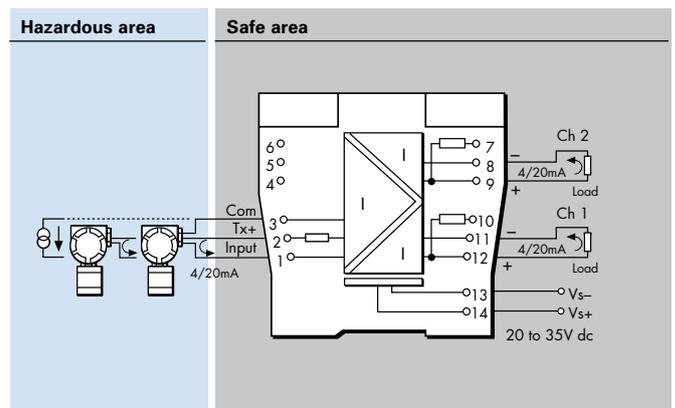
#### Communications supported

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  $\leq 1.5V$ ,  $\leq 0.1A$  and  $\leq 25mW$ ; can be connected without further certification into any IS loop with an open-circuit voltage <28V



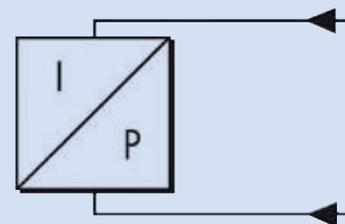
#### SIL capable

These models have been assessed for use in IEC 61508 functional safety applications. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual.

## Isolator applications

### ANALOGUE OUTPUT - CONTROLLER OUTPUTS, I/P CONVERTERS

Backplane device	DIN-rail device	No. of channels	Output to hazardous area	Important features
MTL4546/C/Y	MTL5546/Y	1	1mA <math>i_o</math><math><24\text{mA}</math> <math&gt;v_{\text{max}} 16\text{v}&lt;="" =="" math&gt;<="" td=""> <td>Suitable for HART valve positioners, LFD</td> </math&gt;v_{\text{max}}>	Suitable for HART valve positioners, LFD
MTL4546S	-	1	1mA <math>i_o</math><math><24\text{mA}</math> <math&gt;v_{\text{max}} 16\text{v}&lt;="" =="" math&gt;<="" td=""> <td>Alternative to MTL4546x for long field lines</td> </math&gt;v_{\text{max}}>	Alternative to MTL4546x for long field lines
MTL4549/C/Y	MTL5549/Y	2	1mA <math>i_o</math><math><24\text{mA}</math> <math&gt;v_{\text{max}} 16\text{v}&lt;="" =="" math&gt;<="" td=""> <td>Suitable for HART valve positioners, LFD</td> </math&gt;v_{\text{max}}>	Suitable for HART valve positioners, 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.

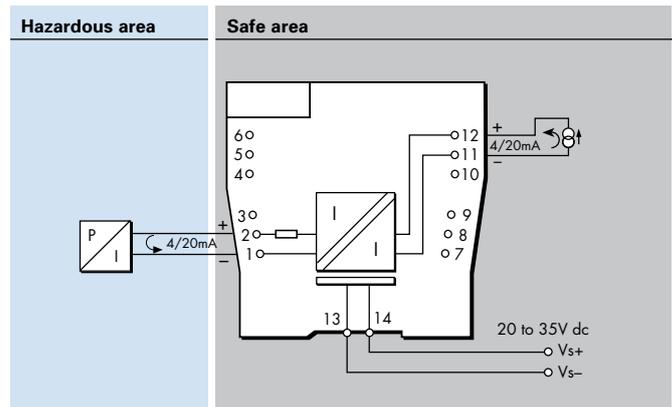
#### Response time

Settles within 200μA of final value within 100ms

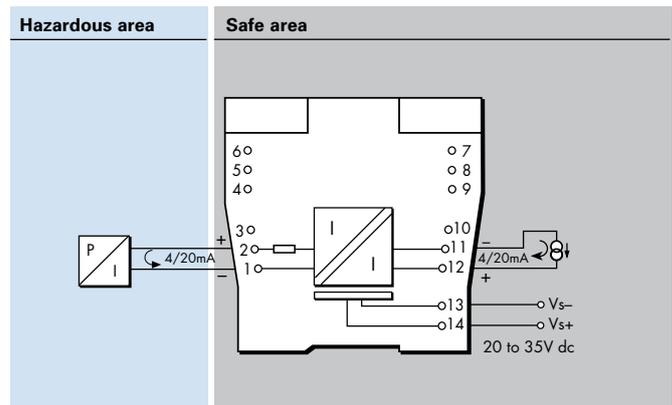
#### Communications supported

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. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual.

# MTL4546S

## ISOLATING DRIVER

for 4–20mA HART® valve positioners with line fault detection and long field lines

The MTL4546S accepts a 4/20mA floating signal from a safe-area controller to drive a current/pressure converter (or any other load up to 710Ω) 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 circuits in the field wiring: if these occur, the current taken into the terminals drops to a preset level. The reduced maximum open-circuit voltage permits the use of longer field lines compared to MTL4546.

### 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

710Ω (14.2V at 20mA)

#### Minimum load resistance

90Ω

#### 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	
Normal	< 6.0V
Open-circuit	< 0.9mA
Short-circuit	N.A.

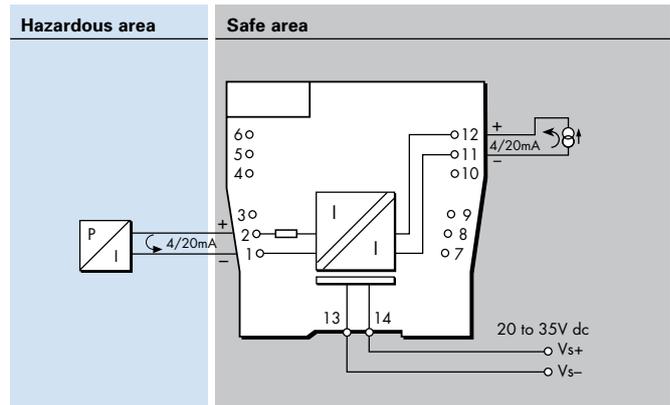
#### Response time

Settles within 200μA of final value within 100ms

#### Communications supported

HART

### MTL4546S



#### 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

$V_o=22V$   $I_o=100mA$   $P_o=550mW$   $U_m=253V$  rms or dc

# 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

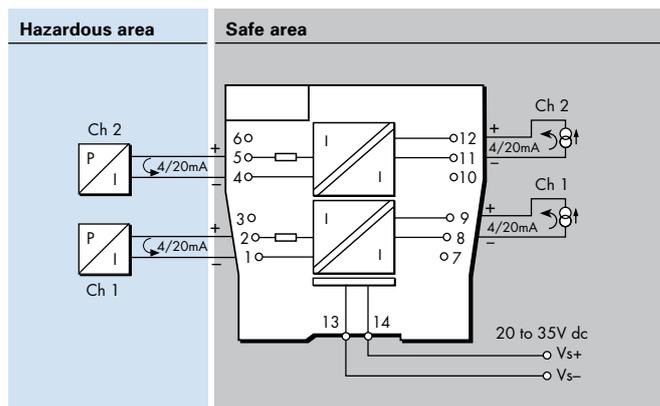
#### Input characteristics

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.

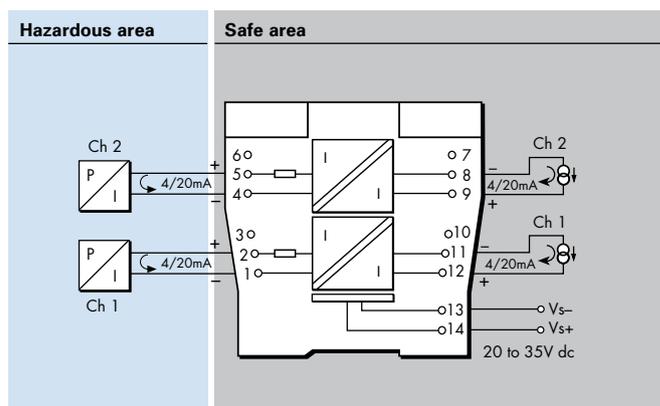
#### Response time

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



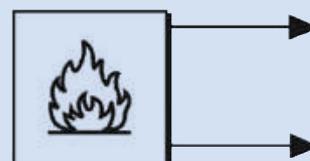
#### SIL capable

These models have been assessed for use in IEC 61508 functional safety applications. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual.

## 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.

### 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  $V_{in} = 24V$  per channel

#### Integral input polarity protection

Input circuit protected against reverse polarity

#### Minimum output voltage $V_{out}$ at 20°C

For  $V_{in} \leq 25V$ :  $V_{out} = V_{in} - (0.38 \times \text{current in mA}) - 2V$   
For  $V_{in} > 25V$ :  $V_{out} = 22.5V - (0.35 \times \text{current in mA})$

#### 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

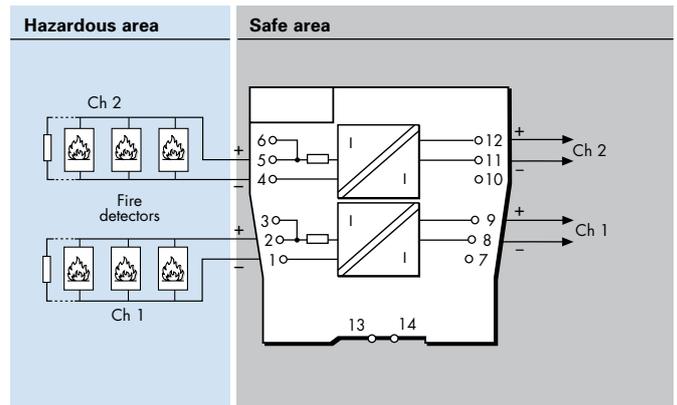
#### Power dissipation within unit

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

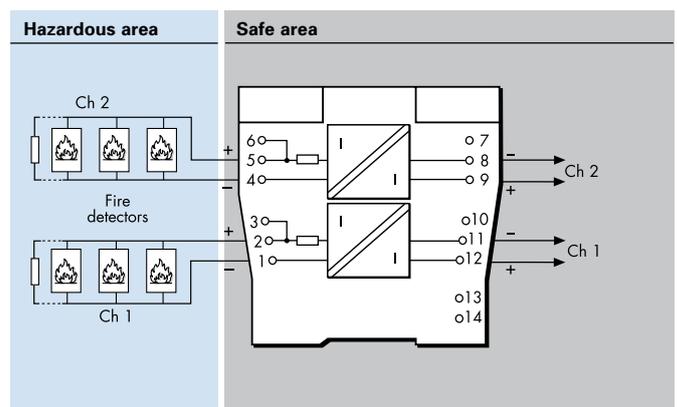
#### Safety description for each channel

$U_o=28V$   $I_o=93mA$   $P_o=0.65W$   $U_m=253V$  rms or dc

### MTL4561



### MTL5561



#### SIL capable

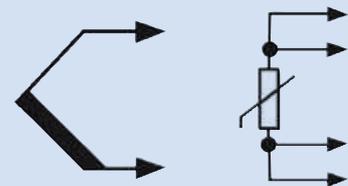
These models have been assessed for use in IEC 61508 functional safety applications. SIL2 capable for a single device (HFT=0) SIL3 capable for multiple devices in safety redundant configurations (HFT=1) See data on MTL web site and refer to the safety manual.

**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
MTL4582B	MTL5582B	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
	XK	GOST P8.585-2001
mV	-75 to +75mV	3mV
RTD 2/3/4 wire	Pt100, Pt500, Pt1000	BS EN 60751:2008
	Cu-50, Cu-53	GOST 6651-94
	Ni100, Ni500, Ni1000	DIN43760:1985
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

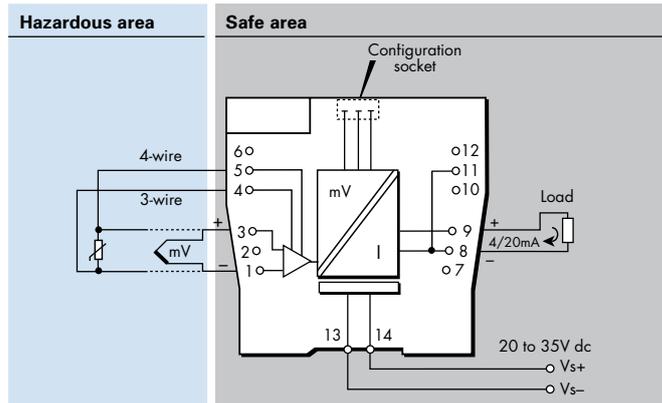
### Example of calibration accuracy and temperature drift (RTD input)

Span: 250Ω

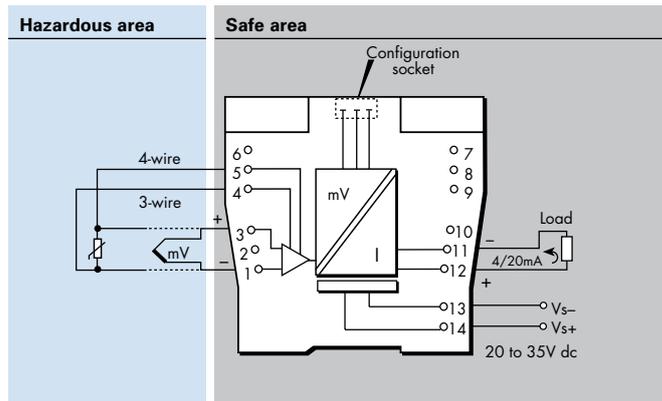
Accuracy: ± (0.08/250 + 11/16000) × 100%  
= 0.1% of span

Temperature drift: ± (0.007/250 × 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 with safety drive on sensor failure enabled.  
>10kΩ with safety drive on sensor failure disabled

### 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

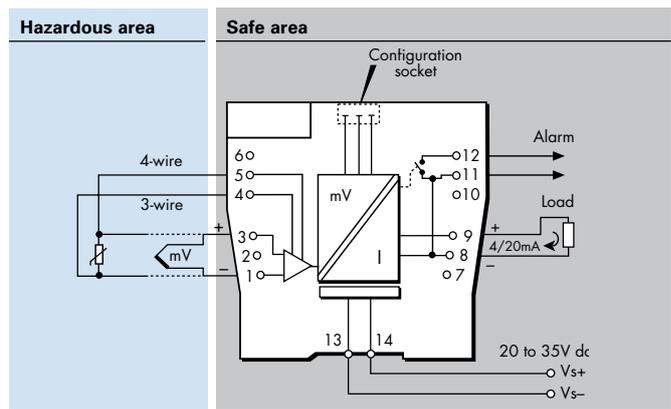
Accuracy: ± (0.08/250 + 11/16000) × 100%  
= 0.1% of span

Temperature drift: ± (0.007/250 × 16000 + 0.6) μA/°C  
= ± 1.0μA/°C

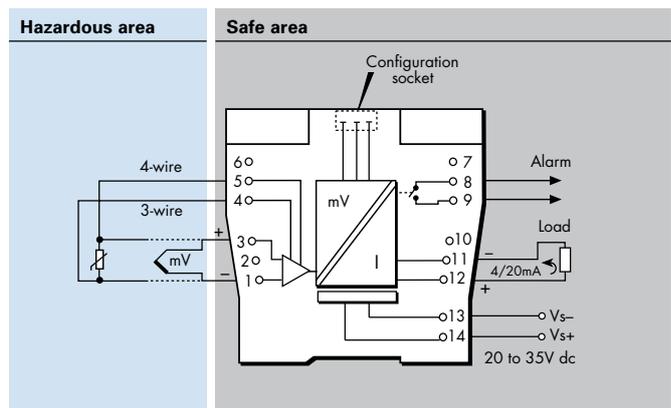
### Safety drive on sensor failure

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.

# 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:  $\pm (0.08/250 + 16/16000) \times 100\%$   
= 0.13% of span

Temperature drift:  $\pm (0.007/250 \times 16000 + 0.6) \mu\text{A}/^\circ\text{C}$   
= ±1.0μA/°C

### Safety drive on sensor failure

Upscale, downscale, or off

### Output range

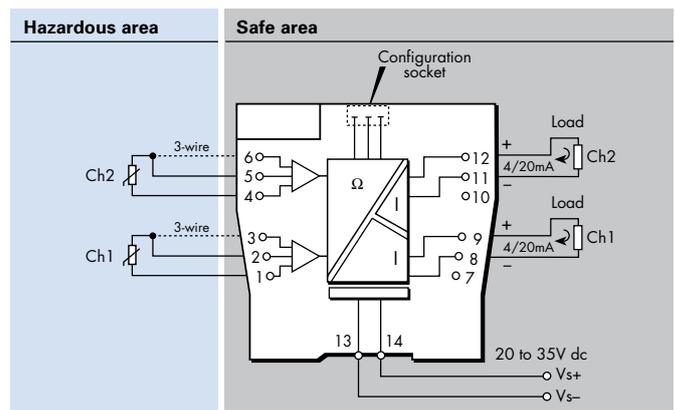
4 to 20mA nominal into 300Ω max.

### Response time

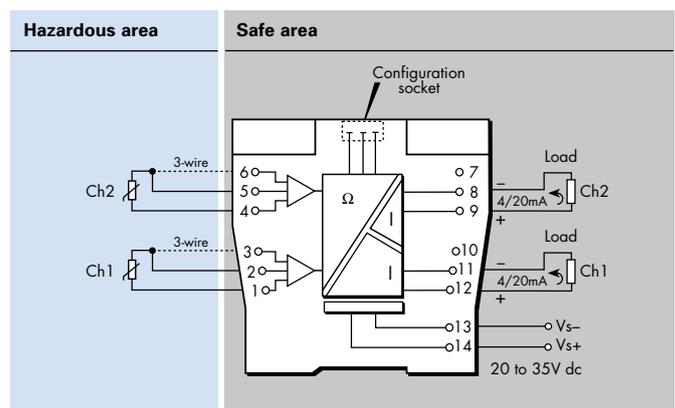
Configurable - 500 ms default

(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, V<sub>s</sub> 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<sub>m</sub> = 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.

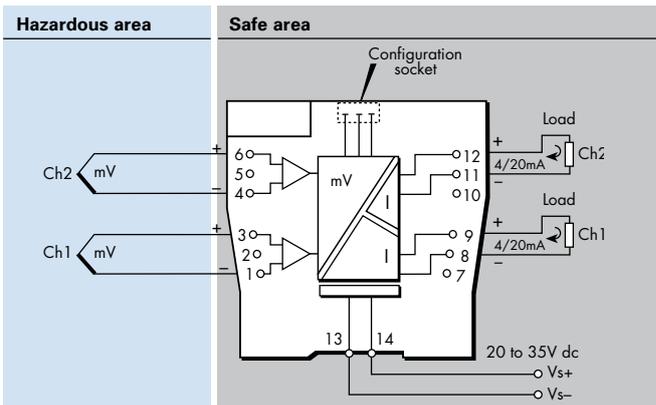
#### Maximum lead resistance

300Ω with safety drive on sensor failure enabled  
>10kΩ with safety drive on sensor failure disabled

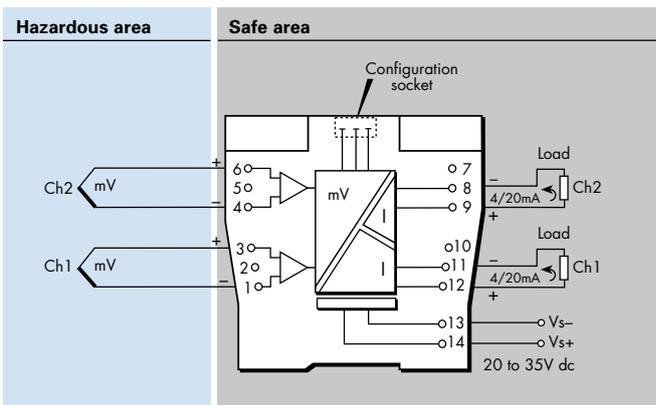
#### Response time

Configurable - 500 ms default

### MTL4576-THC



### MTL5576-THC



(Accuracy at 100/200ms - contact MTL)

#### 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  $\pm 50\text{mV}$ , overrange to  $\pm 55\text{mV}$   
Maximum lead resistance  $600\Omega$

#### Output resistance

$60\Omega$  nominal

#### Transfer accuracy@20°C

Linearity and repeatability  $< 0.05\%$  of reading or  $\pm 5\mu\text{V}$ , whichever is the greater

#### Temperature drift

$< 2\mu\text{V}/^\circ\text{C}$ , maximum

#### Response time

Settles to within 10% of final value within  $150\mu\text{s}$

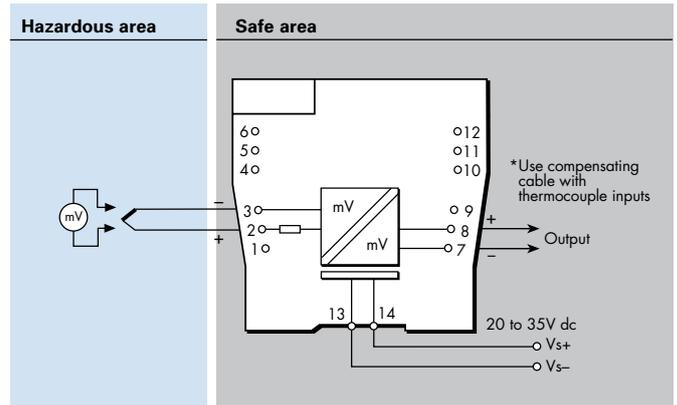
#### Frequency response

dc to 4kHz nominal

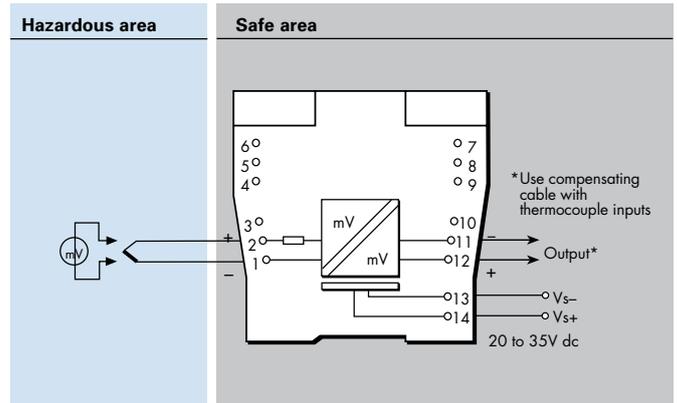
#### Safety drive on THC burnout

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  $\leq 1.5\text{V}$ ,  $\leq 0.1\text{A}$  and  $\leq 25\text{mW}$ ; can be connected without further certification into any IS loop with an open-circuit voltage  $< 28\text{V}$

# MTL4582B - MTL5582B

## RESISTANCE ISOLATOR

### to repeat RTD signals

The MTLx582B 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 MTLx582B should be considered as an alternative, non-configurable MTLx575, 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.

### 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

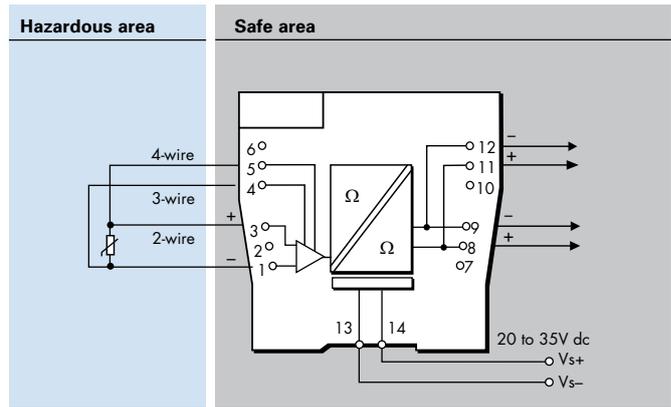
#### Safety drive on open-circuit sensor

Upscale to 420Ω nominal

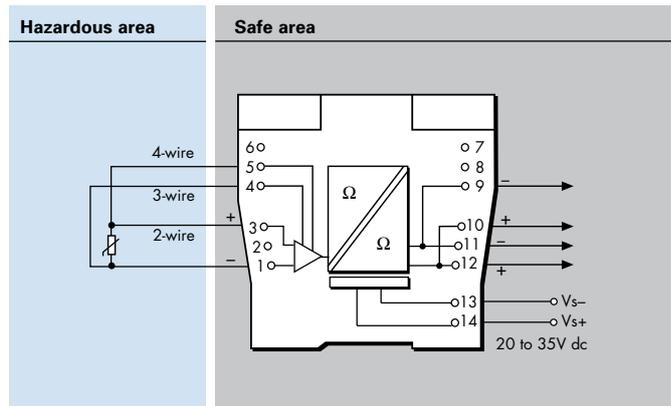
#### Transfer accuracy@20°C

<0.15Ω at excitation current 1 - 5mA  
<0.25Ω at excitation current 0.5 - 1mA

### MTL4582B



### MTL5582B



#### 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

$U_o = 1.2V$   $I_o = 4mA$   $P_o = 1.2mW$   $U_n = 253V$  rms or dc

Non-energy-storing apparatus  $\leq 1.5V$ ,  $\leq 0.1A$ ,  $\leq 25mW$ ; can be connected without further certification into any IS loop with

an open circuit voltage < 5V.

##### Terminals 1, 3, 4 and 5

$U_o = 6.51V$   $I_o = 10mA$   $P_o = 17mW$

### 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
-	MTL5051	Serial-data comms isolator
-	MTL5314	Trip amplifier
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

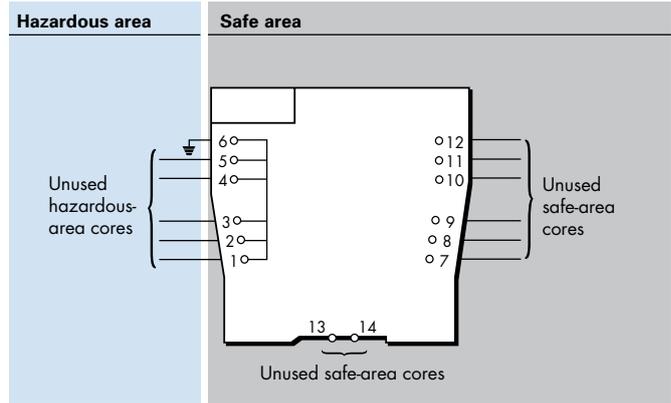
The primary function of the MTLx599, which can be used with all other MTLx500 range units, is to provide termination and earthing facilities for unused cable cores from hazardous areas.

### SPECIFICATION

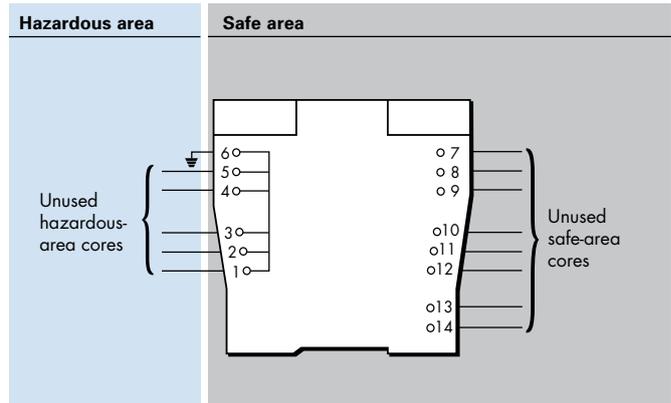
See also common specification

**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.

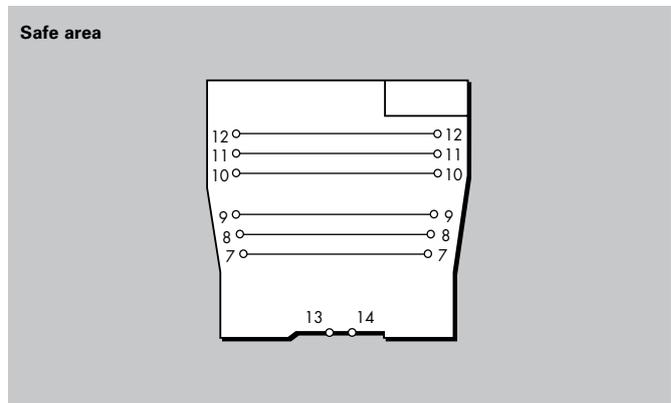
Note: Must not be used with signals >50V or >0.25A

### SPECIFICATION

See also common specification

**Weight**  
60g

### MTL4599N



# 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  $V_s=20V$ , 105mA
- At  $V_s=24V$ , 90mA
- At  $V_s=35V$ , 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  $\pm$  5% (load <23mA)
- +12V mode 8.0V min (load >23 to <50mA)
- +5V 5.6V  $\pm$  5% (load >23 to <50mA)

### Hazardous Interfacing

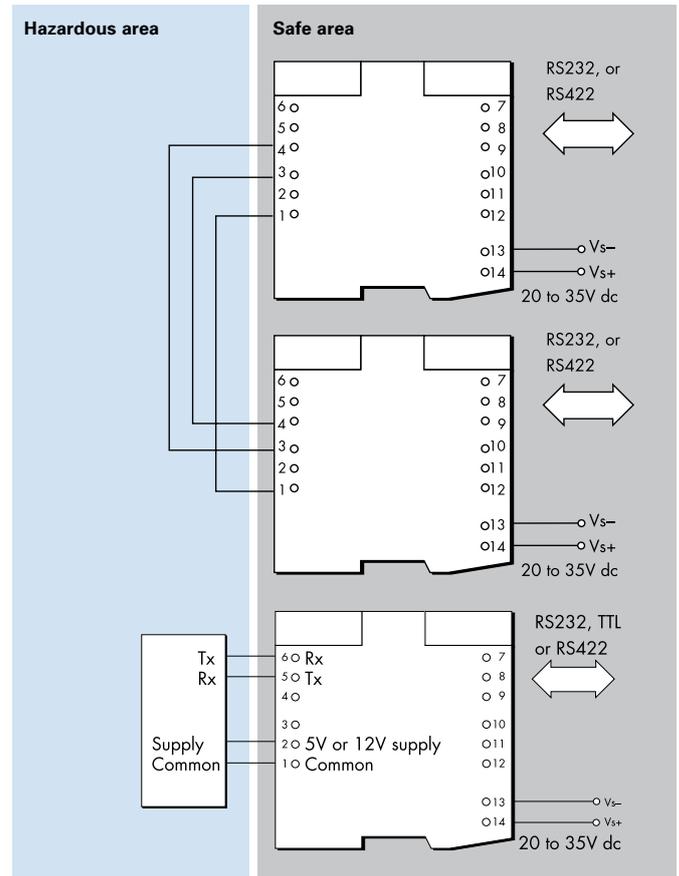
See MTL640 range for details of interfacing with MTL646 and MTL647 IS text displays.

### 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.

# 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 multturn 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, cosφ >0.7  
40V dc, 2A, resistive load  
Contact life expectancy 3.3x10<sup>5</sup> 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

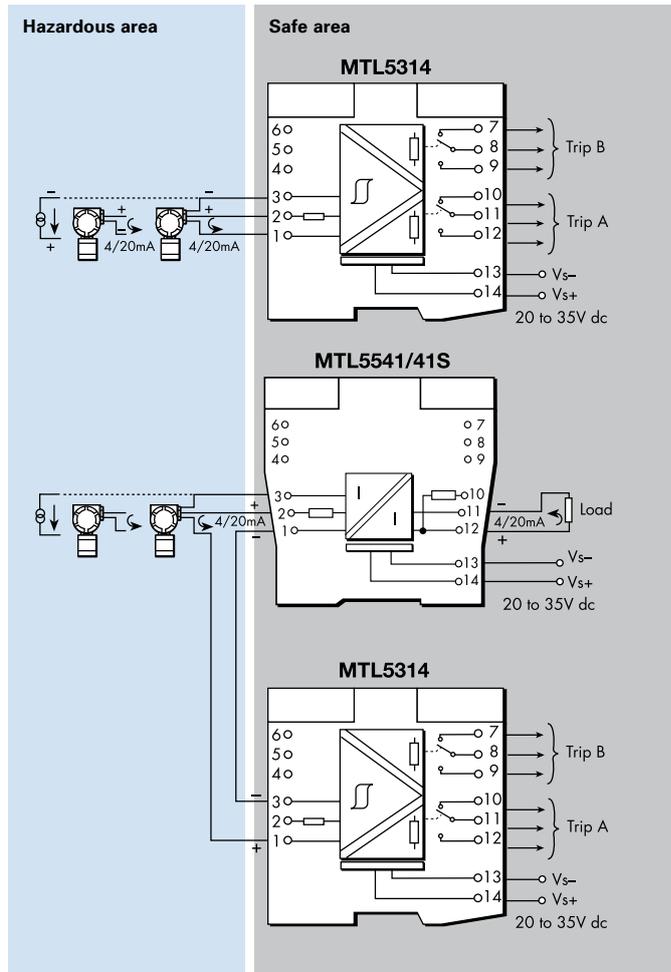
#### Maximum current consumption (with 20mA signal)

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:  $U \leq 1.5V$ ,  $I \leq 0.1A$ ,  $P \leq 25mW$ . 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.

# MTL4600 RANGE 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 of 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 range of 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 range 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 range 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	MTL4600	Function	Channels	Description
MTL4604	DI	1	1 ch DI relay output + NE LFD alarm	MTL4641	AI	1	1 ch smart Tx repeater 4-20mA
MTL4610	DI	4	4 ch DI	MTL4641A	AI	1	1 ch smart repeater 4-20mA passive I/P
MTL4611	DI	1	1 ch DI C/O relay output + LFD	MTL4641S	AI	1	1 ch smart Tx repeater 4-20mA sink
MTL4614	DI	1	1 ch DI relay output + LFD alarm	MTL4641AS	AI	1	1 ch repeater 4-20mA passive I/P sink
MTL4614D	DI	1	1 ch dual relay output	MTL4644	AI	2	2 ch smart Tx repeater 4-20mA
MTL4616	DI	2	2 ch DI relay output + LFD	MTL4644A	AI	2	2 ch smart repeater 4-20mA passive I/P
MTL4617	DI	2	2 ch DI relay output + LFD alarm	MTL4644AS	AI	2	2 ch repeater 4-20mA passive I/P sink
MTL4619L	DI	1	24V/48V digital input	MTL4644D	AI 1 in 2 out	1	dual O/P smart Tx repeater
MTL4619H	DI	1	110Vac/125Vdc digital input	MTL4644S	AI	2	2 ch smart Tx repeater 4-20mA sink
MTL4621	DO	1	loop powered solenoid/alarm driver	MTL4646	AO	1	1 ch smart 4-20mA output + LFD
MTL4623	DO	1	solenoid/alarm driver + LFD	MTL4646Y	AO	1	1 ch smart 4-20mA output + OC LFD
MTL4623R	DO	1	solenoid/alarm driver + rev LFD	MTL4649	AO	2	2 ch smart 4-20mA output + LFD
MTL4623L	DO	1	solenoid/alarm driver loop powered + LFD	MTL4649Y	AO	2	2 ch smart 4-20mA output + OC LFD
MTL4624	DO	1	solenoid/alarm driver switch cont + OVR	MTL4675	TI	1	temperature converter + alarm
MTL4624S	DO	1	solenoid/alarm driver switch cont + OVR	MTL4676-RTD	TI	2	2 ch RTD temperature converter
MTL4626	RO	2	2 ch DI relay output	MTL4676-THC	TI	2	2 ch THC temperature converter
MTL4627	DO	1	24Vdc 250mA digital output				
MTL4628	RO	1	relay output				
MTL4632	Pulse	1	pulse isolator				

For data sheets please visit [https://www.mtl-inst.com/product/mtl4600\\_range/](https://www.mtl-inst.com/product/mtl4600_range/)

# MTL4500, MTL4600, MTL5500, MTL5000 RANGE COMMON SPECIFICATIONS

Please go to our website at [www.mtl-inst.com](http://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 2.5mm<sup>2</sup> stranded or single-core

## Mounting

### MTL4500/4600

MTL4500 range 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

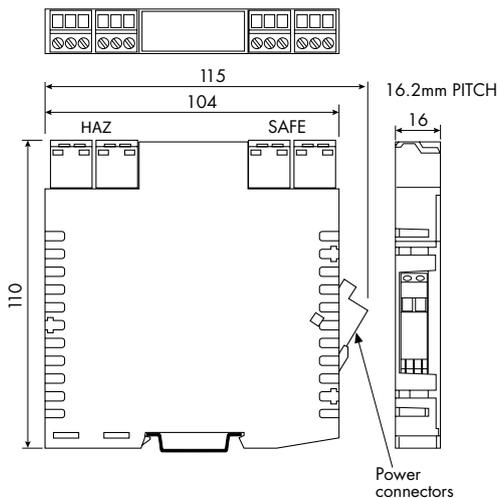
MTL5500/5000 150g

## EMC

to EN61326 and NE21\*

HART® is a registered trademark of HART Communication Foundation

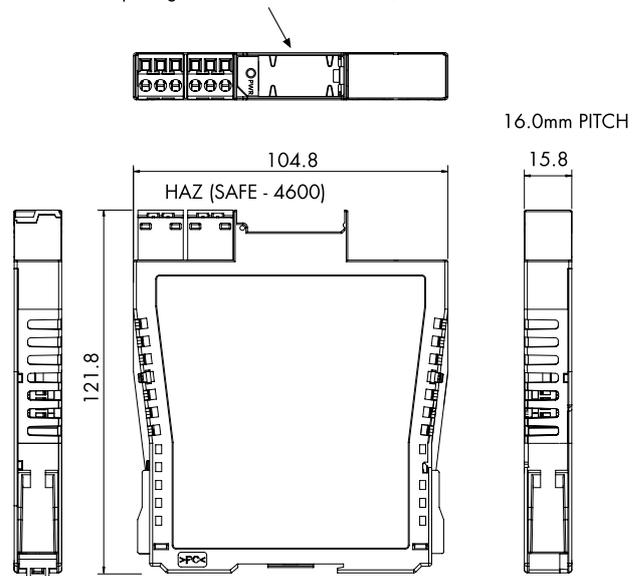
## MTL5000



## DIMENSIONS (mm)

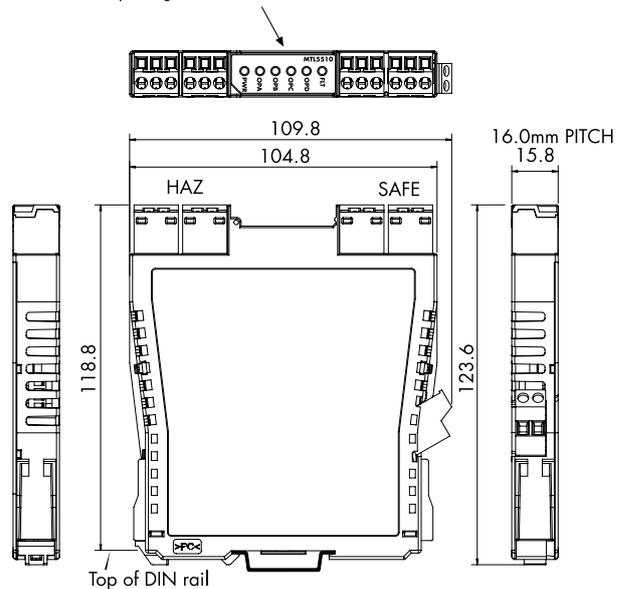
### MTL4500 (MTL4600)

Optional TH5000 tag holder for individual isolator identification. Accepts tag label 25 x 12.5 ±0.5mm, 0.2mm thick



### MTL5500

Optional TH5000 tag holder for individual isolator identification. Accepts tag label 25 x 12.5 ±0.5mm, 0.2mm thick



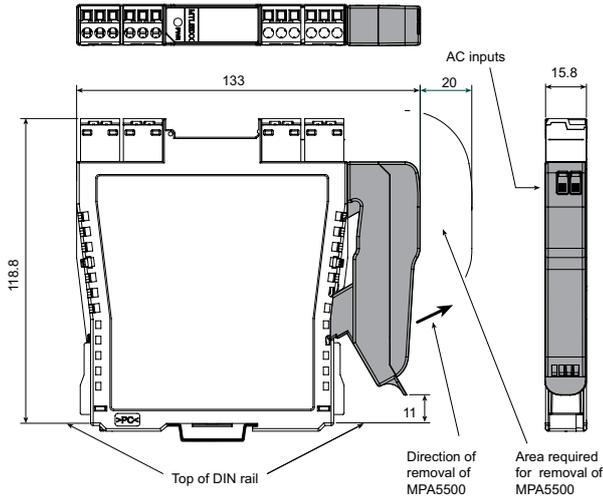
\* MTL4500, 4600, 5500

For 20mS power interruption compliance, a suitable power supply must be used.

## MPA5500 A.C. POWER ADAPTOR

The MPA5500 enables any MTL5500 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<sup>2</sup> 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 range 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

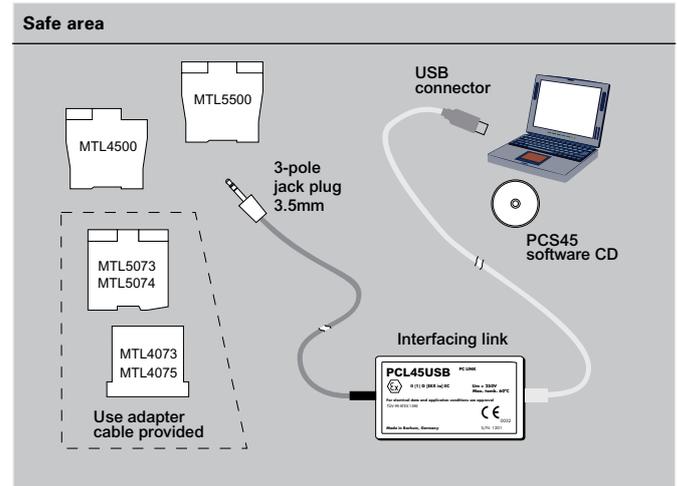
Weight: 28g approx.

#### 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 range of 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 range of 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](http://www.mtl-inst.com)

#### Recommended minimum PC configuration

Microsoft Windows XP, Win7, Win8

20MB of available hard disc space

CD ROM drive

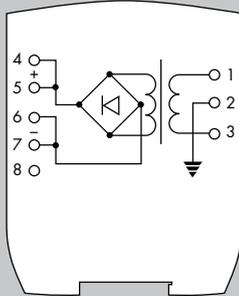
Available USB port

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 range of modules.

### Safe area



### 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

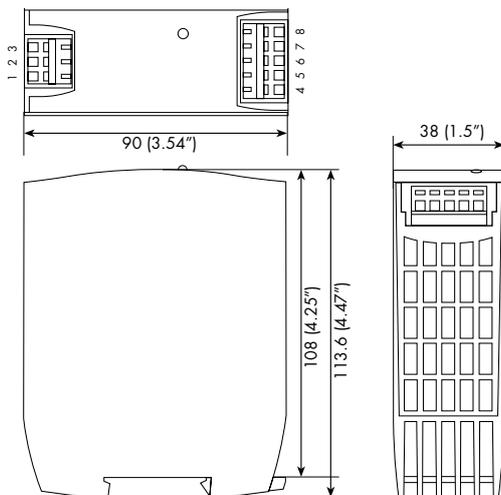
Operating temperature -10°C to +50°C

Storage temperature -40°C to +85°C

#### Terminals

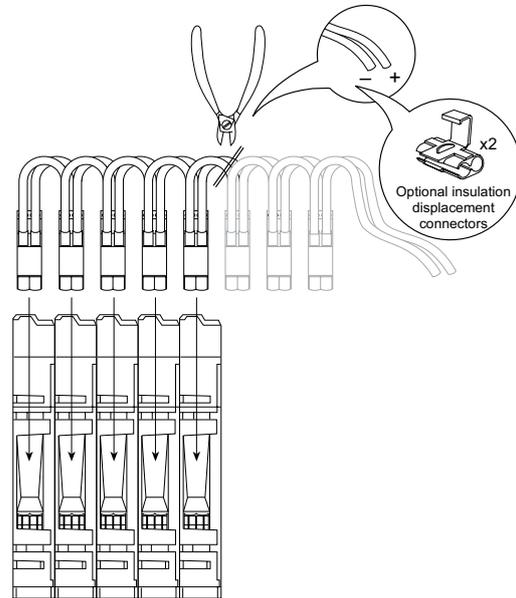
Cage clamp type accommodating conductors up to 2.5mm<sup>2</sup>, stranded or single-core

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



## MTL5500 RANGE POWERBUS KITS PB - 8T,16T,24T,32T

A quick and easy way to distribute DC power to MTL5500 range 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 (0.75mm<sup>2</sup>) 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

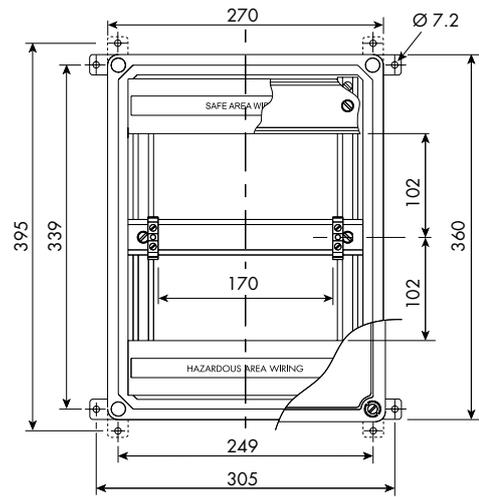
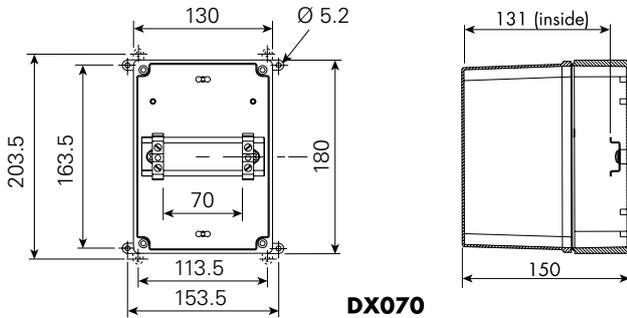
### CHOOSING A POWERBUS KIT

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.

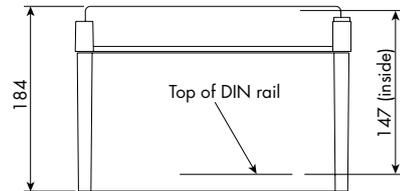
*Note: To reduce the risk of excessive voltage drop or overcurrent do not connect powerbuses in series.*

# MTL5500 RANGE ENCLOSURES

## DIMENSIONS (mm) AND MOUNTING



**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 range of 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	
<b>DX070</b>	4	(2)*
<b>DX170</b>	10	(8)*

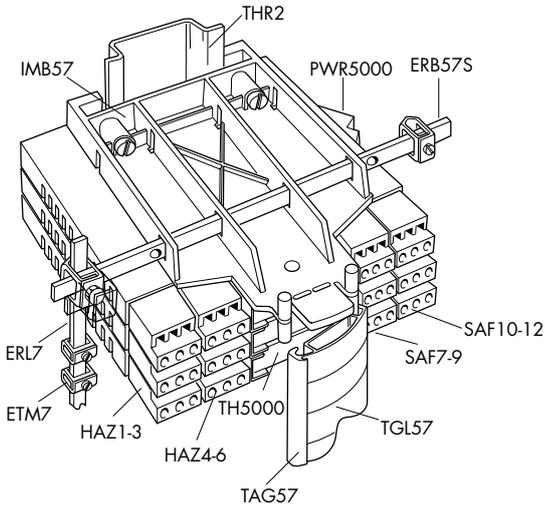
*\* Use these figures when IMB57 mounting blocks for tagging/earth are included.*

### Ambient temperature limits

Dependent on units fitted. See instruction manual INM5500.

# MTL5500 RANGE ACCESSORIES

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



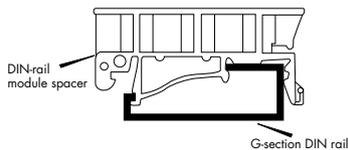
## MOUNTING

### THR2 DIN rail, 1m length

DIN rail to EN50022; BS5584; DIN46277

### MS010 DIN rail module spacer, 10mm, pack of 5

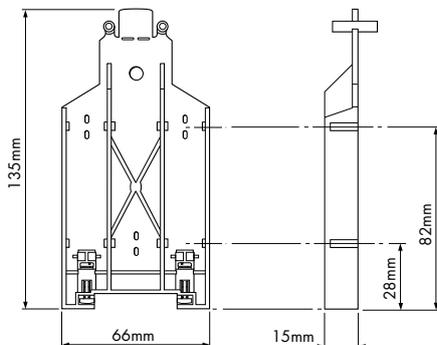
Grey spacer, one required between each MTL5533 or MTL5995-PS and any adjacent module on a DIN rail, to provide 10mm air-circulation space between modules



## EARTH RAILS AND TAG STRIP

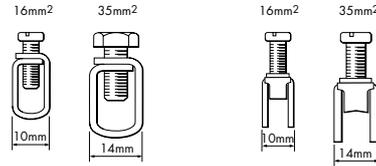
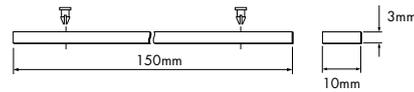
### IMB57 Insulating mounting block

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<sup>2</sup>) earth-rail clamp and one (10mm, 16mm<sup>2</sup>) earth clamp.



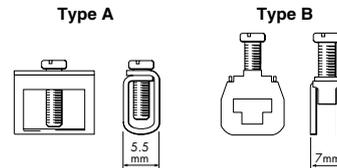
### ERL7 Earth rail, 1m length

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<sup>2</sup>. Exact dimension dependent on manufacturer.



### TAG57 Tagging strip, 1m length

Cut to size. Supplied with tagging strip label suitable for MTL5000 or MTL5500 modules.



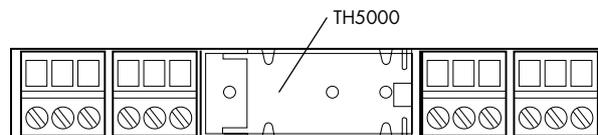
### TGL57 Tagging strip labels, set of 10 x 0.5m

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 range of powerbus kits'**

# CUSTOM, STANDARD AND UNIVERSAL BACKPLANES FOR EASY DCS INTEGRATION

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



The MTL4500/4600 range of 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

Eaton provides a complete design and manufacturing service for MTL customised backplanes. Customised backplanes give the vendors and users of process control and safety systems the opportunity to integrate MTL4500/4600/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.

## 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

## 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 Bently-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

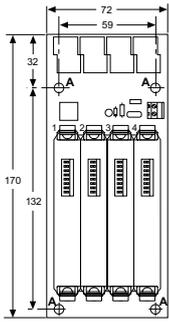
### Siemens

ET200, S7

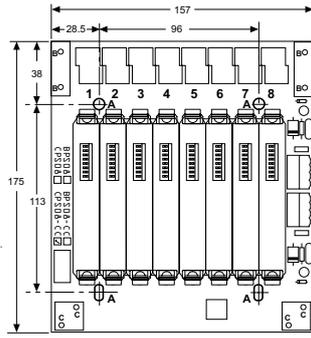
### Yokogawa

Centum R3, VP, Prosafe RS, CS3000

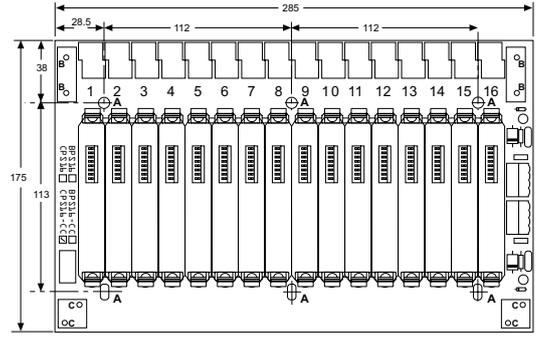
## CPS BACKPLANE DIMENSIONS (mm)



CPS04  
CPS04-CC

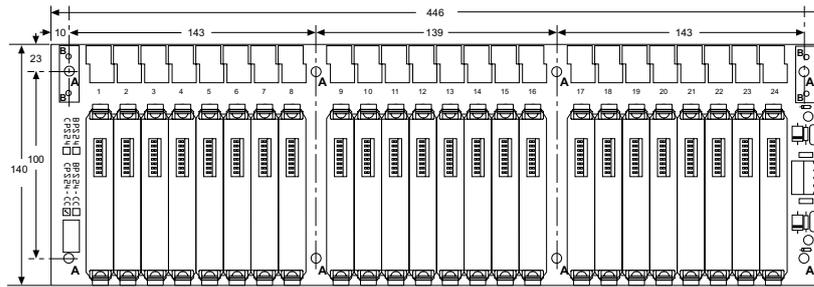


CPS08  
CPS08-CC



CPS16  
CPS16-CC

-CC - Conformal Coating



CPS24

### Power requirements, Vs

21V dc to 35V dc through plug-in connectors

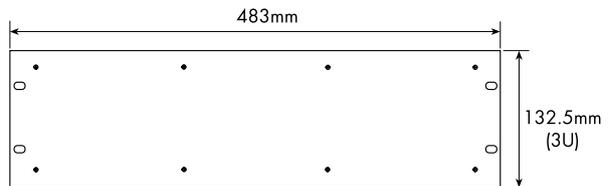
### Safe-area connections

CPS: 2.5mm<sup>2</sup> screw-clamp terminals – 6 positions per module

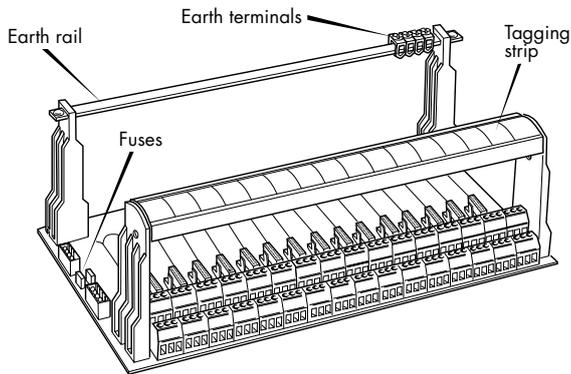
### Weight (without modules or accessories)

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

# CUSTOM BACKPLANES

MTL4500 range of 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. Eaton 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 as 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 RANGE

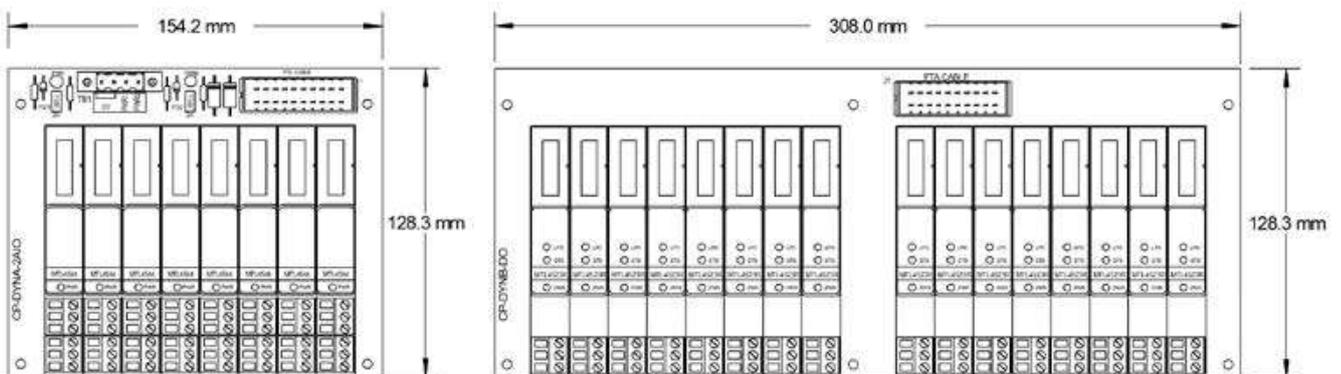
FTA	Size	Function	MTL modules
CP-DYNB-AIO	B	16ch analogue input/output	MTL4541, 4546Y, 4573
CP-DYNB-AI250	B	16ch analogue input 1-5V o/p	MTL4541, 4573
CP-DYNA-2AIO	A	16ch analogue input/output	MTL4544, 4549Y
CP-DYNB-DI	B	16ch digital input	MTL4511, 4514
CP-DYNB-DILF	B	16ch digital input with LFD	MTL4514
CP-DYNB-2DI	B	32ch digital input	MTL4513, 4516, 4517
CP-DYNB-4DI	B	48ch digital input	MTL4510
CP-DYNA-DO	A	8ch digital output	MTL4521, 4521L
CP-DYNB-DO	B	16ch digital output	MTL4521, MTL4521L

### 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.

### CP-DYN DIMENSIONS



For full technical details please contact your local MTL sales office.

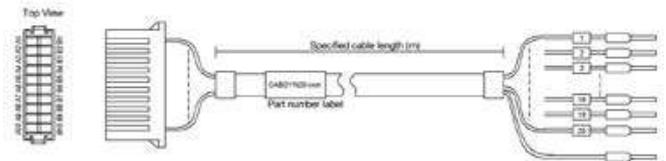


### CABLES

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

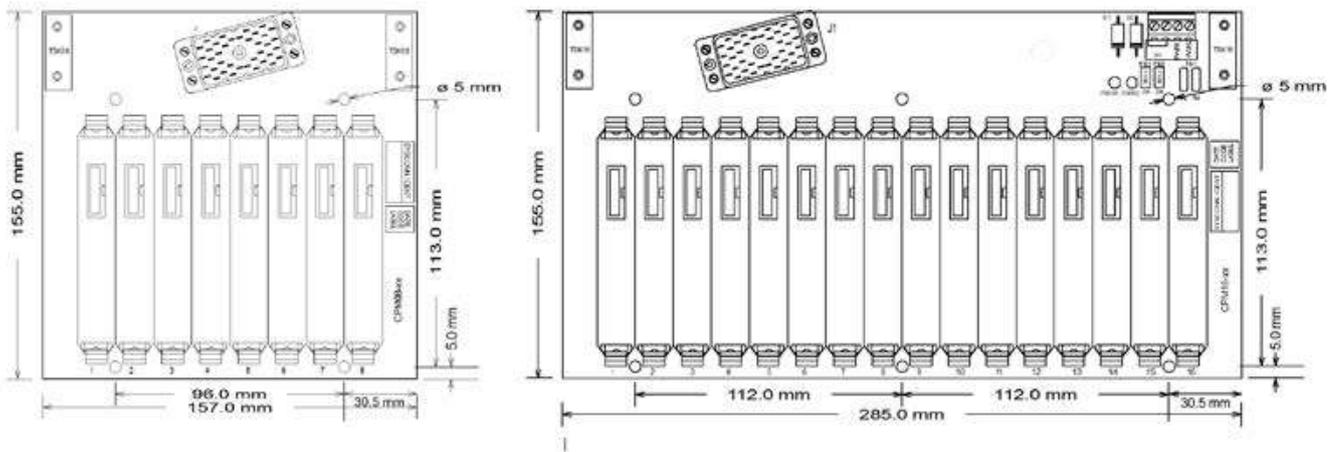
CABDYN20-0.5	0.5m cable
CABDYN20-1	1.0m
CABDYN20-2	2.0m
CABDYN20-3	3.0m
CABDYN20-5	5.0m
CABDYN20-8	8.0m
CABDYN20-10	10m
CABDYN20-15	15m
CABDYN20-20	20m
CABDYN20-25	25m
CABDYN20-30	30m



## CPELCO RANGE

A range of dedicated backplanes to interface with MTL4500 range of 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	MTL4541/4573/4546Y	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

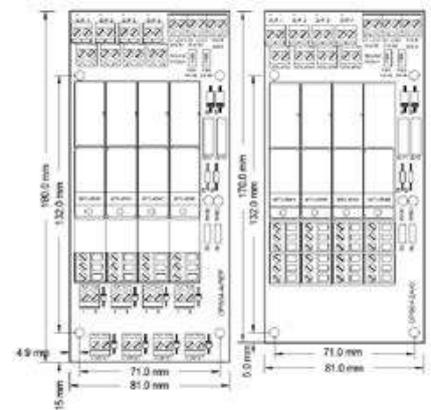


For full technical details please contact your local MTL sales office.

## ANALOGUE SIGNAL REPEAT

CPS04-AIREP backplane can 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 your local MTL sales office if you wish to discuss your application requirements.

## PRODUCT MIGRATION

Migration options for legacy MTL4000 range 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](http://www.mtl-inst.com)



## ORDERING INFORMATION



### MTL4500/5500 range 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 your local MTL sales office 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 range instruction manual

**INM4500/4600** MTL4500/MTL4600 range instruction manual

#### Configurator and software

**PCL45USB** Configurator, PC interface and software

**PCS45** PC software

Please go to our website at [www.mtl-inst.com/certificates](http://www.mtl-inst.com/certificates) for the latest information regarding safety approvals, certificates and entity parameters.

MTL1000 range of signal conditioners

# For reliable, high quality process communications

The new MTL1000 range of signal conditioning isolators complement our intrinsic safety products to provide a complete interface solution.

New



Reduced installation costs  
Increased reliability  
Single source supply

## MTL HART® multiplexers

Eaton 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, we provide 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.

Eaton's MTL HART® connections provide the means to make full use of these features.

By connecting field instruments, control systems and instrument management software, the MTL HART® connections allow better use of maintenance resources, reduced commissioning and process down-time, and consequently lower costs for commissioning and loop maintenance.

There are two types of MTL 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® is a registered trademark of HART Communication Foundation

**HART** COMMUNICATION PROTOCOL



Delivering valuable process data from HART® field devices



# MTL4850 and MTL4854

## MTL 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](http://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.

HART® is a registered trademark of the HART Communication Foundation

## 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

### Current consumption

#### MTL4850

60mA at 24V ±10%

#### MTL4854

42mA at 24V ±10%

### Power dissipation

#### MTL4850

<1.6W at 24V ±10%

#### MTL4854

<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

125 gm

#### MTL4854

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

Div 2 mounting

ATEX & IECEx

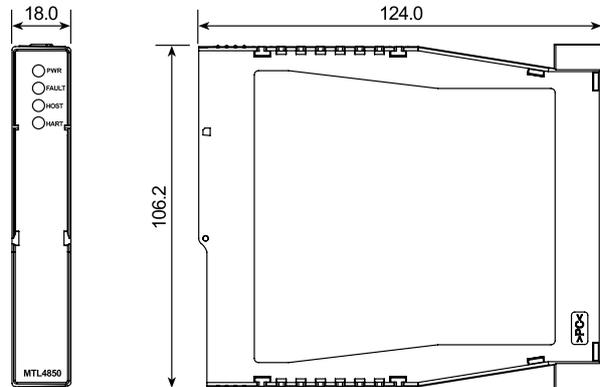
CSA, FM & FMC (MTL4850)

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)



## 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 Eaton's MTL product line for details.)

#### Weight (excl. modules and accessories)

220g approx.

### HTP-SC32 BACKPLANE \*

#### Capacity

1 x MTL4850 or MTL4854 HART multiplexer module

#### Maximum power requirements

1.4W

#### Weight (excl. modules and accessories)

330g approx.

### 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

2.5mm<sup>2</sup> screw terminals

#### Operating temperature

-40°C to +70°C

### HCU16 HART CONNECTION UNIT\*

#### Accuracy (HCU16-P250 only)

250Ω ±0.05%

#### Connectors

2.5mm<sup>2</sup> screw clamp terminals  
3 terminals per channel  
20-way HART signal cable (to HMP-HM64)

#### Weight

383g approx.

### HCU16AO CONNECTION UNIT WITH FILTERS

#### Series impedance

dc < 2Ω  
HART signal > 240Ω

#### Connectors

2.5mm<sup>2</sup> removable screw clamp terminals  
2 terminals per channel in groups of 4 channels  
20-way HART signal cable (to HMP-HM64)

#### Weight

768g approx.

### COMMON SPECIFICATION HCU16 & HCU16AO

#### Capacity

16 channels

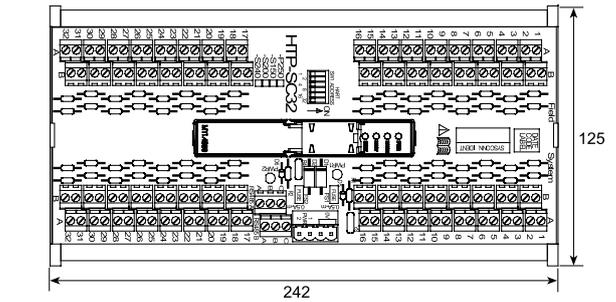
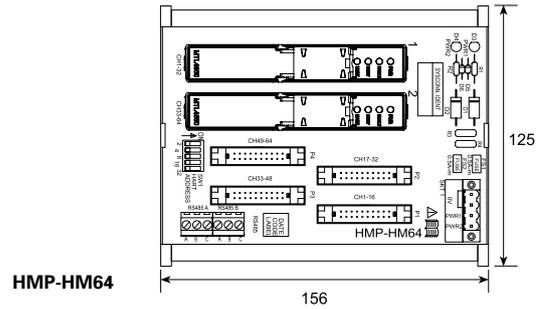
#### Isolation

Channel-to-channel 50V dc

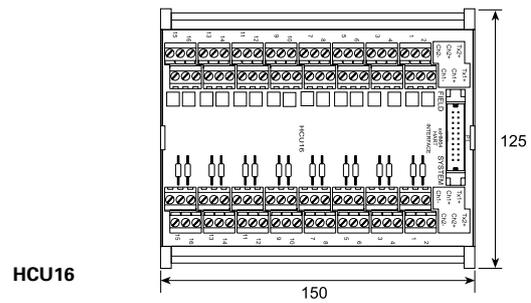
#### Mounting

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

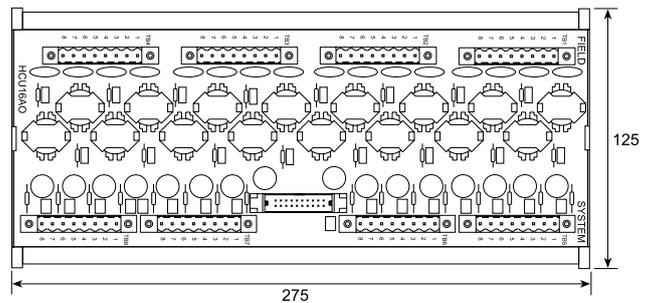
\*For further details of the model options refer to the Instruction Manual INM4850 - available from the MTL website.



HTP-SC32



HCU16



HCU16AO

## 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 product line 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

- 2.5mm<sup>2</sup> screw terminals (2 terminals/module)

#### RS485 port

- 2.5mm<sup>2</sup> screw terminals

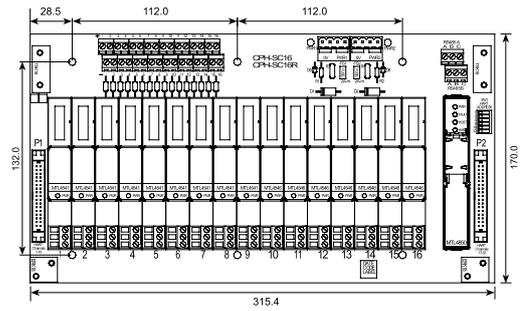
#### Accuracy

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

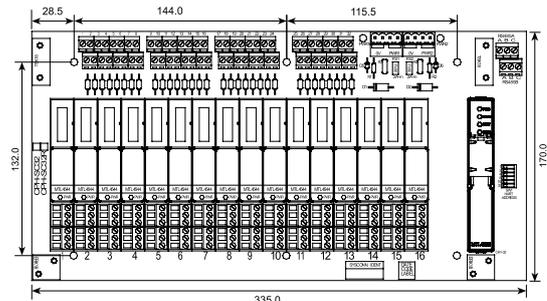
#### Weight (excl. modules and accessories)

- 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 †

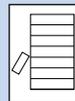
Integrated HART connection unit, 32ch

#### HTP-SC32-S240 †

Integrated HART connection unit, 32ch

† See Notes

### MTL4500 range of 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

## MTL 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 a 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.

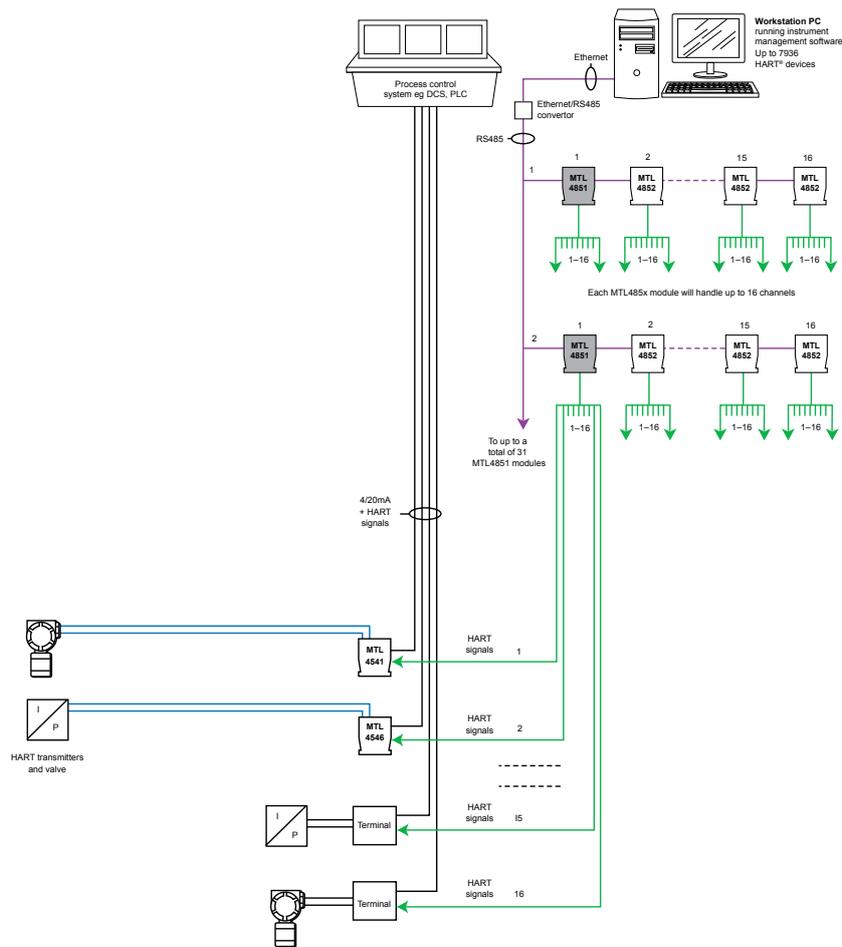
### The benefits of utilising these powerful software packages online include:

- 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](http://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.

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

## SYSTEM OVERVIEW (TYPICAL INSTALLATION)



### LED INDICATORS - MTL4851 module

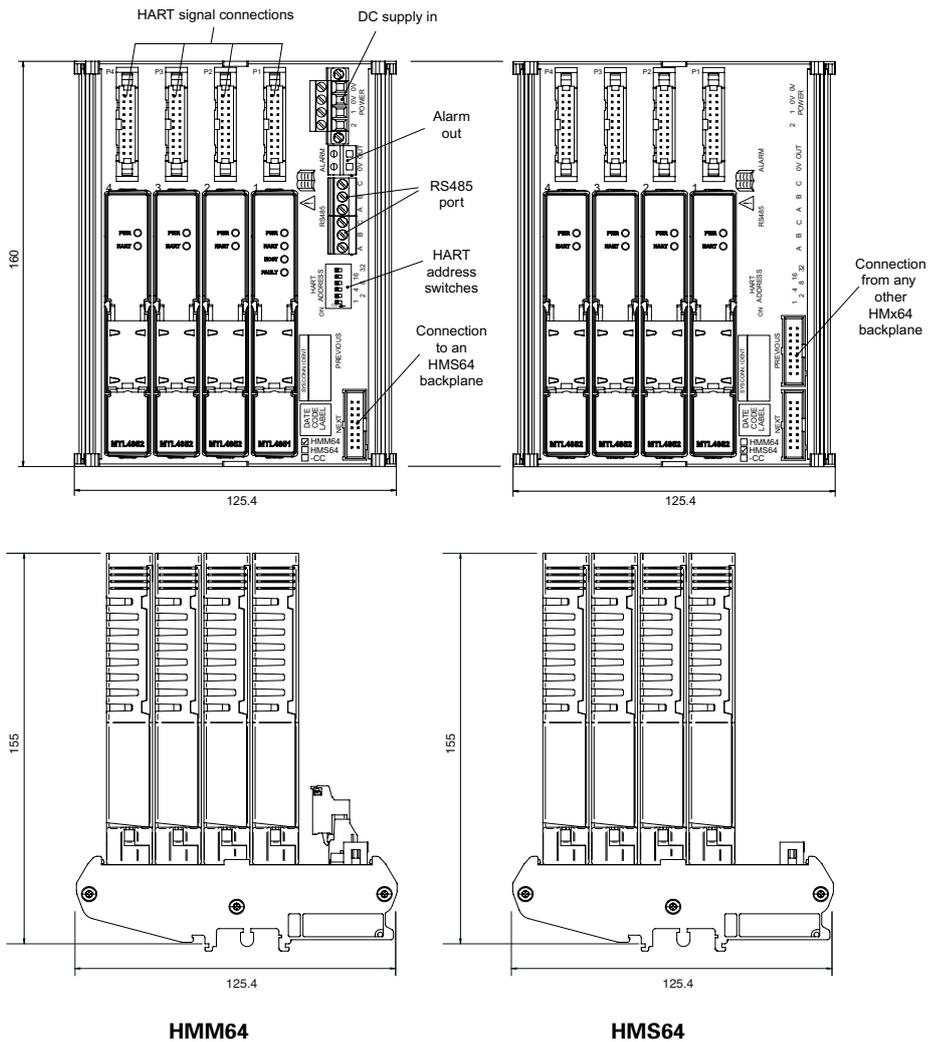
LED	Colour	State	Description
PWR	green	Off	Multiplexer is not receiving power
		On	Multiplexer is receiving power
FAULT	red	Off	Multiplexer is in the running state
		Pulsing	Multiplexer build/rebuild is in progress
		Blinking	No HART loops found
		On (steady)	A fault was detected and multiplexer operation 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



## BACKPLANES FOR MTL4851/MTL4852 GENERAL PURPOSE VERSIONS



### 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

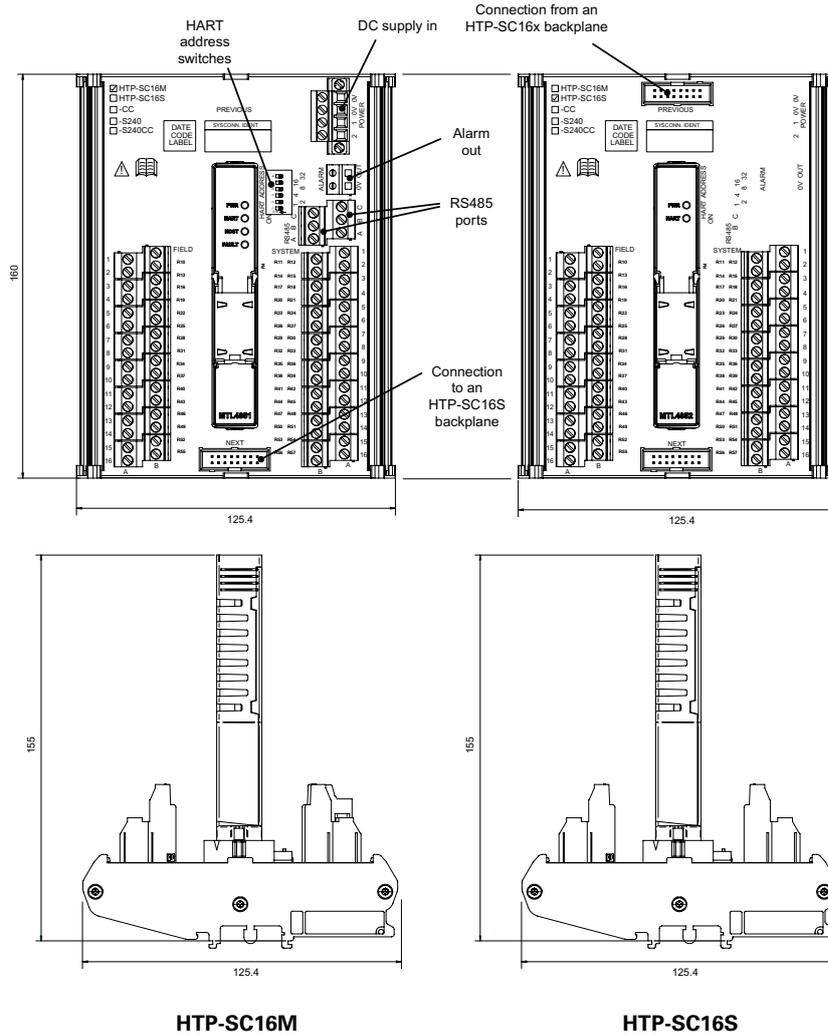
#### Alarm connectors

2 terminals for alarm output and alarm clear

#### Conductor terminals

Accept conductors of up to 2.5mm<sup>2</sup> stranded or single-core

## 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<sup>2</sup> 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<sup>2</sup> 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)

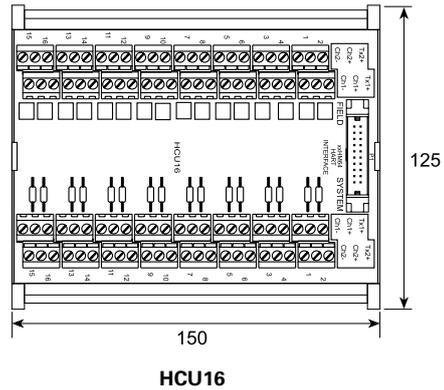
250Ω ±0.05%

#### Connectors

- 2.5mm<sup>2</sup> screw-clamp terminals
- 3 terminals per channel
- 20-way HART signal cable (to HMM64/HMS64)

#### Weight

383g approx.



### HCU16AO CONNECTION UNIT WITH FILTERS

#### Series impedance

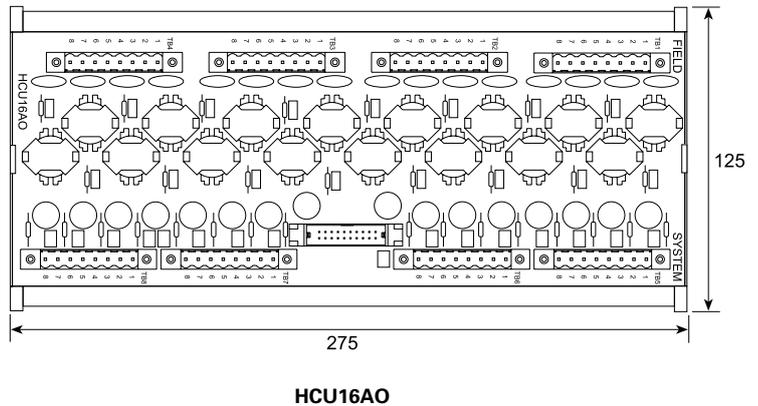
- dc < 2Ω
- HART signal > 240Ω

#### Connectors

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

#### Weight

768g approx.



### 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

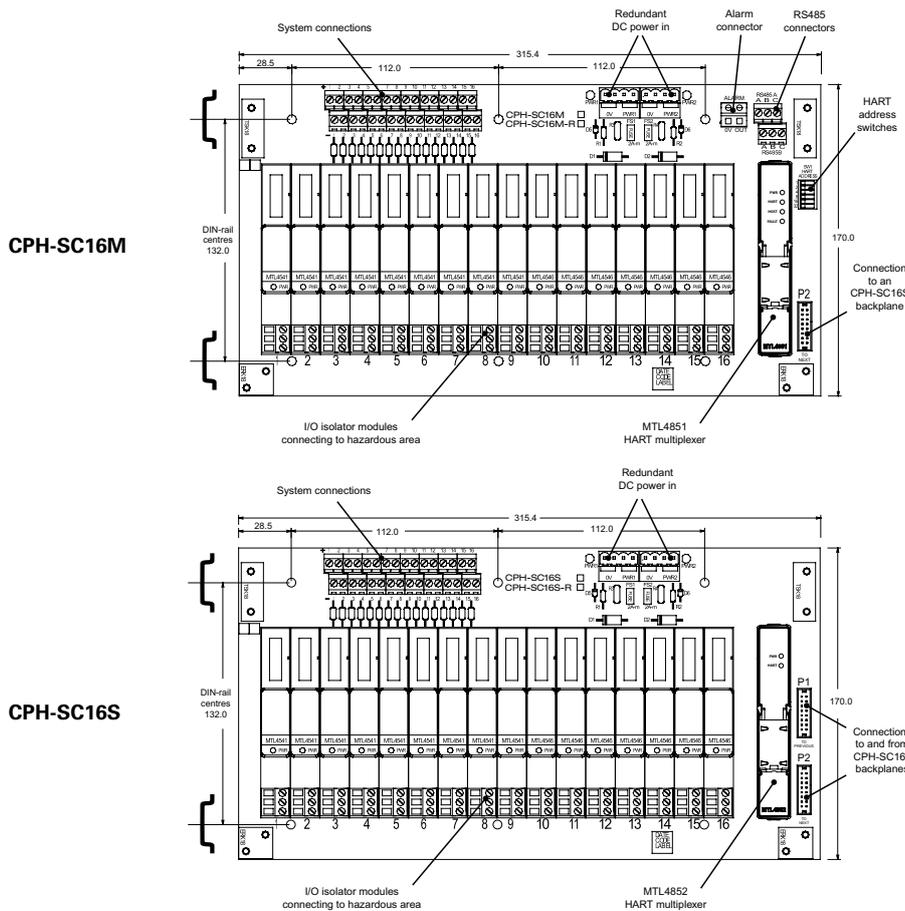
MTL offers a range of general purpose and IS interfaces providing direct connection with control system I/O cables as well as HART® connectivity. For general purpose signals, a number of custom HART® interface termination units are available for most DCS and PLC I/O cards. These replace the existing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

#### Typical system examples are:

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

Contact Eaton's MTL product line with details of your specific requirements.

## BACKPLANES FOR MTL4851/MTL4852 INTRINSIC SAFETY VERSIONS



### 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

2.5mm<sup>2</sup> 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

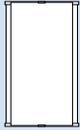


<b>MTL4851</b>	HART multiplexer primary module
<b>MTL4852</b>	HART multiplexer secondary module

### Multiplexer accessories

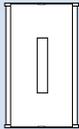
<b>TH5000</b>	Tag holder (Pack of 20)
<b>ET-485</b>	Serial RS485 to Ethernet converter

### General purpose connection units



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

### Integrated connection units



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

### HART Backplane accessories

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

† See Notes

### MTL4500 range backplanes



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

### Backplane accessories for MTL4500 range

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

### Literature

<b>INM4851</b>	MTL4851 Instruction manual
<b>INA485x</b>	ATEX safety instructions

### Notes:

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

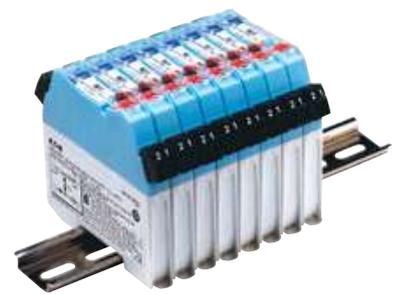
## MTL zener barriers

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.

Eaton's MTL7700 range has an impressive pedigree and the user will benefit from the exceptional application knowledge that we have developed in this field.

For details and specification sheets please visit our web site at [www.mtl-inst.com](http://www.mtl-inst.com)



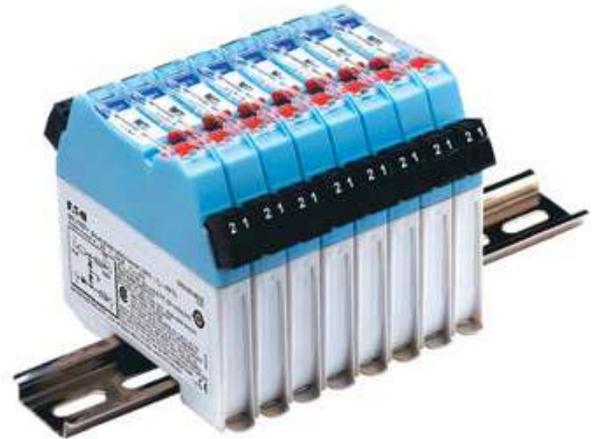


Eaton's MTL intrinsic safety zener barriers,  
a simple yet highly flexible form of IS safety  
interface, compact and inexpensive

# MTL7700 range

## 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 range barriers
- Compatible terminal numbering and safety descriptions



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

The **MTL7700 range 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 range 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.



## HOW THEY WORK

All MTL7700 range 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<sub>m</sub>)

The maximum permissible safe-area voltage (U<sub>m</sub>) for MTL7700 range 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 2.5mm<sup>2</sup> (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

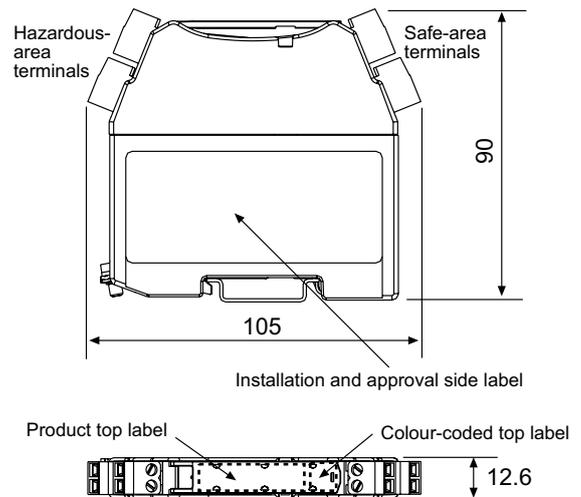
### Weight

140g approx

### Mounting and earthing

By 35mm Top Hat DIN rail

## DIMENSIONS (mm)



## MTL7700 RANGE KEY BARRIERS SUMMARISED

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

# 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

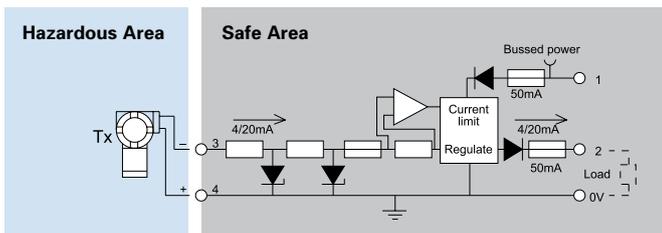
The MTL7706+ is a 1-channel shunt-diode safety barrier, with built-in electronic overvolt protection, for energising a 2-wire, 4/20mA transmitter in a hazardous area. It is powered from a positive supply of 20–35V dc and delivers a 4/20mA signal into an earthed load in the safe area. It is proof against 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

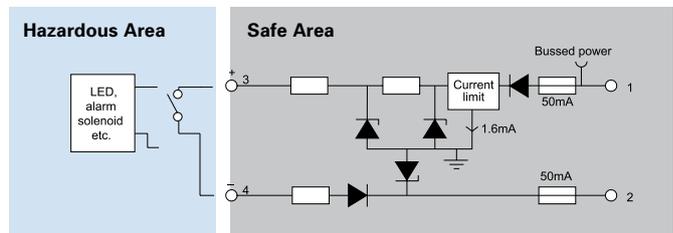
### MTL7707+ for switch inputs and switched outputs

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)

load x 345Ω + 0.3V, terminals 1 to 3

load x 25Ω + 0.9V, terminals 4 to 2

#### Supply current

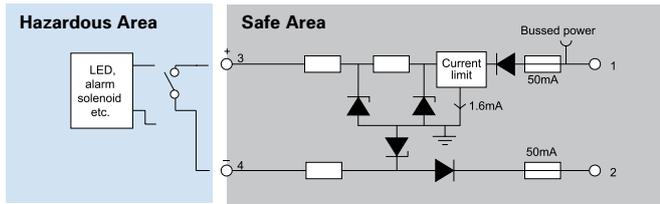
load + 1.6mA, supply <26V

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)

load x 218Ω + 0.3V, terminals 1 to 3  
load x 20.1Ω + 0.9V, terminals 4 to 2

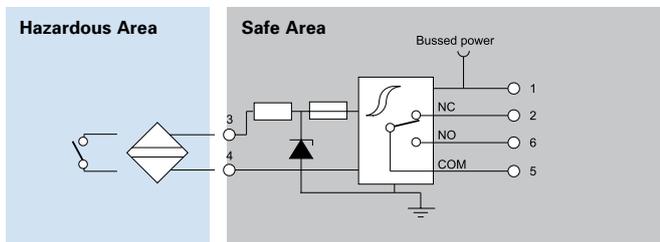
### Supply current

load + 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

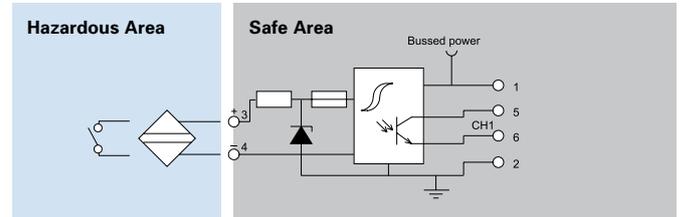
### Response time

<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

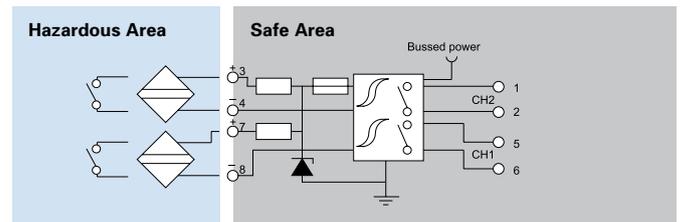
### Supply current

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

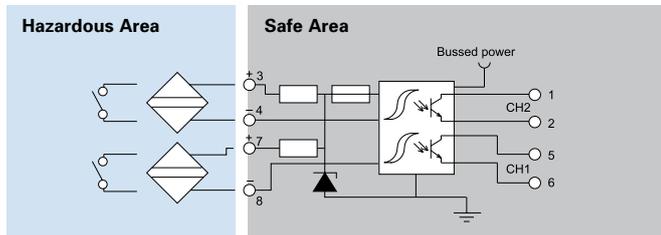
### Response time

<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  $>2.1\text{mA}$  ( $<2\text{k}\Omega$ )

Output de-energised if input  $<1.2\text{mA}$  ( $>10\text{k}$ )

#### Output characteristics

Operating frequency dc to 2.5kHz

Max off-state voltage 35V

Max off-state leakage  $10\mu\text{A}$

Max on-state voltage drop 1.41V @ 50mA, 1.22V @ 2mA typically  $<1\text{V}$

Max on-state current 50mA

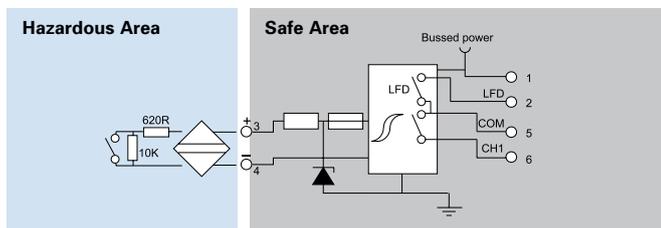
#### Supply current

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 circuit 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  $>2.1\text{mA}$  ( $<2\text{k}\Omega$ )

Output de-energised if input  $<1.2\text{mA}$  ( $>10\text{k}\Omega$ )

### LFD relay + Red LED

Energised if input  $<50\mu\text{A}$  or  $<100\Omega$

### Relay contacts

50V ac 0.5A. Resistive

30V dc, 1A. Resistive

### Supply current

38mA maximum @ 24V

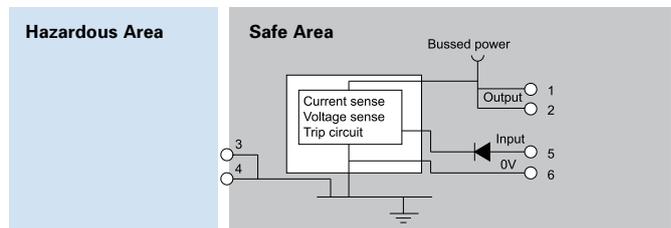
### Response time

$<10\text{ms}$

## 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 interrupting the supply to the unit. A red LED indicates a circuit trip condition and a green LED the availability of power at the outputs. Bussted 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

$>1.8\text{A}$

#### 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 RANGE BARRIER APPLICATIONS

## 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.

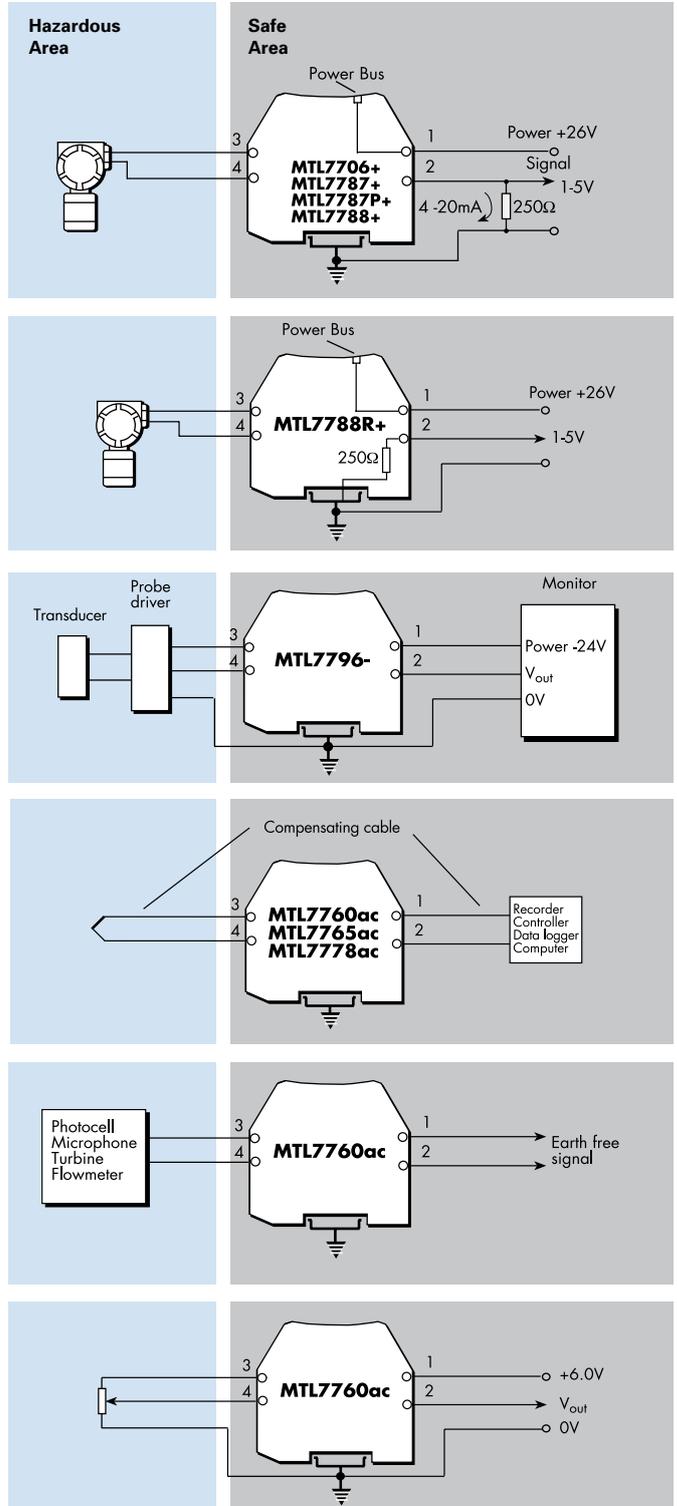
### AC sensors, photocells, microphones and turbine flowmeters

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.

The MTL7700 range of 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.



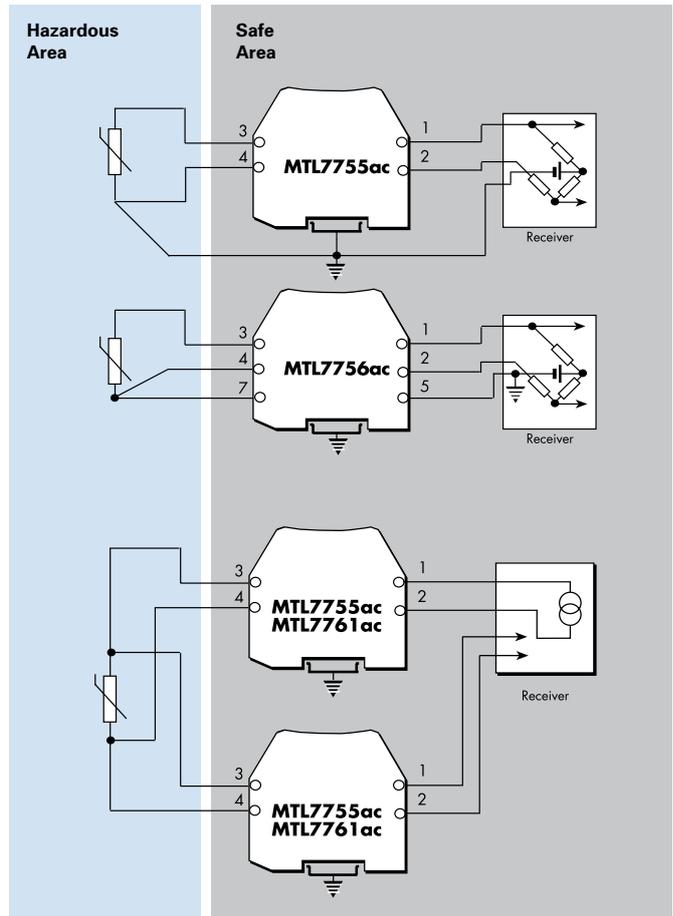
**RTDs**

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.



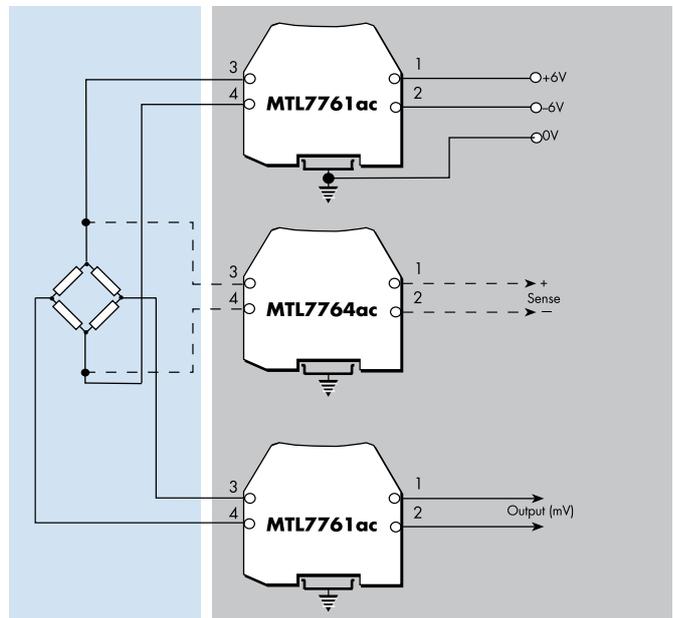
**STRAIN-GAUGE BRIDGES**

**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.



## STRAIN-GAUGE BRIDGES (cont)

### Double strain-gauge bridges

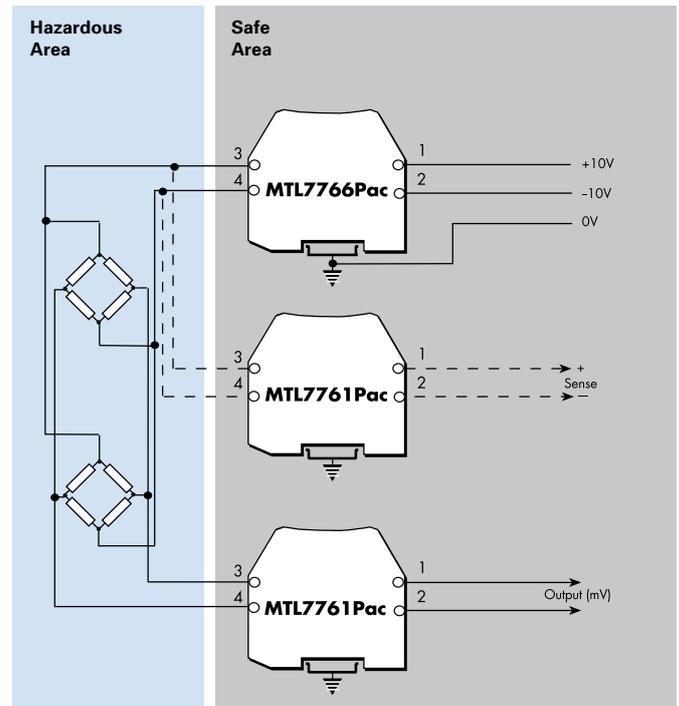
Quite frequently there is a demand to monitor two load cells, and a possible circuit, safe in IIC, is shown.

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



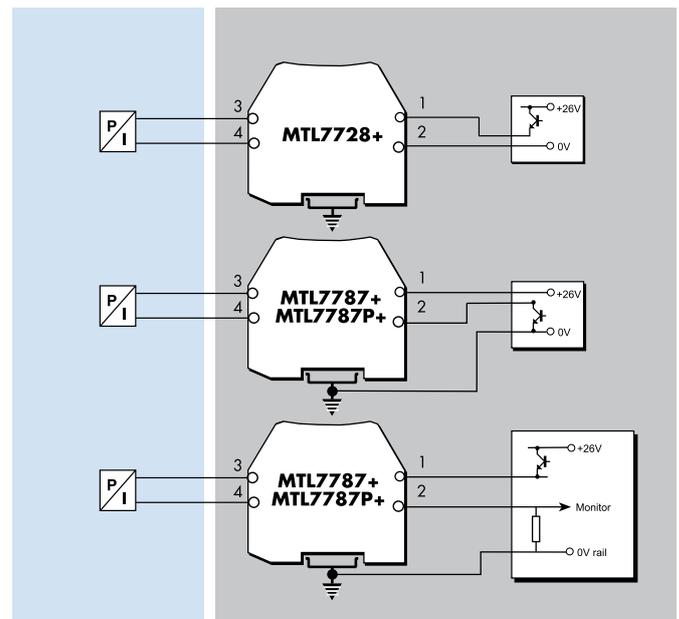
## ANALOGUE OUTPUTS

### 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.



## 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

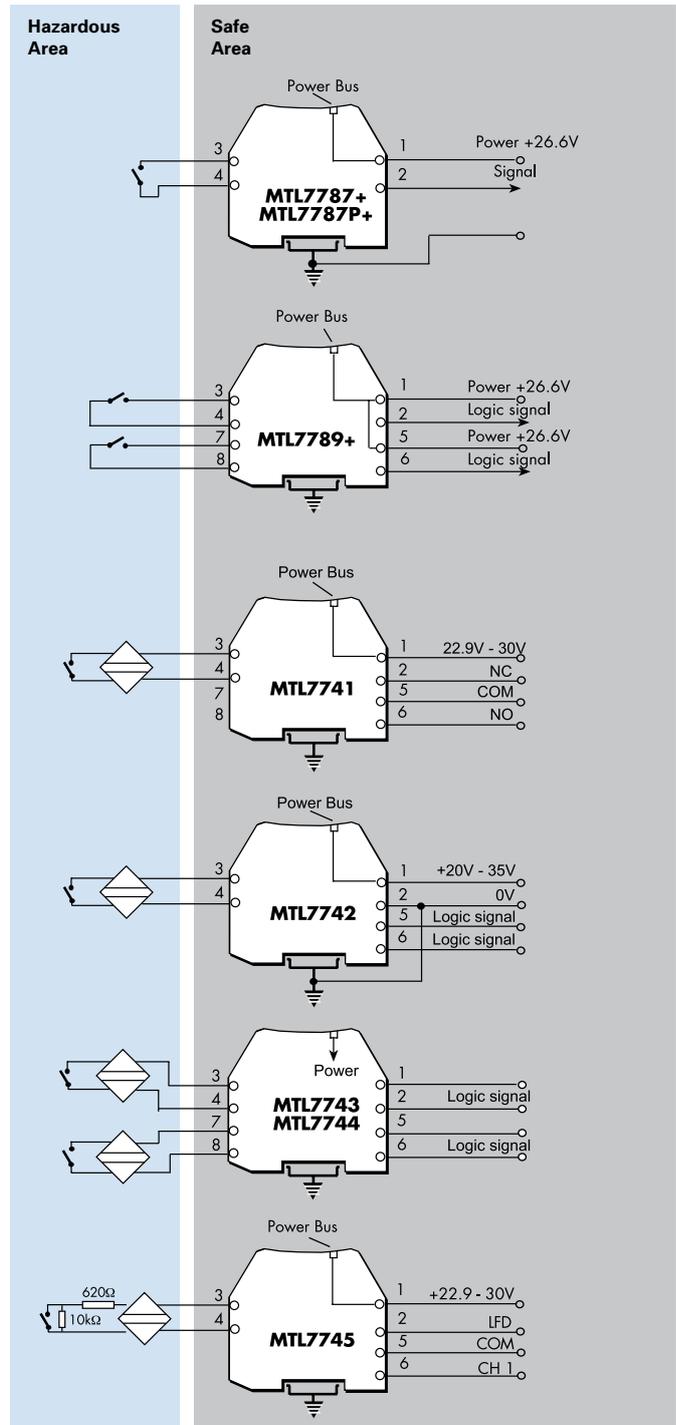
MTL's range of new switch/prox input barriers provide the user with a choice of relay and solid state outputs in single and dual channel versions.

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.



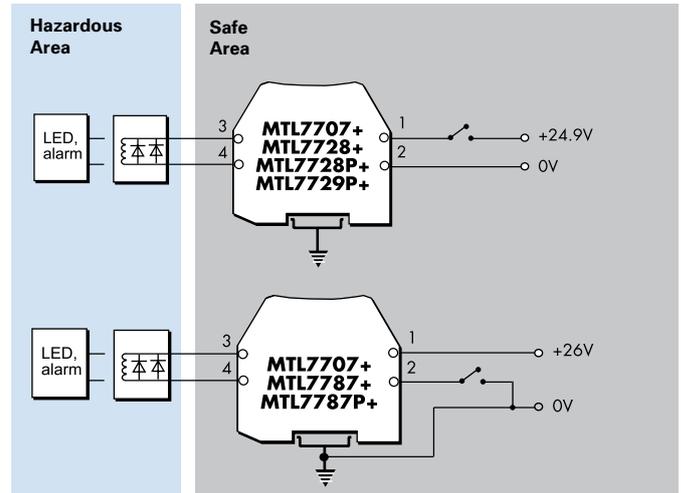
## DIGITAL (ON/OFF) OUTPUTS

### 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

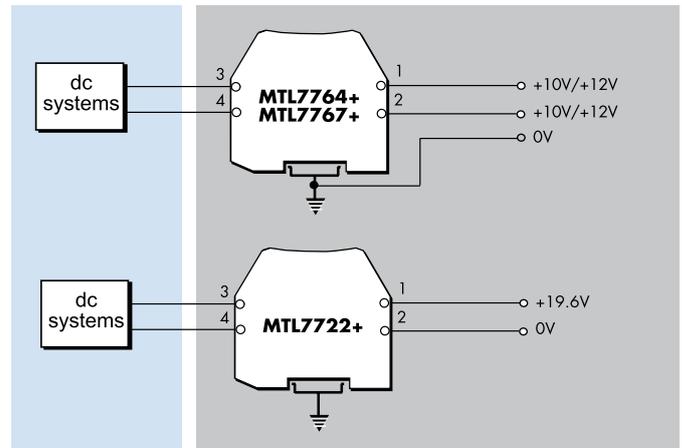
### Low-level to 12V dc systems

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

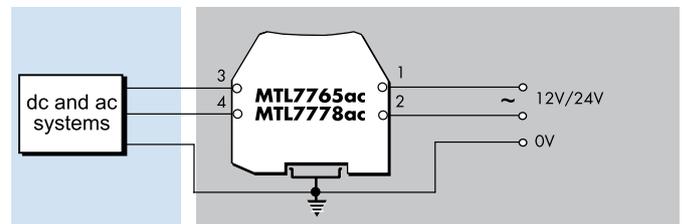
The single-channel MTL7722+ is recommended for 18V dc systems.



## 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.

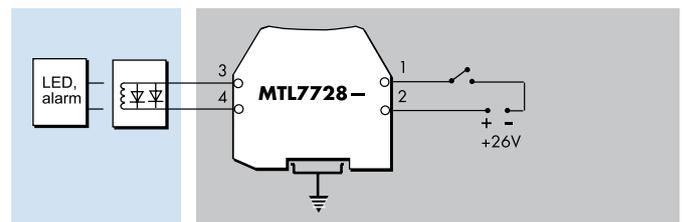


## NEGATIVE AND FLOATING POWER SUPPLIES

### Digital (on/off) outputs

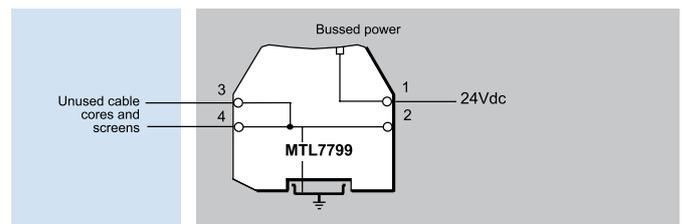
The MTL7728- is used with a negative power supply and positive earth. Typically used for digital inputs or outputs, as shown.

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.

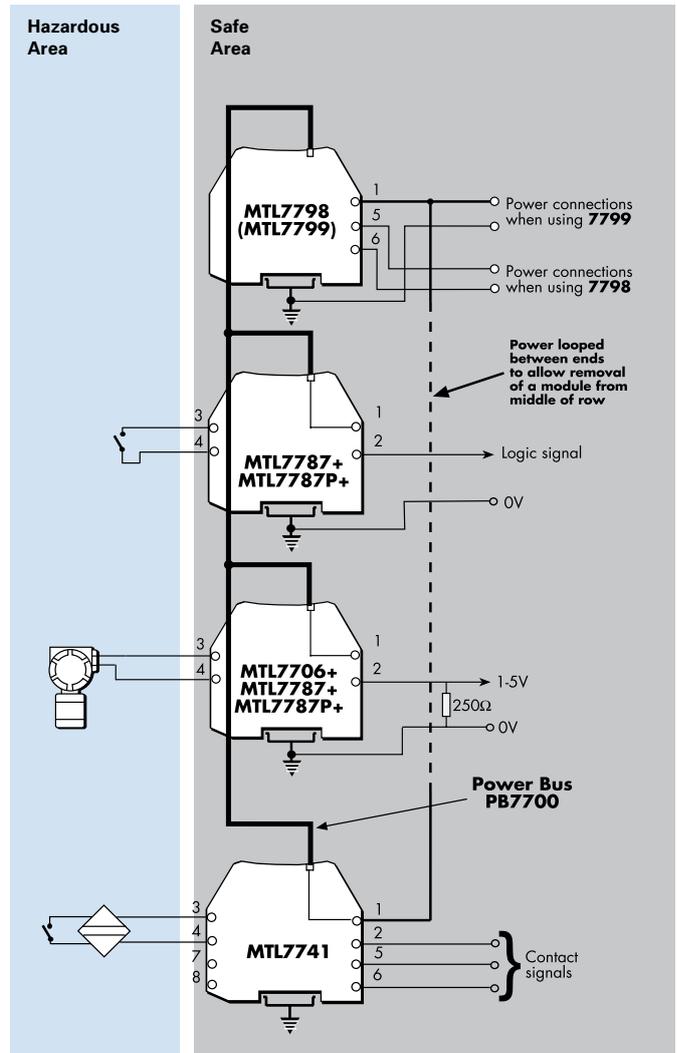
Typical applications include hazardous-area switches, 4/20mA transmitters and proximity detectors. The diagram illustrates the configuration for 4 barriers but up to 40 barriers can be served by this method.

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.

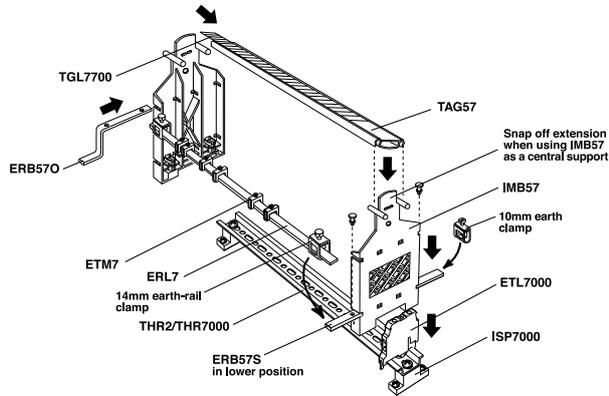
The MTL7799 dummy barrier can be used instead of the MTL7798 for direct 'feed-through' connection of a 24V dc supply onto the power bus. Looping the power feed to each end of the bussed power allows the removal of individual barriers without loss of power to others in the chain.

Other units that can use the power bus facility:

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

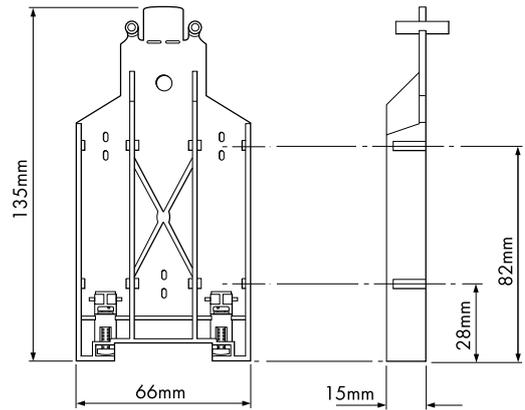


# MTL7700 RANGE ACCESSORIES



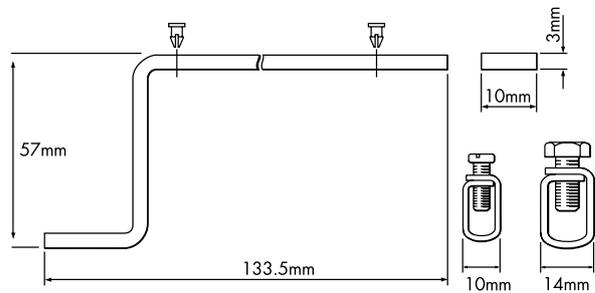
## IMB57 Insulating mounting block

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



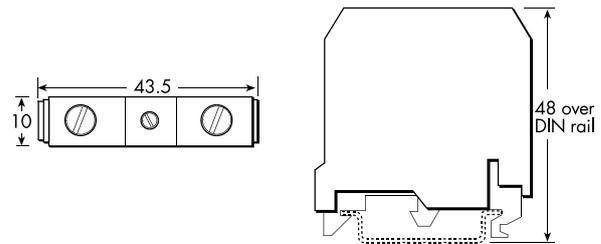
## ERB570 Earth-rail bracket, offset

Nickel-plated; supplied with two push fasteners, one 14mm earth-rail clamp and one 10mm earth clamp for cables  $\leq 16\text{mm}^2$ .



## ETL7000 earth terminal

Provides connection for routing the IS earth from the DIN rail to an appropriate plant earth. Maximum cable cross-section is  $10\text{mm}^2$ . Two recommended per discrete length of DIN rail. See instruction manual INM7700 for more details.



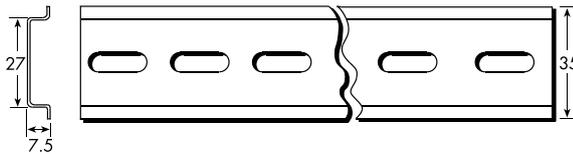
## MOUNTING/EARTHING ACCESSORIES

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

### THR2 standard DIN rail

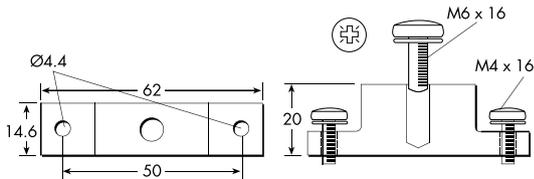
### THR7000 plated rail

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



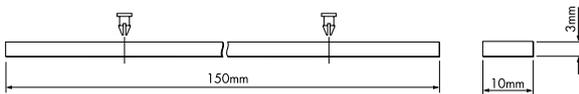
### ISP7000 insulating spacers

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.



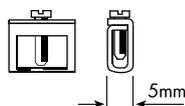
### ERB57S Earth-rail bracket, straight

Nickel-plated; supplied with two push fasteners, one 14mm earth-rail clamp and one 10mm earth clamp for cables  $\leq 16\text{mm}^2$  (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.



### 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.

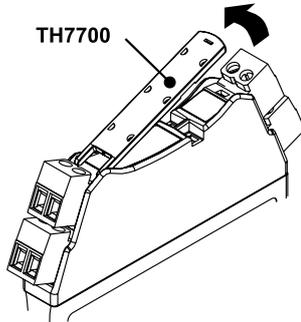
## TAGGING ACCESSORIES

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 range 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.

### MTL700 BUSBAR accessory

#### ADB700 Adaptor bracket, MTL700

Tin-plated; supplied with two M4 screws and washers. For mounting an MTL7700 range barrier to an MTL700 busbar (EBB7).

Note: This is only to be used when the EBB7 is supported by IMB7 insulating mounting blocks, it should not be used with the smaller SMB7 mounting blocks.



For the latest certificate information see [www.mtl-inst.com/certificates](http://www.mtl-inst.com/certificates)

## 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
ADB700	Adaptor bracket to convert MTL700

### 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

### 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 range
INA7700	ATEX information, MTL7700 range
INM57ENC	Instruction manual, MTL5000/7000 range enclosures
CD7700...	Customer drawings

## 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

## MTL600 range of displays

Eaton's range of MTL 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 contaminants.

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:  
U<sub>i</sub>=30V, I<sub>i</sub>=200mA, P<sub>i</sub>=1.2W, C<sub>i</sub>=0nF, L<sub>i</sub>=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<sub>o</sub> = 28V, I<sub>o</sub> = 200mA, P<sub>o</sub> = 0.96W max.)

### Dimensions

See page 110



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 <math><1V</math> 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

<math><1V</math>, loop powered

#### Ambient Temperature

Operating:  $-25^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
Storage:  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$

#### 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

$\pm 0.01\text{mA}$

#### Effects of temperature on accuracy

Zero:  $\pm 0.0025\%$  of span / $^{\circ}\text{C}$   
Span:  $\pm 0.01\%$  of span / $^{\circ}\text{C}$

#### Ripple rejection

<math><0.01\text{mA}</math> 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:  
 $U_i=30V$ ,  $I_i=200\text{mA}$ ,  $P_i=1.2W$ ,  $C_i=0\text{nF}$ ,  $L_i=0\text{mH}$  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  
( $U_o = 28V$ ,  $I_o = 200\text{mA}$ ,  $P_o = 0.96W$  max.)

#### Dimensions

See page 110

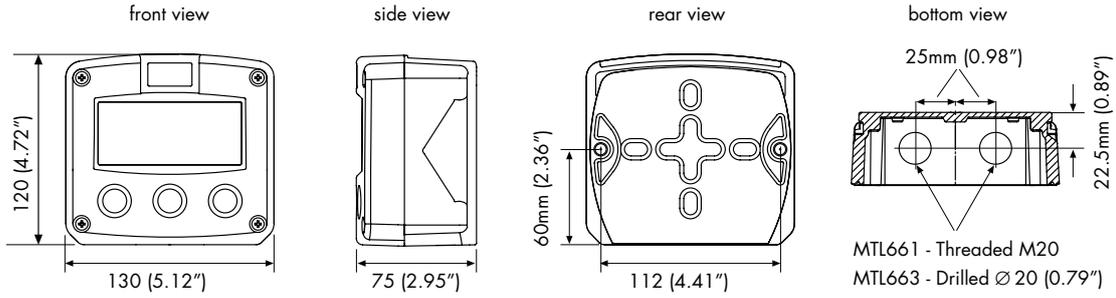
### ORDERING INFORMATION

When ordering a MTL665 use one of the following order codes to uniquely specify your requirement.

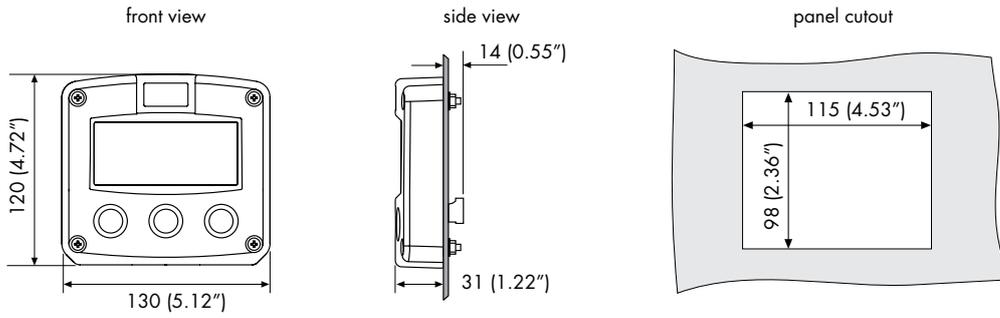
Order code	Type	Backlight	Case material	Weight (nom.)	Case style
MTL665	Panel	No	Aluminium	300g	C
MTL665B	Panel	Yes	Aluminium	300g	C

## CASE DIMENSIONS (mm)

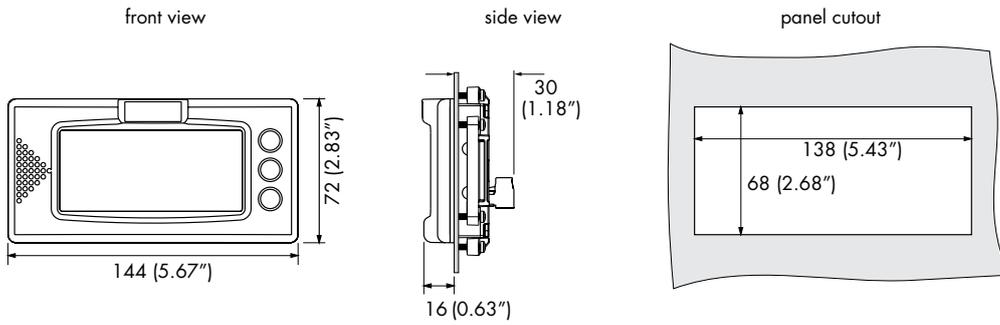
### Style 'A'



### 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+

# 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.

## 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  $5\Omega + 0.7V$

$R_{off}$  greater than  $1M\Omega$

### I.S. parameters

$U_i = 28Vdc$ ,  $I_i = 200mA$ ,  $P_i = 0.85W$

## 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

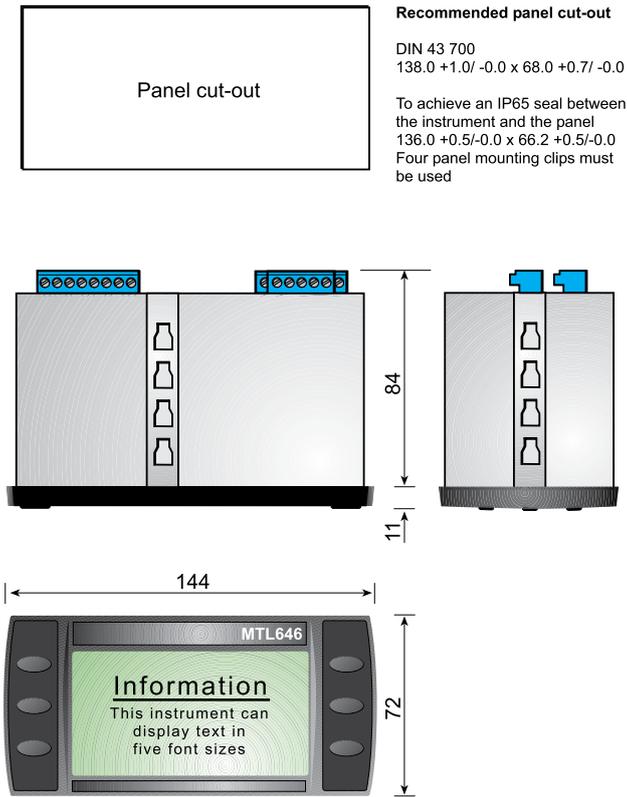
### Tag number

Thermally printed strip on rear of instrument.

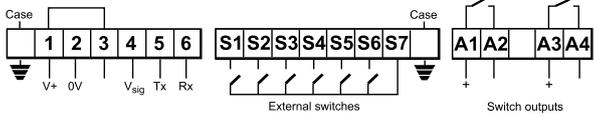
### Programming guide

May be downloaded from <http://www.mtl-inst.com>

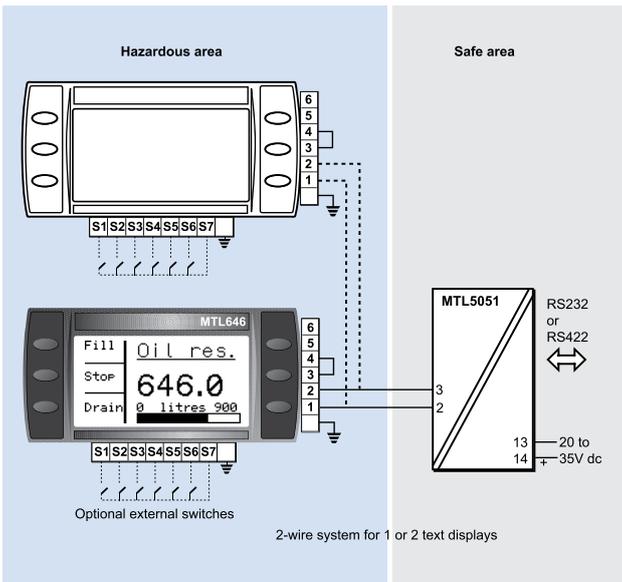
**MTL646**  
**DIMENSIONS (mm)**



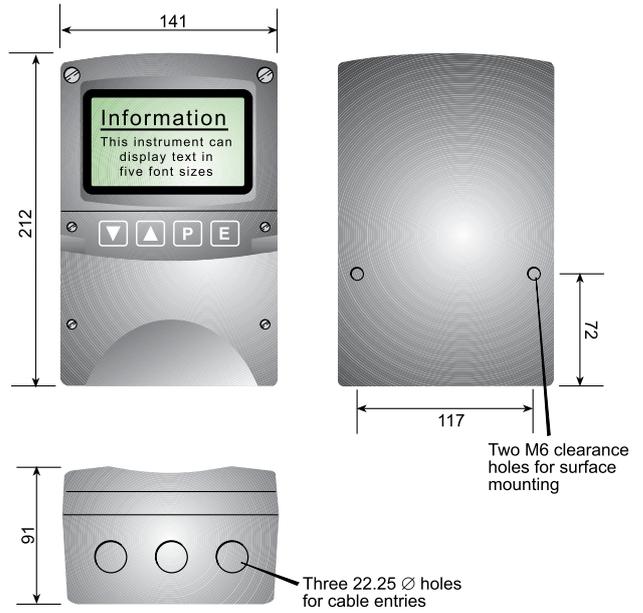
**TERMINAL CONNECTIONS**



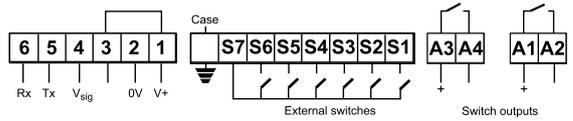
**CONNECTIONS**



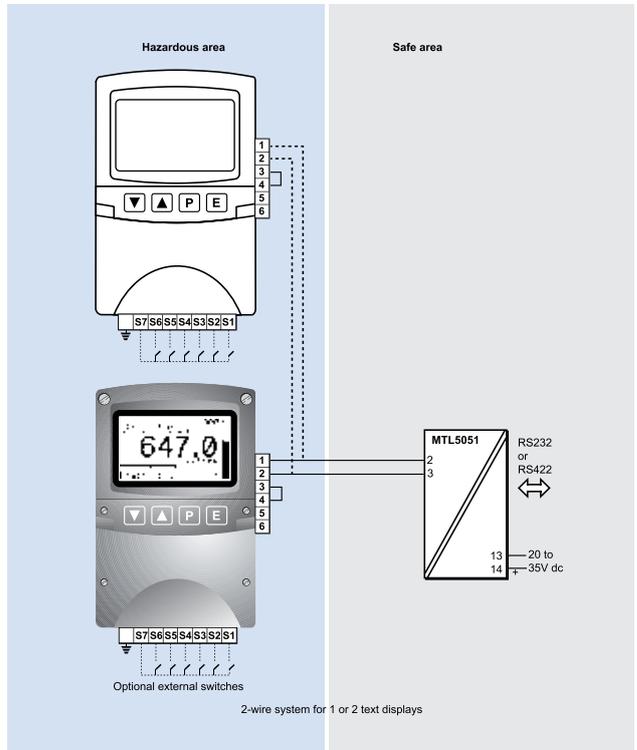
**MTL647**  
**DIMENSIONS (mm)**



**TERMINAL CONNECTIONS**



**CONNECTIONS**





# Providing instant value to your project

## MTL services and support Services tailored to your needs

With our years of experience in intrinsic safety, functional safety and FOUNDATION™ fieldbus, our team can provide instant value to your project - at any time in its lifecycle from Front End Engineering Design (FEED) to construction and commissioning right through to post-project network integrity maintenance.

Getting it right from the start is the key to the success of any project and we are here to help you select the right solution for your applications. Regardless of whether you are designing a “traditional” analogue system, HART® based

system or a complete digital system incorporating FOUNDATION™ fieldbus, industrial Ethernet or wireless, Eaton can assist with project definition, network services and knowledge capture.

With our global network of sales associates, help is never far away. Our local professional sales teams continue to be your interface to the complete organisation, helping you get your project completed on budget and on time, with real and sustainable benefits.



# Learn with Eaton

## Why educate?

Education is essential in today's workplace to...

- Replace skills and experience lost through retirement and workforce reduction
- Reduce reliance on costly external expertise and consultancy
- Enable multi-skilling of employees
- Promote continuous vocational learning
- Empower individuals to become effective professionals

Eaton can help fill the skills gap by providing training across a wide range of technical subjects, and using a variety of training media.

## Training to suit your needs and budget

Decades of experience in designing MTL instrumentation products for process control applications contribute to Eaton's training and education resources. Free-of-charge "Lunch and Learn" seminars are available in many regions, and chargeable full-day training courses can be arranged on request.

Live, internet-based webinars can also be staged for teams working across diverse geographies or time zones.

## From technology through to application

Training materials are available to cover the full scope of Eaton's MTL products, and include:

- Explosion protection of electrical apparatus in flammable atmospheres
- Intrinsic safety design and installation
- FOUNDATION™ fieldbus connectivity and diagnostics
- Cyber security for process control
- Functional safety
- Industrial Ethernet, including intrinsically safe Ethernet solutions
- Surge protection

...plus a range of allied subjects and product-specific content.

So why not explore how Eaton can help develop your workforce? Contact your nearest Eaton office to discuss your training requirements.









Intrinsic safety  
concept simplifies  
circuits and permits  
live maintenance  
within the  
hazardous area





EATON Crouse-Hinds series

# The safety you rely on.

See the complete MTL intrinsic safety product portfolio at [www.mtl-inst.com](http://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](mailto: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,  
10 Kent Road, Mascot, New South Wales, 2020, Australia  
Tel: +61 1300 308 374 Fax: +61 1300 308 463  
E-mail: [mtlsalesanz@eaton.com](mailto:mtlsalesanz@eaton.com)

**BeNeLux**

MTL Instruments BV  
Ambacht 6, 5301 KW Zaltbommel  
The Netherlands  
Tel: +31 (0)418 570290 Fax: +31 (0)418 541044  
E-mail: [mtl.benelux@eaton.com](mailto:mtl.benelux@eaton.com)

**CHINA**

Cooper Electric (Shanghai) Co. Ltd  
955 Shengli Road, Heqing Industrial Park  
Pudong New Area, Shanghai 201201  
Tel: +86 21 2899 3817 Fax: +86 21 2899 3992  
E-mail: [mtl-cn@eaton.com](mailto:mtl-cn@eaton.com)

**FRANCE**

MTL Instruments sarl,  
7 rue des Rosières, 69410 Champagne au Mont d'Or  
France  
Tel: +33 (0)4 37 46 16 53 Fax: +33 (0)4 37 46 17 20  
E-mail: [mtlfrance@eaton.com](mailto: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: [csckerpen@eaton.com](mailto:csckerpen@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](mailto:mtlindiasales@eaton.com)

**ITALY**

MTL Italia srl,  
Via San Bovio, 3, 20090 Segrate, Milano, Italy  
Tel: +39 02 959501 Fax: +39 02 95950759  
E-mail: [chmninfo@eaton.com](mailto: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](mailto: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](mailto:info@norex.no)

**RUSSIA**

Cooper Industries Russia LLC  
Elektrozavodskaya Str 33  
Building 4  
Moscow 107076, Russia  
Tel: +7 (495) 981 3770 Fax: +7 (495) 981 3771  
E-mail: [mtlrussia@eaton.com](mailto:mtlrussia@eaton.com)

**SINGAPORE**

Eaton Industries Pte Ltd  
100G Pasir Panjang Road, Interlocal Centre  
#07-08 Singapore 118523  
Tel: +65 6645 9888 Fax: +65 6297 4819  
E-mail: [sales.mtlsing@eaton.com](mailto:sales.mtlsing@eaton.com)

**SOUTH KOREA**

Cooper Crouse-Hinds Korea  
7F, Parkland Building 237-11 Nonhyun-dong Gangnam-gu,  
Seoul 135-546, South Korea.  
Tel: +82 6380 4805 Fax: +82 6380 4839  
E-mail: [mtl-korea@eaton.com](mailto: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](mailto:mtlgulf@eaton.com)

**UNITED KINGDOM**

Eaton Electric Ltd,  
Great Marlings, Butterfield, Luton  
Beds LU2 8DL  
Tel: +44 (0)1582 723633 Fax: +44 (0)1582 422283  
E-mail: [mtlenquiry@eaton.com](mailto:mtlenquiry@eaton.com)

**AMERICAS**

Cooper Crouse-Hinds MTL Inc.  
3413 N. Sam Houston Parkway W.  
Suite 200, Houston TX 77086, USA  
Tel: +1 281-571-8065 Fax: +1 281-571-8069  
E-mail: [mtl-us-info@eaton.com](mailto:mtl-us-info@eaton.com)

**Eaton Electric Ltd,**  
Great Marlings, Butterfield, Luton  
Beds LU2 8DL, UK.  
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283  
E-mail: [mtlenquiry@eaton.com](mailto:mtlenquiry@eaton.com)

[www.mtl-inst.com](http://www.mtl-inst.com)

**EATON**  
Powering Business Worldwide

© 2017 Eaton  
All Rights Reserved  
ZL-C-IS-SOLN-EN-0617  
June 2017

**Eaton Electric Limited,**  
Great Marlings, Butterfield, Luton  
Beds, LU2 8DL, UK.  
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283  
E-mail: [mtlenquiry@eaton.com](mailto:mtlenquiry@eaton.com)  
[www.mtl-inst.com](http://www.mtl-inst.com)

Eaton is a registered trademark.  
All other trademarks are property  
of their respective owners.

Connect with Eaton, MTL:

