Your safe link to the hazardous area

MTL2000 SERIES

isolating IS interface units



Selected items within this Series are available in the UK through MTL's new express service

- **Mains or 24V dc supply**
- **250V input/output/power supply isolation**
- **No high-integrity earth needed**
- **Broken line and earth fault protection**
- **Compatible with MTL3000 Series**

Telematic Ltd offers surge protection devices which are mechanically compatible with the MTL2000 Series.

Ask for the SD Series data sheet!

The MTL2000 Series is the original range of MTL IS isolating devices for handling on/off or analogue signals between hazardous-area process instrumentation and safe-area control equipment. It includes IS relays for bringing back status or command signals from switches or proximity detectors, on/off units for driving solenoids, alarms or LEDs, temperature trip amplifiers, and 4/20mA analogue units which will energise and bring back the signal from a 2-wire transmitter, or drive an I/P converter.

Each design is available in three versions, 240V, 120V ac mains and 24V dc, and is mechanically compatible with the MTL3000 Series of 24V dc powered units. Both series provide an alternative to the shunt-diode safety barrier in applications where isolation is essential or preferred for its ease of application or where a high-integrity 'safety earth' is not easily available. Isolation between input, output, and power supply circuits eliminates the need to consider relationships to earth, makes system hook-ups easier to arrange and allows hazardous-area circuits to be left floating or earthed at any one point. The removal of earth requirements reduces many installation costs and enables some systems to be implemented that would otherwise be impossible. All units are certified intrinsically safe by the major authorities for connection into Zone 0, IIC, T4 (or T6) hazardous areas worldwide.

High integrity is a key feature of the series. As far as possible, each design provides protection against power supply failure, field circuit breaks and field line faults to earth. For example, a break in any of the three lines of an RTD trip amplifier de-energises the relays to give an alarm.

Two modes of earth fault protection are available. In 'fail-safe' operation, built-in relays or hazardous-area loads are de-energised by any earth fault in the field, a mode achieved simply at neglible cost by earthing one or more terminals on the unit. For critical applications, a 'no-fail' mode is available whereby field circuits remain floating while their resistance to earth is monitored by an MTL2220 earth leakage detector. The unit thus continues to operate in the event of an earth fault, the fault being brought to the attention of the operator.

Each unit is housed in a robust moulded plastic case fitted with vibration-proof terminals for field cables. Terminals can be annotated by two 18-digit rows of alpha-numeric tagging information. Where appropriate, LEDs are fitted to indicate relay status.

Units can be mounted directly on standard symmetrical 35mm (top-hat) rail, or alternatively on flat surfaces using SMC2 mounting clips. Accessories and enclosures are shared with the MTL3000 Series. For details, see the MTL2000 & 3000 series enclosures and accessories section.

For full details of individual units refer to the individual descriptions and specifications. See also MTL2000 maximum cable parameters, common specification, dimensions, approvals, and ordering information.

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MTL2210B SWITCH-OPERATED RELAY

1-channel

CE

The MTL2210B enables two 500VA safe-area loads to be controlled in separate circuits simultaneously by one light-duty on/off switch in a hazardous area. Alternatively, it can be arranged to latch for pushbutton stop/start control of an electric motor, the relay then being energised by brief closure of one switch contact and de-energised by the brief opening of another. The stop switch overrides the start switch, even if the start circuit is closed, making sure that the motor can be turned off under all conditions. In this application, the second pair of changeover output contacts enables the status of the motor to be fed to a computer or data logger.

SPECIFICATION

See also common specification

Number of channels
One, fully floating

Location of switch(es)
Zone 0, IIC, T6 hazardous area
Div 1, Group A, hazardous location

Voltage applied to switch(es)
5.6V dc from 1.5kΩ

Input/output characteristics
Relay energised if <200Ω between tmnls 1 & 2 and 3 & 4
Relay de-energised if >500Ω between tmnls 1 & 2* or 3 & 4
Hysteresis, nominal 100Ω
**Non-latching mode*

Latching facility
(Enabled by linking terminals 5 & 6)
Relay then latches ON when energised (shorts tmnls 1 & 2)
Relay de-energised if unlatch circuit broken (latching)

Power supply failure protection
Relay de-energised if supply fails

Broken line protection
Relay de-energised if either line broken (non-latching)
Relay de-energised if unlatch circuit broken (latching)

'Fail-safe' earth fault protection
(Enabled by connecting terminal 8 to earth)
Relay de-energised if <1kΩ to earth, total for all 3 lines
Relay not de-energised if >7.5kΩ to earth, total for all 3 lines

'No-fail' earth fault protection
(Enabled by connecting terminal 8 to MTL2220)
Fault on any line proclaimed: unit continues working

Response time
50ms, nominal

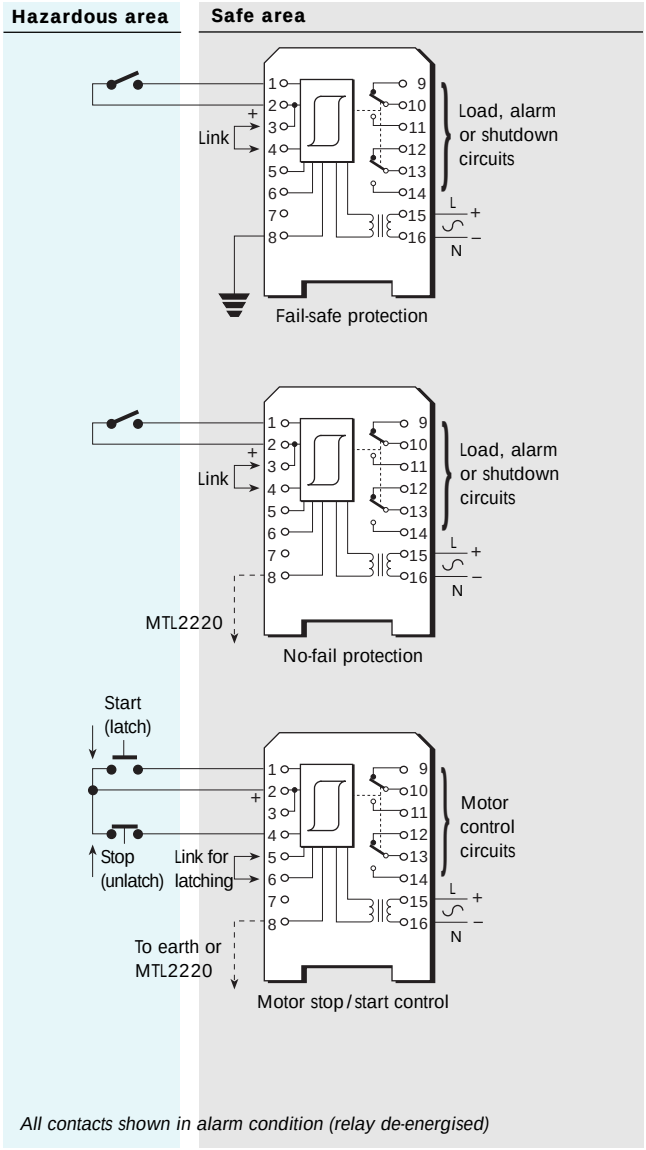
Contacts
2-pole changeover

Contact rating
250V:5A:500VA (ac) (resistive loads, reactive loads must be suppressed)
250V:5A:250W (dc) (resistive loads, reactive loads must be suppressed)

Contact life expectancy
2 x 10^5 operations at maximum load

LED indicator
ON when relay energised

Consumption
0.9 to 1.4W (ac versions)
60mA (24V dc version)



All contacts shown in alarm condition (relay de-energised)

Ambient temperature limits
–20 to +55°C (all versions, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description
7V, 300Ω, 22mA

FM max entity parameters
V_{oc} = 8.3V, I_{sc} = 26mA, C_a = 7µF, L_a = 47mH

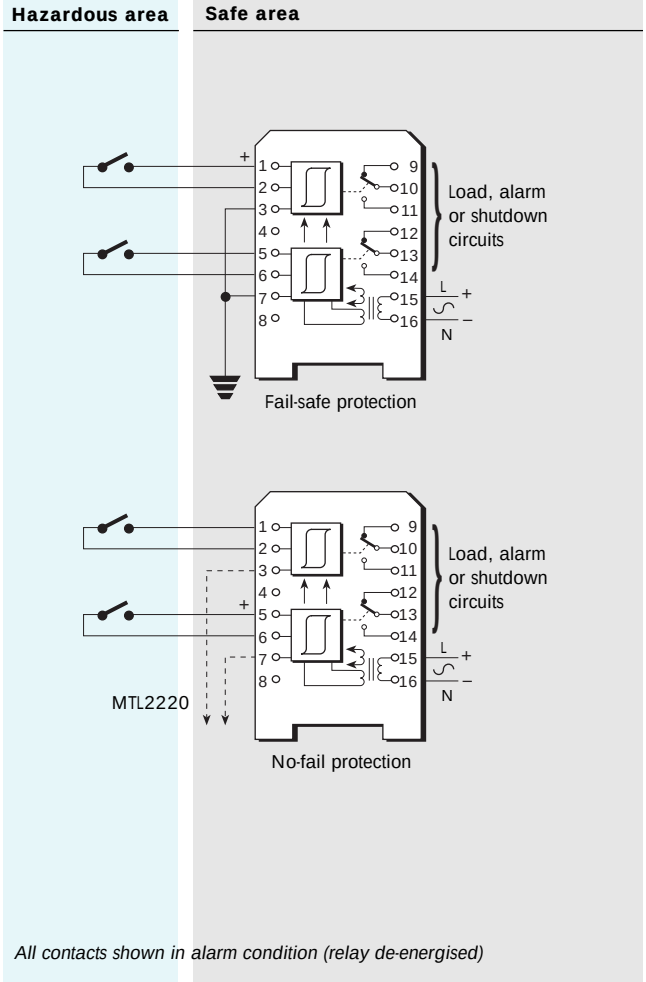
This unit may show degraded immunity performance under some EMC test conditions – refer to supplementary specification SUP2210B for further details.

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2211 SWITCH-OPERATED RELAY

2-channel

The MTL2211 enables two 500VA safe-area loads to be controlled independently through two relays by two light-duty on/off switches in a hazardous area. The two input circuits are independently fully floating and are unaffected by each other. Each relay is provided with two sets of changeover contacts, which are connected in parallel within the unit for maximum reliability. Applications include the operation of medium-powered electrical equipment such as alarms, lights, and small electrical motors, or contactors for controlling higher-powered equipment.



All contacts shown in alarm condition (relay de-energised)

SPECIFICATION

See also common specification

Number of channels
Two, independently fully floating

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

Voltage applied to each switch
2.5V dc from 680Ω

Input/output characteristics (each channel)
Relay energised if <200Ω in switch circuit
Relay de-energised if >500Ω in switch circuit
Hysteresis, nominal 100Ω

Power supply failure protection
Both relays de-energised if supply fails

Broken line protection (each channel)
Relay de-energised if either line broken

Fail-safe earth fault protection (each channel)
(Enabled by connecting terminal 3 or 7 to earth)
Relay de-energised if <1kΩ to earth, total for both lines
Relay not de-energised if >7.5kΩ to earth, total for both lines

'No-fail' earth fault protection (each channel)
(Enabled by connecting terminal 3 or 7 to MTL2220)
Fault on either line proclaimed: unit continues working

Response time (each channel)
50ms, nominal

Contacts (each channel)
1-pole changeover, duplicated within unit

Contact rating
250V:5A:500VA (ac), resistive loads, reactive loads must be suppressed
250V:5A:250W (dc), resistive loads, reactive loads must be suppressed

Contact life expectancy
3 x 10^5 operations at maximum load

LED indicator (each channel)
ON when associated relay energised (safe condition)

Consumption
1.7 to 2.5W (ac versions)
110mA (24V dc version)

Ambient temperature limits
–20 to +50°C (ac versions, close packed)
–20 to +45°C (24V dc versions at 26V, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description (each channel)
7V, 300Ω, 22mA

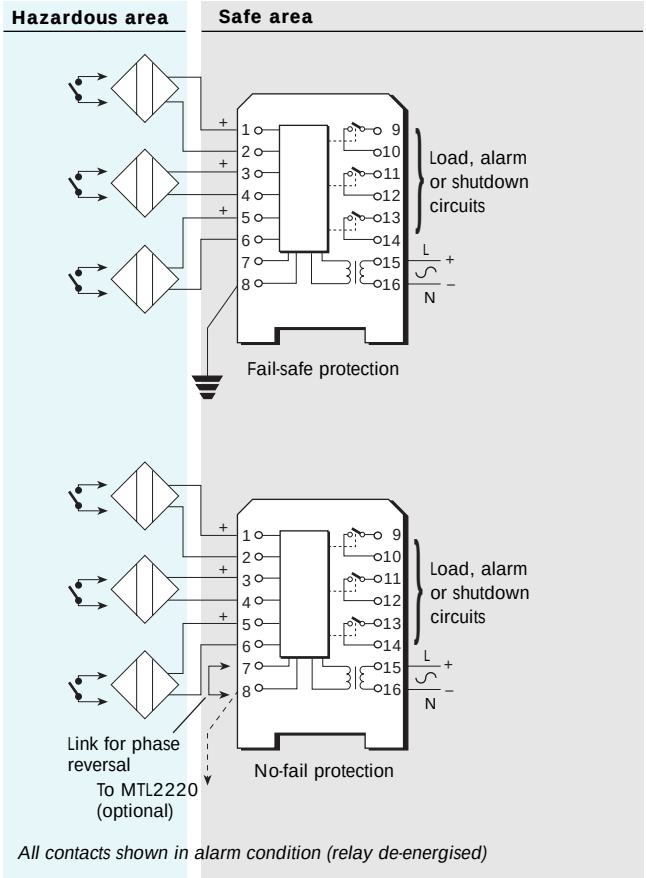
FM max entity parameters (each channel)
V_{oc} = 8.3V, I_{sc} = 21.7mA, C_a = 5.5µF, L_a = 75mH

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2213 SWITCH/ PROXIMITY DETECTOR RELAY

3-channel

The MTL2213 enables three 100VA safe-area loads to be controlled independently by three light-duty on/off switches or certified proximity detectors in a hazardous area. Switches and proximity detectors may be mixed. The three input circuits are interconnected but fully floating. For proximity-detector and some switch applications, a phase-reverse link allows alarm conditions to be signalled for either state of the sensors. 'Alarm' means relays de-energised with their on/off contacts open, and all three circuits have to operate in the same fashion. This compact low-cost unit is suitable for a wide variety of applications. The MTL2213 supersedes the MTL2212 for which it is a direct replacement, except that only terminal 8 can be used for connecting to earth.



SPECIFICATION

See also common specification

Number of channels
Three, interconnected, fully floating

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

Location of proximity detectors
Zone 0, IIC, T4–T6 if suitably certified
Div 1, Group A, hazardous location

Voltage applied to each sensor
7.7 to 9.0V dc from 1kΩ

Input/output characteristics (each channel)
Relay energised if >2.1mA* (<2kΩ) in sensor circuit
Relay de-energised if <1.2mA* (>10kΩ) in sensor circuit
Hysteresis: 200μA (650Ω) nominal
**NAMUR and DIN 19234 standards for proximity detectors*

Phase reverse facility
Operation of all 3 relays reversed by linking terminals 7 & 8

Power supply failure protection
All three relays de-energised, contacts open, if supply fails

Broken line protection (each channel, normal phase only)
Relay de-energised, contacts open, if either line broken

Fail-safe earth fault protection (each channel, normal phase only)
(Enabled by connecting terminal 8 to earth)
Relay de-energised if <25Ω to earth, total for both lines
Relay not de-energised if >52kΩ to earth, total for both lines

'No-fail' earth fault protection (either phase)
(Enabled by connecting terminal 8 to MTL2220)
Fault on any line proclaimed: unit continues working

Response time (each channel)
50ms, nominal

Contacts (each channel)
On/off, open when relay de-energised

Contact rating
250V,5A,100VA (ac), resistive loads, reactive loads must be suppressed
250V,5A,100W (dc), resistive loads, reactive loads must be suppressed

Contact life expectancy
1.5×10^5 operations at maximum load
$> 10^6$ operations at 200V ac peak or dc, 10VA (resistive load)

LED indicator (each channel)
ON when associated relay energised

Consumption
1.7 to 2.5W (ac versions)
110mA (24V dc version)

Ambient temperature limits
–20 to +50°C (ac versions, close packed)
–20 to +45°C (24V dc versions at 26V, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description (each channel)
10.5V, 800Ω, 14mA

FM max entity parameters (each channel)
V_{oc} = 10.5, I_{sc} = 14.0mA, C_a = 3.0μF, L_a = 165mH

This unit may show degraded immunity performance under some EMC test conditions – refer to supplementary specification SUP2213 for further details.

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2215 SWITCH-OPERATED RELAY

IS-output

The MTL2215 enables either one or two separate IS circuits in a hazardous area to be relay-contact controlled by a single on/off switch or logic signal in a safe area. Applications include the calibration of strain-gauge bridges, changing 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 still remain safe if connected together.

SPECIFICATION

See also common specification

Number of channels
One, fully floating

Location of control circuit
Safe area

Input/output characteristics
Relay energised if <27kΩ or <1V applied
Relay de-energised if >54kΩ or >2V applied (50V maximum)
Hysteresis, nominal: 16kΩ or 0.6V

Power supply failure protection
Relay de-energised if supply fails

Response time
50ms, nominal

Contacts (suitable for connection to IS circuits)
2-pole changeover

Contact rating (non-IS applications)
250V,5A,500VA (ac), resistive loads, reactive loads must be suppressed
250V,5A,250W (dc), resistive loads, reactive loads must be suppressed

Contact life expectancy (non-IS applications)
2 x 10^5 operations at maximum load

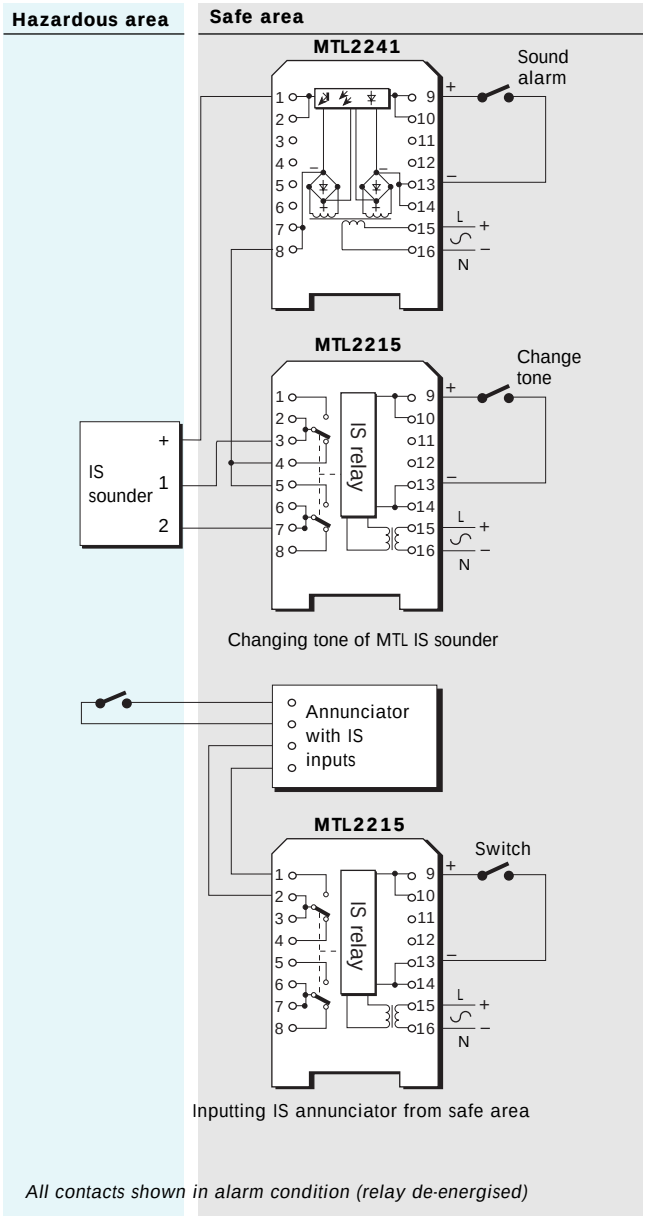
LED indicator
ON when relay energised

Consumption
0.9 to 1.4W (ac versions)
60mA (24V dc version)

Ambient temperature limits
–20 to +55°C (all versions, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description (each channel)
Non-energy-storing apparatus: relay contacts may be connected to any certified IS circuit in Zone 0 without further certification

Note: The 2-pole changeover contacts may be used to switch separate IS circuits only if these remain intrinsically safe when interconnected, since the two sets of relay contacts are not segregated from each other.



See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2220 EARTH LEAKAGE DETECTOR

The MTL2220 continuously monitors floating electrical circuits in a hazardous area, and warns if their resistance to earth falls below 10kΩ. It enables other MTL2000 and 3000 Series units to be used in the 'no-fail' mode, whereby earth faults on field lines can be detected and rectified without upsetting control or needing emergency action. The measuring circuit of the unit uses a 1Hz oscillator, amplifier and phase-sensitive demodulator to reject electrical interference up to 250V. A self-test facility enables the unit to be checked automatically or manually from time to time to ensure the integrity of the whole system. Testing is carried out by connecting two safe-area terminals together; this triggers an IS opto-coupler to connect a known resistance across the input terminals, de-energising the relay and LED if the unit is healthy, but having no effect on the monitored circuits. The changeover output contacts are duplicated within the unit for reliability.

SPECIFICATION

See also common specification

Monitoring signal
4V, 0.1mA, 1Hz, intrinsically safe

Earth fault resistance to de-energise relay
<10kΩ, total for terminals 1 to 7

Earth fault resistance that will not de-energise relay
>30kΩ, total for terminals 1 to 7

Response time
<5s

50Hz rejection
250V rms, series mode

Contacts
1-pole changeover, duplicated within unit

Contact rating
250V,5A,500VA (ac), resistive loads, reactive loads must be suppressed
250V,5A,250W (dc), resistive loads, reactive loads must be suppressed

LED indicator
ON when relay energised (no earth fault)

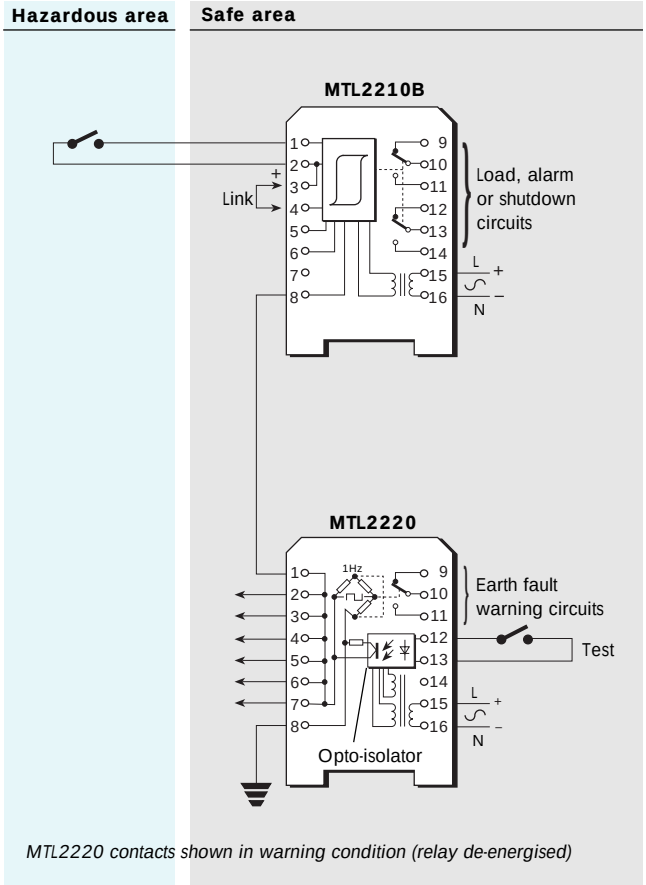
Test facility
Unit is healthy if <2kΩ applied between terminals 12 & 13 de-energises relay and LED within 5s

Consumption
0.9 to 1.4W (ac versions)
60mA (24V dc version)

Ambient temperature limits
–20 to +55°C (all versions, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description (each channel)
6.88V, 53kΩ, 0.13mA

FM max entity parameters
V_{oc} = 8.3V, I_{sc} = 21.7mA, C_a = 5.5µF, L_a = 75mH



MTL2220 contacts shown in warning condition (relay de-energised)

Please note, in addition to the application shown above, the MTL2220 can also be used with most analogue signals.

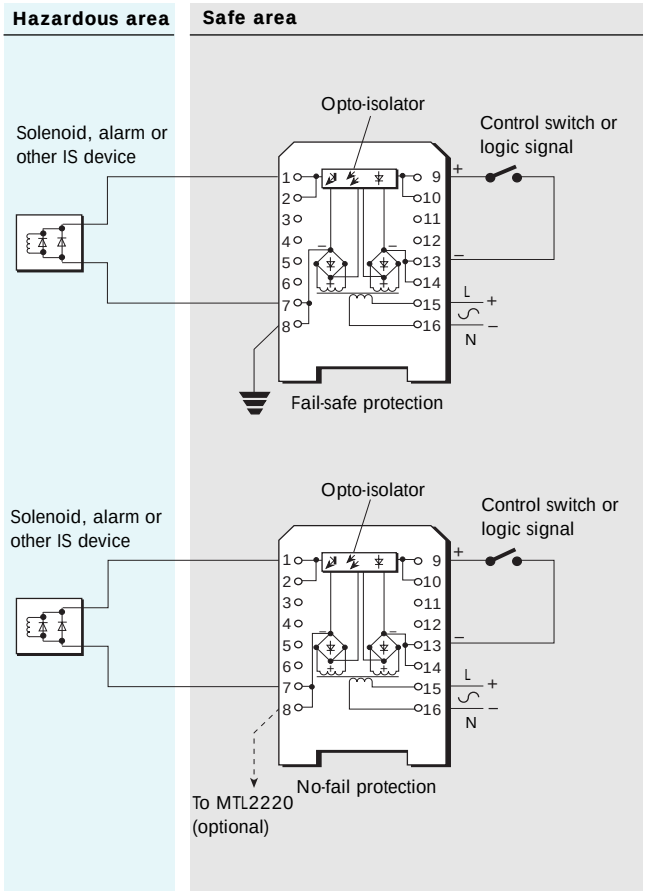
For more information ask for a free copy of Application Note AN9008 or call your local MTL representative

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2241 SOLENOID/ ALARM DRIVER

1-channel

The MTL2241 enables a safe-area contact or logic signal to control a low-power hazardous-area device such as a solenoid or alarm (provided it is certified intrinsically safe) or non-energy-storing 'simple apparatus' such as an LED. Applications include the operation of solenoid valves for process control or the initiation of audible or visual alarms to alert the plant operator. The unit can accept a logic input from an open-collector device or from standard TTL or CMOS 5V-operated logic.



SPECIFICATION

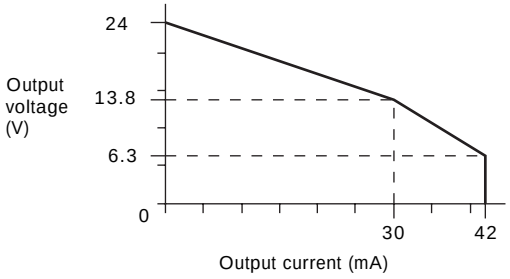
See also common specification

Number of channels
One, fully floating

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

Input/output characteristics
Turns on if <27kΩ or <1V applied
Turns off if >54kΩ or >2V applied

Minimum output voltage



Maximum output voltage
28V from 300Ω, current limited at 46mA

Power supply failure protection
Load de-energised if supply fails

Broken line protection
Load de-energised if the leads go open circuit

'Fail-safe' earth fault protection
Enabled by connecting terminal 8 to earth

'No-fail' earth fault protection
Enabled by connecting terminal 8 to MTL2220
Fault on any line proclaimed: unit continues working

Response time
<10ms

LED indicator
ON when hazardous-area load energised

Consumption
2.4 to 3.6W (ac versions)
160mA (24V dc version)

Ambient temperature limits
–20 to +40°C (ac versions, close packed)
–20 to +30°C (dc version at 26V, close packed)
–20 to +55°C (ac versions, at least 5mm apart)
–20 to +50°C (dc version at 26V, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description
28V, 300Ω, 93mA

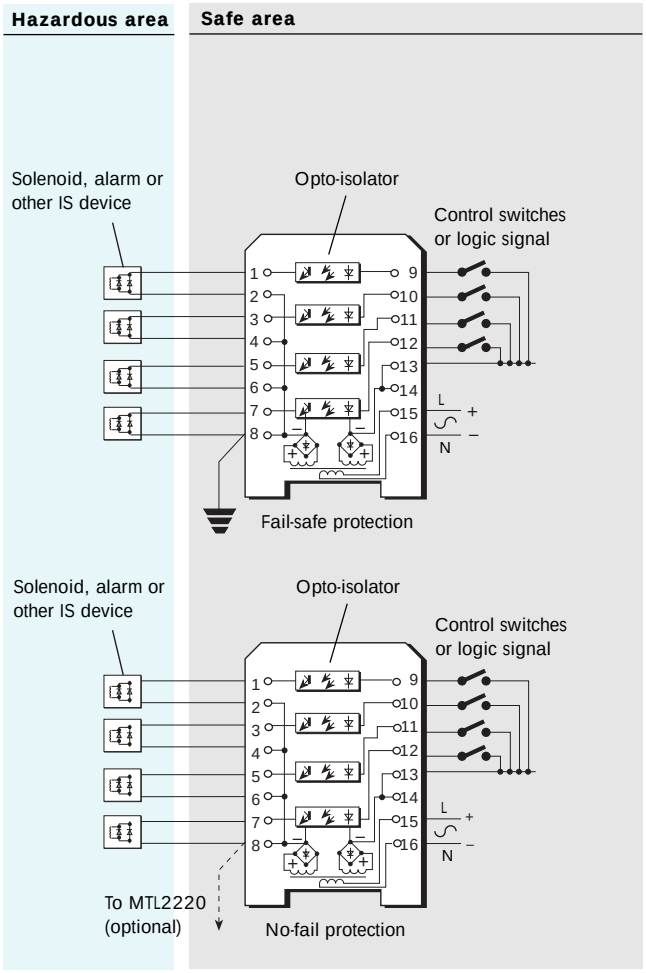
FM max entity parameters
V_{oc} = 34.0V, I_{sc} = 110.4mA, C_a = 0.09µF, L_a = 3.5mH

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2242 SOLENOID/ ALARM DRIVER

4-channel

The MTL2242 unit is a 4-channel version of the MTL2241 which enables up to four hazardous-area devices to be controlled independently by safe-area volt-free contacts or logic signals. The four output circuits are interconnected and can be paralleled, if required, to provide more power. Refer to the MTL2241 for details of applications, etc.



SPECIFICATION

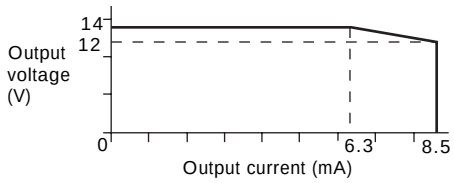
See also common specification

Number of channels
Four, interconnected, fully floating

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

Input/output characteristic (each channel)
Turns on if <27kΩ* or <1V applied
Turns off if >54kΩ* or >2V applied
Hysteresis, 13kΩ* or 0.5V, nominal
**Divide by 4 if all inputs paralleled*

Minimum output voltage (each channel)



Maximum output voltage
17.5V constant, current limited at 12mA

Power supply failure protection
Load(s) de-energised if supply fails

Broken line protection
Load(s) de-energised if any combination of leads goes open circuit

'Fail-safe' earth fault protection (each channel)
Enabled by connecting terminal 8 to earth

'No-fail' earth fault protection (each channel)
Enabled by connecting terminal 8 to MTL2220
Fault on any line proclaimed: unit continues working

Response time
<10ms

LED indicator (each channel)
ON when associated hazardous-area load energised

Consumption
2.4 to 3.6W (ac versions)
160mA (24V dc version)

Ambient temperature limits
–20 to +40°C (ac versions, close packed)
–20 to +30°C (dc version at 26V, close packed)
–20 to +55°C (ac versions, at least 5mm apart)
–20 to +50°C (dc version at 26V, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description (each channel or up to 4 channels connected in parallel)
28V, 300Ω, 93mA

FM max entity parameters
V_{oc} = 34.0V, I_{sc} = 110.4mA, C_a = 0.09µF, L_a = 3.5mH

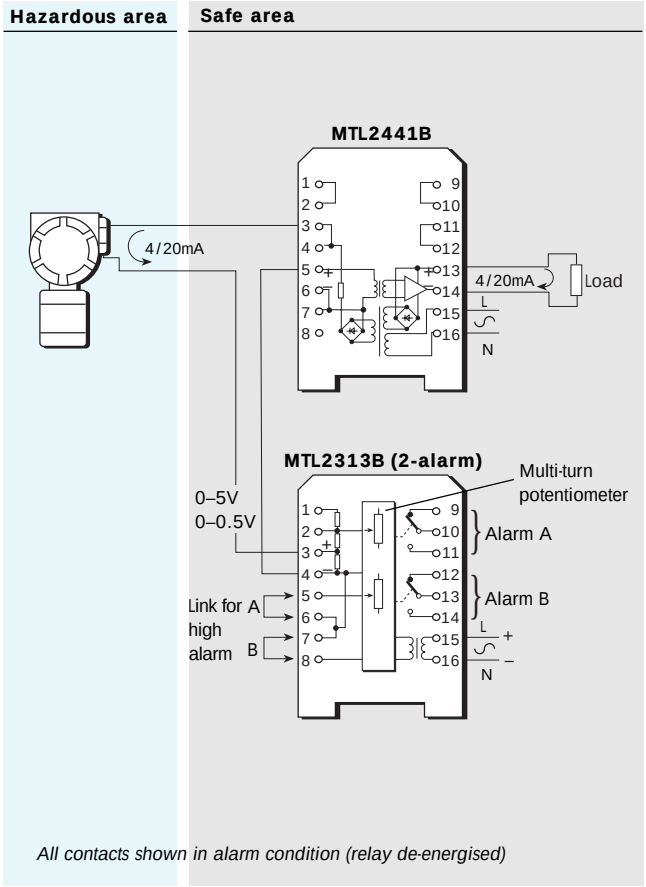
See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2313 TRIP AMPLIFIER

general purpose

CE

The MTL2313 accepts a standard high-level dc signal of 0/20 mA, 0/5V or 0/0.5V from any circuit in a hazardous area, and is particularly suitable for monitoring the output from a 2-wire transmitter. Since the unit drops less than 0.5V at 20mA across its input terminals (which are certified as 'non-energy-storing' in Europe and regarded as 'non-voltage-producing' in the USA) it can be connected into almost any 4/20mA IS loop without causing this to run out of volts or need further attention by the certifying authorities. The unit operates down to zero input current, hence the low alarm can be set to detect a broken cable. On-site alarm setting is carried out simply with a calibrated voltage or current generator.



All contacts shown in alarm condition (relay de-energised)

SPECIFICATION

See also common specification

Versions available
A: 1-alarm
B: 2-alarm

Signal source
Any intrinsically safe circuit

Location of signal source
Zone 0, IIC, T4–T6 hazardous area
Div 1, Group A, hazardous location

Input range
0 to 20mA into 25Ω nominal (terminals 3 and 4)
0 to 5V at 500kΩ nominal (terminals 1 and 4)
0 to 0.5V at 50kΩ nominal (terminals 2 and 4)
Hysteresis, nominal: 1% of input range

Power supply failure protection
Relay de-energised if supply fails

Broken line protection
Low-alarm relay energised if set to zero

Trip-point adjustment
Within 0.1% of input range over whole range (set by multi-turn potentiometer accessible through casing)

Supply voltage effect on trip point
<0.1% of input range for supply voltage change within the specified limits

Temperature effect on trip point (emf input)
<0.02% of input range/°C

Response time
500ms, nominal

Alarm function (selectable by link)
High alarm: relay energised when input signal <trip point
Low alarm: relay energised when input signal >trip point

Alarm relay contacts
1-pole changeover (2-alarm version)
2-pole changeover (1-alarm version)

Contact rating
250V:5A:500VA (ac), resistive loads, reactive loads must be suppressed
250V:5A:250W (dc), resistive loads, reactive loads must be suppressed

Contact life expectancy
2-alarm versions: 3 x 10^5 operations at maximum load
1-alarm versions: 2 x 10^5 operations at maximum load

LED indicator
ON when relay energised

Series mode rejection
<0.1% error for 50Hz rms input equal to 5% of input span

Common mode rejection
<0.1% error for 250V rms, 50Hz

Consumption
1.7 to 2.5W (ac versions)
110mA (24V dc version)

Ambient temperature limits
–20 to +50°C (ac versions, close packed)
–20 to +45°C (dc versions at 26V, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description
Input terminals (1,2,3,and 4): non-energy-storing apparatus (≤1.2V, ≤0.1A, ≤20μJ and ≤25mW); can be connected without further certification into any IS loop with open circuit voltage less than 75V (in USA, application governed by Entity Concept)

FM max entity parameters
V_{oc} = 11.4V, I_{sc} = 0.017μA, C_a = 2μF, L_a = 1000mH

This unit may show degraded immunity performance under some EMC test conditions – refer to supplementary specification SUP2313 for further details.

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2314 THC TRIP AMPLIFIER

CE

The MTL2314 accepts a low-level dc signal from a thermocouple or other emf source in a hazardous area and can be used with earthed or insulated sensors. A safety drive can be set to initiate either a high or low alarm in the event of thermocouple burnout or cable breakage. On-site alarm setting can be carried out without using a thermometer since the built-in cold junction (CJ) compensation circuit is zeroed at 0°C and can be bypassed. All that is needed is a calibrated mV source to inject the emf of the thermocouple at the alarm temperature, for a CJ temperature of 0°C.

SPECIFICATION

See also common specification

Versions available
A: 1-alarm
B: 2-alarm

Signal source (factory-set)
PPR (type R) to BS 4937
CA (type K) to BS 4937
CC (type T) to BS 4937
IC (type J) to BS 4937
Pallaplat THC (terminals 1 & 2)
All units accept emf inputs (terminals 1 and 3)

Location of THC
Zone 0, IIC, T4 hazardous area
Div 1, Group A, hazardous location

CJ compensation
Referenced to 0°C

Input range (0mV=0°C) (factory-set)
–2 to +10mV
–5 to +25mV
–12 to +60mV
Hysteresis: nominally 1% of input range

Input current
<2nA (no safety drive)
<70nA (with safety drive)

Maximum source resistance
1kΩ for specified performance (safety drive off)

Power supply failure protection
Relay(s) de-energised if supply fails

Broken line protection
Upscale or downscale at >0.5mV/s, or off

Calibration accuracy
(CJ set at 20°C) ±1°C

Trip-point adjustment
Within 0.1% of input range over whole range (set by multi-turn potentiometer accessible through casing)

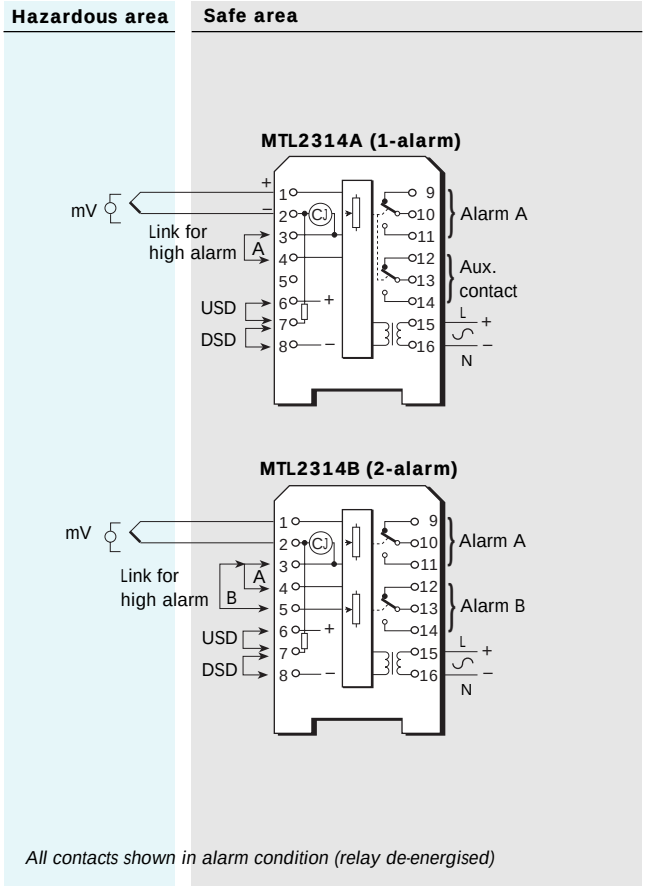
Supply voltage effect on trip point
<0.1% of input range for supply voltage change within the specified limits

Temperature effect on trip point (emf input)
Emf input: <0.015% of input range/°C
THC input: emf input ±0.03°C/°C average

Response time
500ms, nominal

Alarm function (selectable by link)
High alarm: relay energised when input signal <trip point
Low alarm: relay energised when input signal >trip point

Alarm relay contacts
1-pole changeover (2-alarm version)
2-pole changeover (1-alarm version)



All contacts shown in alarm condition (relay de-energised)

Contact rating
250V:5A:500VA (ac), resistive loads, reactive loads must be suppressed
250V:5A:250W (dc), resistive loads, reactive loads must be suppressed

Contact life expectancy
2-alarm versions: 3 x 10^5 operations at maximum load
1-alarm versions: 2 x 10^5 operations at maximum load

LED indicator
ON when relay energised

Series mode rejection
<0.1% error for 50Hz rms input equal to 50% of input span

Common mode rejection
<0.1% error for 250V rms, 50Hz

Consumption
1.7 to 2.5W (ac versions)
110mA (24V dc versions)

Ambient temperature limits
–20 to +50°C (ac versions, close packed)
–20 to +45°C (dc versions at 26V, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description
8.9V, 168Ω, 53mA

FM max entity parameters
V_{oc} = 11.4V, I_{sc} = 2.92mA, C_a = 2.0µF, L_a = 1000mH

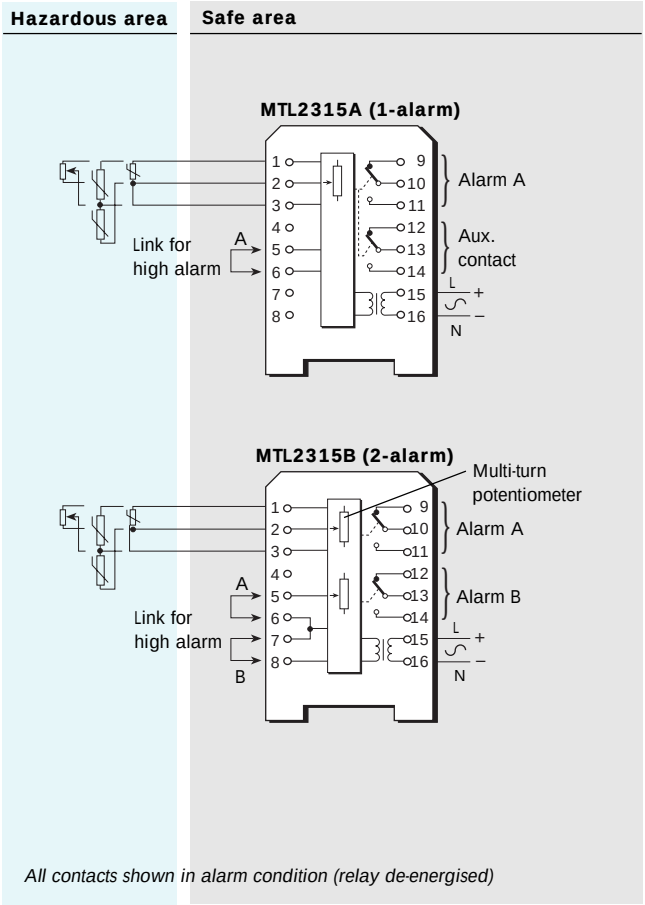
This unit may show degraded immunity performance under some EMC test conditions – refer to supplementary specification SUP2314 for further details.

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2315 RTD TRIP AMPLIFIER

CE

The MTL2315 energises a 3-wire 100Ω platinum resistance temperature detector in a hazardous area, and can be used with earthed or insulated sensors. Alternative versions are available to handle a single direct measurement, temperature difference between two similar sensors, or positional measurement made by a slidewire displacement transducer. Low power dissipation makes sure that self-heating errors in the sensor are neglible. Sensor failure (to open circuit) or any combination of broken leads de-energises the alarm relay(s). On-site alarm setting is made using a decade resistance box.



All contacts shown in alarm condition (relay de-energised)

SPECIFICATION

See also common specification

Versions available
A: 1-alarm
B: 2-alarm

Signal source (factory-set)
Temperature: 3-wire platinum RTD to BS 1904, DIN 43760 (100Ω at 0°C)
Differential temperature: two RTD elements as above
Displacement: 3-wire 100Ω slidewire

Location of RTD or slidewire
Zone 0, IIC, T4 hazardous area
Div 1, Group A, hazardous location

Input range (factory-set)
–20 to +100°C
–50 to +250°C
–120 to +600°C
Displacement: 0 to 100Ω
Hysteresis: nominally 1% of input range

Power supply failure protection
Relay(s) de-energised if supply fails

Broken line protection
Relay(s) de-energised if any combination of leads goes open circuit

Trip-point adjustment
Within 0.1% of input range over whole range (set by multi-turn potentiometer accessible through casing)

Supply voltage effect on trip point
<0.1% of input range for supply voltage change within the specified limits

Temperature effect on trip point
<0.015% of input range/°C

Input line resistance effect on trip point
<0.03% of setting/1Ω resistance in each line
500Ω maximum in each line

Response time
500ms, nominal

Alarm function (selectable)
High alarm: relay energised when input signal <trip point
Low alarm: relay energised when input signal >trip point

Alarm relay contacts
1-pole changeover (2-alarm version)
2-pole changeover (1-alarm version)

Contact rating
250V:5A:500VA (ac), resistive loads, reactive loads must be suppressed
250V:5A:250W (dc), resistive loads, reactive loads must be suppressed

Contact life expectancy
2-alarm versions: 3 x 10^5 operations at maximum load
1-alarm versions: 2 x 10^5 operations at maximum load

LED indicator
ON when relay energised

Series mode rejection
<0.1% error for 5mV rms 50Hz input

Common mode rejection
<0.1% error for 250V rms, 50Hz

Consumption
1.7 to 2.5W (ac versions)
110mA (dc version)

Ambient temperature limits
–20 to +50°C (ac versions, close packed)
–20 to +45°C (dc versions at 26V, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)

Safety description
8.9V, 1000Ω, 8.9mA

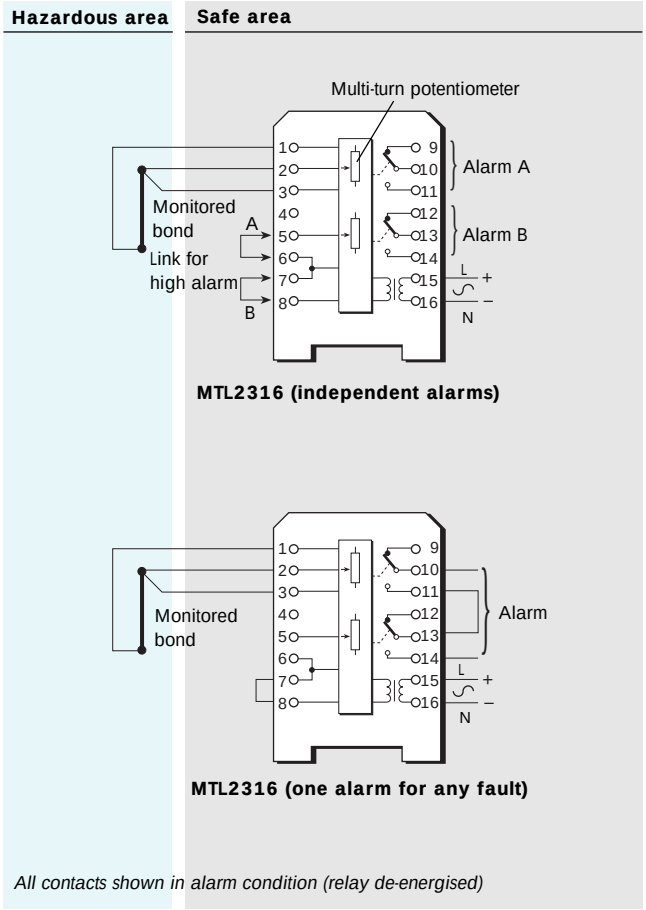
FM max entity parameters
V_{oc} = 11.4V, I_{sc} = 2.8mA, C_a = 2.0µF, L_a = 1000mH

This unit may show degraded immunity performance under some EMC test conditions – refer to supplementary specification SUP2315 for further details.

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2316 BONDING INTEGRITY MONITOR

The MTL2316 continuously monitors a bonding conductor and warns of any significant change in resistance, or of a large current being conducted. The unit is designed for accurate monitoring of clean low-resistance (<1Ω) bonds located in hazardous areas or linked with intrinsically safe circuits and is ideally suited to monitoring 'safety earths' in barrier systems. Loop resistance (bond plus return lead) is monitored by means of a direct current of approximately 0.25mA so that no significant common-mode voltage is imposed on the bonded system.



SPECIFICATION

See also common specification

Version available
2-alarm
Signal source
Resistance of bonding conductor
Location of bonding conductor
Zone 0, IIC, T6 hazardous area
Div 1, Group A, hazardous location
Input range
0 to 2Ω
Hysteresis: nominally 1% of input range
Energising current
0.25mA dc
Power supply failure protection
Relays de-energised if supply fails
Broken line protection
Relays de-energised if any combination of leads goes open circuit
Trip-point adjustment
Within 10mΩ of input range over whole range (set by multi-turn potentiometer accessible through casing)
Supply voltage effect on trip point
<10mΩ of input range for supply voltage change within the specified limits
Temperature effect on trip point
<10mΩ/°C
Response time
≤5s
Alarm function (selectable)
High alarm: relay energised when input signal <trip point
Low alarm: relay energised when input signal >trip point
Alarm relay contacts
1-pole changeover (2-alarm version)
2-pole changeover (1-alarm version)
Contact rating
250V:5A:500VA (ac), resistive loads, reactive loads must be suppressed
250V:5A:250W (dc), resistive loads, reactive loads must be suppressed
Contact life expectancy
2-alarm versions: 3 x 10^5 operations at maximum load
1-alarm versions: 2 x 10^5 operations at maximum load
LED indicator
ON when relay energised
Alarm response to typical faults
Deteriorating bond: high alarm
Bond or leads broken: high and low alarms
DC invasion, polarity as sense current: high alarm
DC invasion, opposite polarity: low alarm
AC invasion: high or low alarm
Monitor lead short circuit: low alarm
Power supply failure: high and low alarms
Series mode rejection
<0.5% error for 40mV rms 50Hz input
Common mode rejection
<0.1% error for 250V rms, 50Hz
Consumption
1.7 to 2.5W (ac versions)
110mA (dc version)
Ambient temperature limits
–20 to +50°C (ac versions, close packed)
–20 to +45°C (dc versions at 26V, close packed)
–20 to +60°C (all versions, at least 5mm apart)
–40 to +80°C (all versions, storage)
Safety description
8.9V, 1000Ω, 8.9mA
FM max entity parameters
V_{oc} = 11.4V, I_{sc} = 2.8mA, C_a = 2.0μF, L_a = 1000mH

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2441B 4/20mA REPEATER POWER SUPPLY

CE

The MTL2441B provides a floating dc supply for energising a 2- or 3-wire transmitter in a hazardous area and repeats the transmitter current in another floating circuit to drive a safe-area load. The unit can be used with all 2-wire transmitters certified as suitable for operation with safety barriers having a safety description of 28V, 300Ω. Other applications include repeating the current flowing in an existing barrier-protected loop to provide a fully isolated output with a high load handling capability and passing measurement or control signals (when used with an MTL2442B isolating driver) through a hazardous area separating two safe areas. The MTL2441B supersedes the MTL2441 but is designed for 240/120V ac supplies only. For a dc powered model choose the MTL3041 or MTL3046B.

SPECIFICATION

See also common specification

Number of channels
One, fully floating

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

Voltage available for transmitter and lines
2-wire transmitter: 17.5V at 20mA (terminal 3 or 4 and 5)
3-wire transmitter: 18V at 20mA (terminal 3 or 4, and 6)
Note: maximum open-circuit voltage 28V

Maximum permitted line resistance
2-wire transmitter: 50 x (17.5V – transmitter voltage requirement) Ω
3-wire transmitter: dependent on transmitter characteristic

Input and output signal range
0 to 20mA

Input resistance (terminals 5 and 6)
≤32Ω (640mV at 20mA)

Safe-area circuit load resistance
1kΩ

Safe area circuit output resistance
>1MΩ

Safe-area circuit ripple
<100µA peak-to-peak

Transfer accuracy at 20°C
Better than 20µA between 4 to 20mA

Temperature drift
<1µA/°C

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

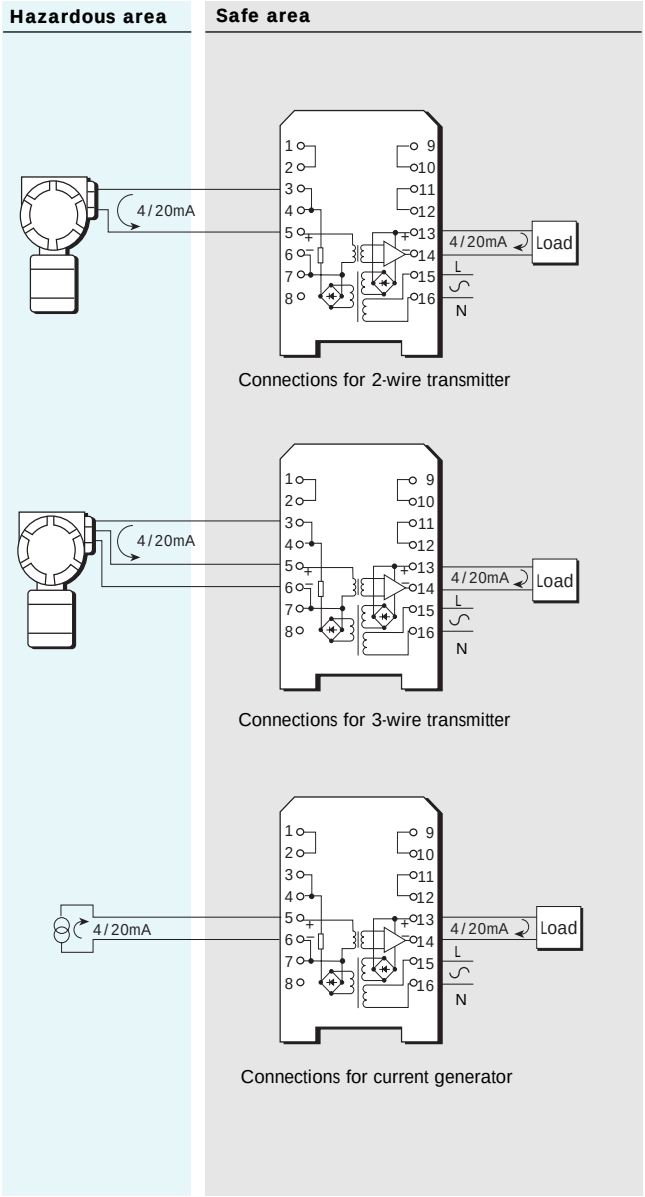
Power supply
240V ac nominal, 180–260V, 48–65Hz
120V ac nominal, 90–130V, 48–65Hz

Power consumption
5VA

Ambient temperature limits
–20 to +50°C close packed
–20 to +60°C at least 5mm apart

Safety description
Terminals 5 and 6 or 7
Non-energy storing allowing insertion into existing loops without further certification

FM maximum entity parameters
Terminals 3 or 4 to 5 and 6
28V, 300Ω, 93mA
Terminals 3 or 4 to 5
V_{oc} = 25.8V, I_{sc} = 85.4mA, C_a = 0.17µF, L_a = 5.1mH
Terminals 3 or 4 to 6
V_{oc} = 24.8V, I_{sc} = 76.7mA, C_a = 0.19µF, L_a = 6.3mH



Note: MTL3041 and MTL3046B are recommended for applications using 24V dc supplies

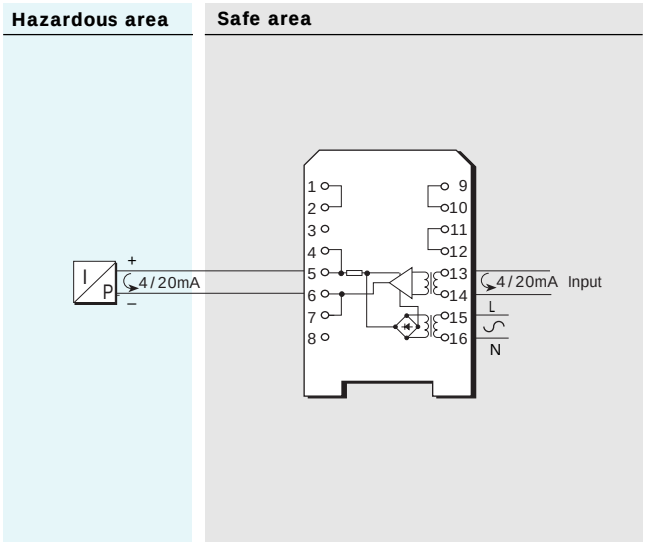
This unit may show degraded immunity performance under some EMC test conditions – refer to supplementary specification SUP2441B for further details.

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

MTL2442B 4/20mA ISOLATING DRIVER

CE

The MTL2442B isolates and passes on a 4/20mA signal from a safe-area controller to drive a hazardous-area load such as a current-to-pressure (I/P) converter, a position actuator, or an electrically-driven valve, etc. Input and output circuits float independently to ensure compatibility with all types of drive instrumentation and permit the use of earthed or poorly insulated loads. In conjunction with an MTL2441B repeater power supply, the unit can be used to pass measurement or control signals through a hazardous area between two safe areas. The MTL2442B supersedes the MTL2442 but is designed for 240/120V ac supplies only. For a 24V dc powered model refer to the MTL3042 or MTL3045.



Note: MTL3042 or MTL3045 is recommended for applications using 24V dc supplies

SPECIFICATION

See also common specification

Number of channels
One, fully floating

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

Input and output signal range
4 to 20mA dc

Input resistance
≤200Ω (4V at 20mA)

Maximum load resistance
800Ω (16V at 20mA)

Output resistance
>1MΩ

Input and output circuit ripple
<100µA peak-to-peak

Transfer accuracy at 20°C
Better than 20µA

Temperature drift
<1µA/°C

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

Power supply
240V ac nominal, 180–260V, 48–65Hz
120V ac nominal, 90–130V, 48–65Hz

Power consumption
5VA

Ambient temperature limits
–20 to +50°C close packed
–20 to +60°C at least 5mm apart

Safety description
28V, 300Ω, 93mA

FM maximum entity parameters
V_{oc} = 28Vdc, I_{sc} = 93mA, C_a = 0.13µF, L_a = 4.2mH

This unit may show degraded immunity performance under some EMC test conditions – refer to supplementary specification SUP2442B for further details.

See also MTL2000 approvals, maximum cable parameters, common specification, dimensions and ordering information

APPROVALS

Country (Authority)	Australia (NSW M)	Australia (QMD)	Australia (SA)	Canada (CSA)	Czech Republic (FTZU)	Denmark (DEMKO)	Finland (SETI)	Hungary (BKI)	Japan (RIIS)	Korea (KRS)	Poland (KDB)	Romania (ISM)	UK* (BASEEFA)	UK* (Systems) (BASEEFA)	USA (FM)
Standard	CMRA 1912/12B	CMA 1925-1981	AS1829-1981 or AS2380.7-1987 AS2380.1-1989	C22.2 No. 157	CSN33 0380	EN 50 020	EN 50 020	MSZEN 50 014 & 020 or MS24814/7-77	1979 Rec Practice		PN-84/E–08107	STAS 6877/1-86 and 6877/4-87	CENELEC EN 50 020 BS5501: Pts.1&7: 1977	CENELEC EN 50 039 BS5501: Pt.9:1982	3610 Entity
Approved for	Coal mines	Mining	Ex (ia) IIC	Class I,II,III Div.1, Gps A-G	[Ex ia IIC]	[EEx ia]IIC	(EEx ia)IIC	[Ex ia] IIC	3a G6	[EEx ia] IIC Tamb=60°C	[Ex ia IIC]	[Ex ia IIC]	[EEx ia] IIC	EEx ia IIC T4 or T6†	Class I,II,III Div.1, Gps A-G
							Certificate/File No.						†T6 for switches or if the hazardous-area device is suitably certified		
MTL2210B	MDA Ex.ia 0547A	MDA Ex. i 0547.QLD	Ex 268 to AS1829	LR36637-11		R75911SK	049285-01	91B2-037	IS29910	LND03065 -EL003			Ex802334	Ex832392	J.I.0G6A6.AX
MTL2211	MDA Ex ia 0547A	MDA Ex. i 0547 QLD	Ex 268 to AS1829	LR36637-11		R75911SK	049285-02	90B2-045	IS29910	LND03065 -EL003			Ex802333	Ex832392	J.I.0E4A0.AX
MTL2213	MDA Ex.ia 2244		Ex 961X to AS2380.7	LR36637-21	J02045			90B2-045	IS29910	LND03065 -EL003	Nr.91.013W		Ex88B2114	Ex882115	J.I.1Q0A4.AX
MTL2215	MDA Ex ia 1183	MDA Ex i 1138 QLD	Ex 268 to AS1829	LR36637-12		R75914SK		87B2-022					Ex822403		J.I.2H1A2.AX
MTL2220	MDA Ex ia 0548	MDA Ex i 0548 QLD	Ex 268 to AS1829	LR36637-12		R75914SK	049284-01	90B2-045				Nr.91.2835	Ex802327	Ex832392	J.I.0E4A0.AX
MTL2241	MDA Ex.i 1144		Ex 268 to AS1829	LR36637-12		R75913SK		87B2-020					Ex812280	Ex832392	J.I.0H1A7.AX
MTL2242	MDA Ex.i 0761	MDA Ex i 0760 QLD	Ex 268 to AS1829	LR36637-12		R75913SK		87B2-020					Ex802208	Ex832392	J.I.0F0A4.AX
MTL2313	MDA Ex.i 1180	MDA Ex i 1180 QLD	Ex 268 to AS1829	LR36637-13	J02044	R75910SK		87B2-022			Nr.91.014W		Ex822302		J.I.0H2A9.AX
MTL2314	MDA Ex.i 1181	MDA Ex i 1181 QLD	Ex 268 to AS1829	LR36637-13	J02046	R75910SK		87B2-022			Nr.91.015W		Ex822304	Ex822305	J.I.0H2A9.AX
MTL2315	MDA Ex.i 1182	MDA Ex i 1182 QLD	Ex 268 to AS1829	LR36637-13	J02047	R75910SK		87B2-022			Nr.91.016W		Ex822306	Ex822307	J.I.0H2A9.AX
MTL2316	MDA Ex.i 1182	MDA Ex.i 1182	Ex 268 to AS1829	LR36637-13		R75910SK		87B2-022			Nr.91.017W		Ex822306	Ex822307	J.I.0H2A9.AX
MTL2441B			Ex 268 to AS2380	LR36637-69									Ex92C2462	Ex93C2199	J.I.2X5A9.AX
MTL2442B			Ex 268 to AS2380	LR36637-69									Ex93C2224	Ex93C2225	J.I.2X5A9.AX

If in doubt ask for the certificate and check the latest information.

* Certificates accepted by all EU member countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and UK)

MAXIMUM CABLE PARAMETERS

Model	BASEEFA (CENELEC) Group	µF	mH	or µH/Ω	FM Group	µF	mH
MTL2210B	IIC	13 (0.9*)	69	600	A & B	7	47
	IIB	39 (2.7*)	207	1800	C	21	190
	IIA	104 (7.2*)	552	4800	D	56	370
MTL2211	IIC	13 (0.9*)	69	600	A & B	5.5	75
	IIB	39 (2.7*)	207	1800	C	16.5	270
	IIA	104 (7.2*)	552	4800	D	44	600
MTL2213	IIC	2.4 (0.44*)	165	825	A & B	3	165
	IIB	7.2 (1.32*)	495	2475	C	9	495
	IIA	19.2 (3.52*)	1320	6600	D	24	1320
MTL2215	Maximum cable parameters defined by the associated circuit						
MTL2220	See specifications of units with which an MTL2220 may be used						
MTL2241 and MTL2242	IIC	0.13 (0.08*)	4.2	55	A & B	0.09	3.5
	IIB	0.39 (0.24*)	12.6	165	C	0.27	13
	IIA	1.04 (0.64*)	33.6	440	D	0.72	26
MTL2313	Maximum cable parameters defined by the associated circuit						
MTL2314	IIC	4	12.5	295	A & B	2	1000
	IIB	12	37.5	885	C	6	1000
	IIA	32	100	2360	D	16	1000
MTL2315 and MTL2316	IIC	4	400	1000	A & B	2	1000
	IIB	12	200	3000	C	6	1000
	IIA	32	3200	8000	D	16	1000
MTL2441B and MTL2442B	Terminals 3 or 4 to 5 and 6						
	IIC	0.13	4.2	55	A & B		
	IIB	0.39	12.6	165	C		
	IIA	1.04	33.6	440	D		

* Value when unit connected to MTL2220

COMMON SPECIFICATION

Location of unit
Safe area

Isolation
250V ac between input, output and power supply terminals
Tested at 1500V rms minimum between safe and hazardous-area terminals

Power supply
Each model* is available in three versions:
240V ac nominal, 180–260V, 48–65Hz
120V ac nominal, 90–130V, 48–65Hz
24V dc nominal, 20–32.5V (including transients and ripple)
*(except the MTL2441B/2442B which are available only for ac supplies)

Replaceable fuse (24V dc units only)
160mA, 5 x 20mm glass, DIN 41571 sheet 2

Maximum safe-area voltage (U_m)
250V rms or dc, nominal (absolute maximum in USA)

Humidity
5–95% RH

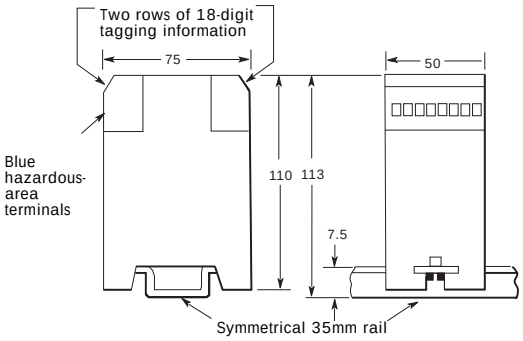
Terminals
For conductors up to 4mm² (12AWG)

Mounting
On 35mm rail to EN 50 022, BS 5584 and DIN 46277, or on a flat surface using an SMC2 surface mounting clip

Tagging
Two 18-digit rows of Klippon BSG $^1/_2$ marking tags

Weight
500g approximately

DIMENSIONS (mm) and MOUNTING DETAILS



EMC COMPLIANCE

The modules that comply with EMC EN 650 081-2/EN 050 682-2 generic emission/imunity standards (which refer to appropriate IEC/CISPR standards) are marked accordingly.

ENCLOSURES and ACCESSORIES

A range of enclosures is available which provides IP65 protection for up to 2, 4, 8, or 18 units. Alternatively, units can be installed in users' own racks or panels with MTL700 Series accessories which also provide full tagging and cable screen earthing facilities.

CONDITIONS of USE

Conditions governing the use of MTL2000 Series interface units are given in the relevant certificates and schedules, copies of which are available on request.

TO ORDER, specify:

1) **Model number, eg:**
MTL2210B 1-channel switch-operated relay
2) **Power supply version, ie:**
240V ac, 120V ac, 24V dc (except the MTL2441B/2442B which are available only for ac supplies)
3) **THC type (MTL2314A & B only), ie:**
PPR (type R), CA (type K), CC (type T), IC (type J), Pallaplat
4) **Measurement (MTL2315A & B only), ie:**
Temperature, Differential temperature, Displacement
5) **Input range (MTL2314A & B only), ie:**
–2 to +10mV, –5 to +25mV, –12 to +60mV
6) **Input range (MTL2315A and B only), ie:**
–20 to +100°C, –50 to +250°C, –120 to +600°C, Displacement; 0 to 100Ω
7) **Literature**
AN9008 A user's guide to MTL3000 and 2000 Series interface units