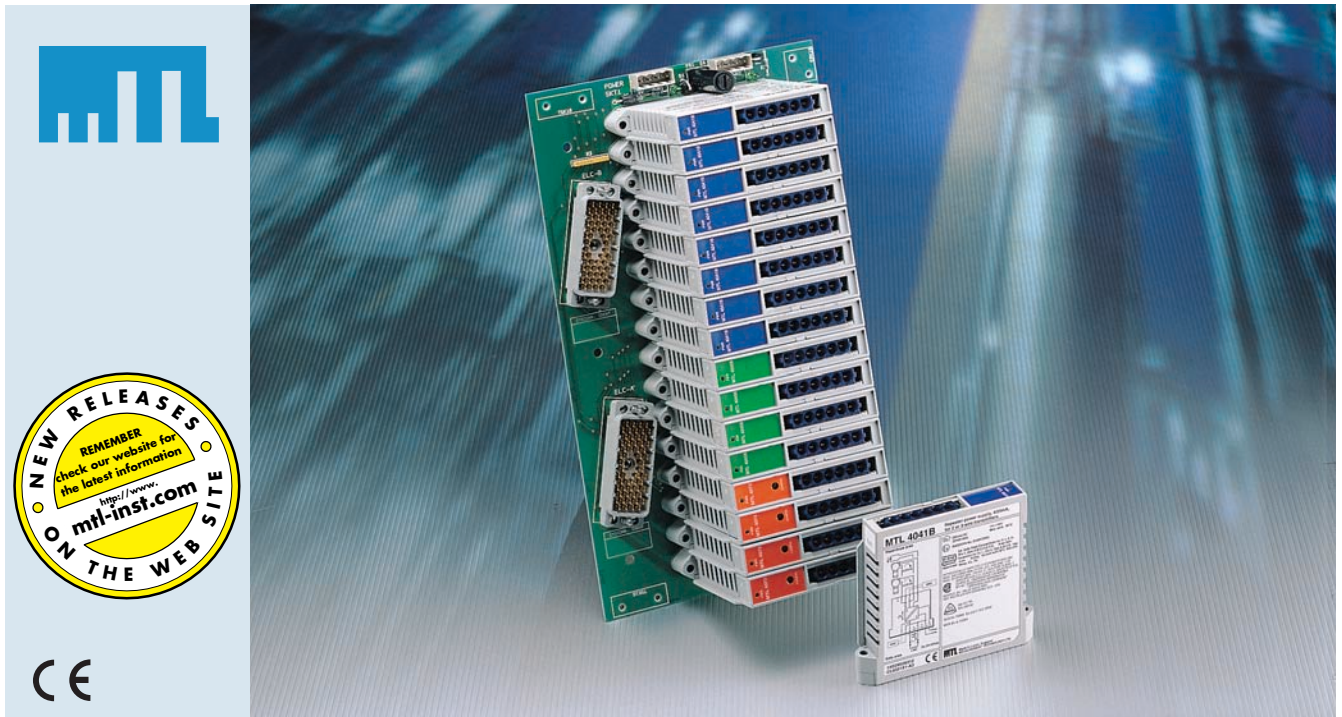


For close integration of IS circuits into process-connected systems

MTL4000 SERIES

isolating IS interface units



- ◆ Compact modular design with 'plug-in' connections
- ◆ High module/channel packing densities
- ◆ System backplanes with bussed power and safe-area connections
- ◆ Custom-designed backplanes for closest integration into process-connected systems
- ◆ Reduced system engineering and installation costs
- ◆ Range of standard enclosures protected to IP65
- ◆ Modules certified internationally for equipment and wiring in all zones and explosive atmospheres
- ◆ Patented hazardous-area connection UK2256326 EU EP0516455B1

The **MTL4000 Series** of 'third-generation' isolating interface units introduces new concepts for integrating intrinsic safety into large or medium sized process-connected systems. Being exceptionally compact, the units give high packing densities. Units plug into system backplanes with safe-area connections made by multiway connectors – an approach which not only simplifies engineering but also reduces installation and maintenance costs.

Modules handle the majority of applications covering on/off or analogue signals between hazardous-area equipment and safe-area systems. Modules incorporate proven intrinsically safe isolation techniques internationally certified for protecting equipment and wiring in all zones and explosive atmospheres.

Key module design features include a multiway connector on the base of each unit which mates with a connector on the backplane to provide both safe-area and power supply connections. Hazardous-area connections are made by a single connector which plugs into the top of the module. These connectors are available with either screw-clamp terminals or crimp connectors. This use of removable connectors greatly simplifies installation and maintenance, so reducing time, cost, and the risk of errors.

Status LEDs, configuration switches and ports are located on the tops of individual modules for easy access.

The compact design (modules are only 16mm wide) reduces weight and gives exceptionally high packing densities.

Based on proven IS isolation technology, MTL4000 Series modules do not need a high integrity earth and the associated circuits can be left floating or be earthed at any one point in accordance with good earthing practices. MTL4000 Series provides single channel single loop integrity across the range with the addition of dual channel options mainly for the switch/proximity modules.

Line fault detection (LFD) facilities are provided on the MTL4014/4015/4016/4017/4113X switch/proximity detectors, the MTL4023 solenoid/alarm driver and the MTL4045B/4046 4/20mA isolating drivers. Analogue input units such as the MTL4041B provide line fault detection by repeating O/C or S/C currents to the safe-area control system.

System backplanes are located in safe areas and, since the hazardous-area circuits are connected directly to the modules, do not need to be certified. See MTL series backplanes, enclosures and accessories for full details.

MTL4013 SWITCH/ PROXIMITY DETECTOR INTERFACE

two-channel, solid-state output



The MTL4013 is a two-channel unit enabling safe-area loads to be controlled, through logic compatible solid-state outputs, by switches or proximity detectors located in hazardous areas. It can also be used with positive displacement (PD) flowmeters and some turbine meters. Earth fault detection is available optionally by using the MTL4013 with an MTL4220 earth leakage detector. Power and switch status is indicated by LEDs located on top of the module.

SPECIFICATION

See also common specification, cable parameters and approvals

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 if suitably certified
Div. 1, Group A, hazardous location

Voltage applied to sensor

7.0V – 9.0V dc from 1k Ω

Input/output characteristics

Output on if $>2.1\text{mA}^*$ ($<2\text{k}\Omega$) in sensor circuit
Output off if $<1.2\text{mA}^*$ ($>10\text{k}\Omega$) in sensor circuit
Hysteresis: 200 μA (650 Ω) nominal

**NAMUR and DIN 19234 standards for proximity detectors*

'No-fail' earth fault protection

Enabled by connecting terminals 3 and 6 to an MTL4220 earth leakage detector

Fault on either line proclaimed: unit continues working

Note: if it is required to maintain isolation between the two channels, separate earth leakage detectors are needed

Output characteristics

Operating frequency: dc to 5kHz
Maximum off-state voltage: 35V
Maximum off-state leakage current: 10 μA
Maximum on-state voltage drop: $[1 + (0.1 \times \text{current in mA})]\text{V}$
Maximum on-state current: 50mA
Note: each output is Zener-diode protected against inductive loads

LED indicators

Amber: one provided for each channel, ON when output circuit is closed

Green: one provided for power indication

Power requirement, V_s

47.5mA at 24V dc
45mA at 20V dc
50mA at 35V dc

Power dissipation within unit

1.15W at 24V
1.75W at 35V

Isolation

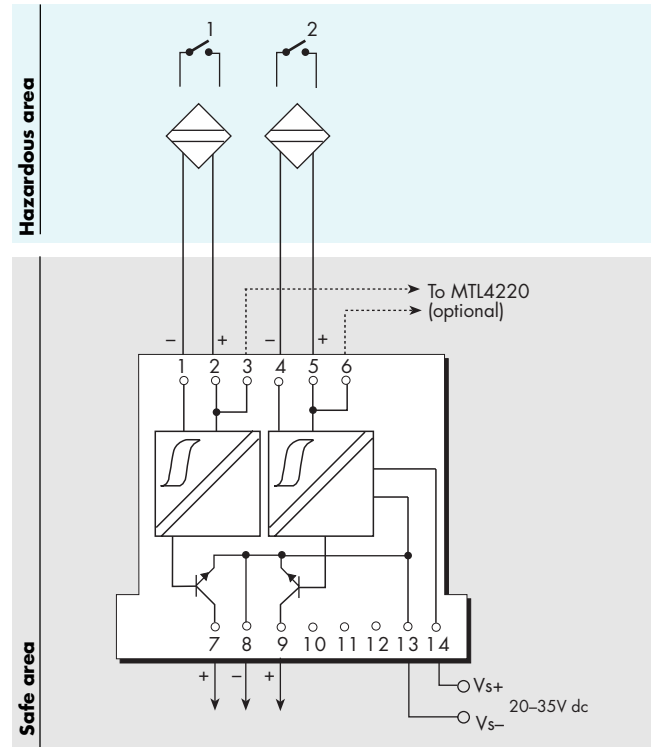
250V ac between safe and hazardous area circuits

Safety description for each channel

10.5V, 800 Ω , 14mA

FM entity parameters

$V_{oc} = 10.5\text{V dc}$, $I_{sc} = 14\text{mA}$, $C_a = 2.4\mu\text{F}$, $L_a = 165\text{mH}$



Terminal	Function
1	Input 1 –ve
2	Input 1 +ve
3	Optional link from input 1 to MTL4220
4	Input 2 –ve
5	Input 2 +ve
6	Optional link from input 2 to MTL4220
7	Output 1 +ve
8	Outputs 1/2 –ve
9	Output 2 +ve
13	Supply –ve
14	Supply +ve

MTL4014 SWITCH/ PROXIMITY DETECTOR INTERFACE

with line fault detection



The MTL4014 enables a safe-area load to be controlled by a proximity detector or switch located in a hazardous area through a reed relay. Line faults are signalled through a separate reed relay. The line fault detection (LFD) function can be used with both proximity detectors and switches, provided that for switches suitable resistors are added as shown in the circuit diagram. 'No-fail' earth fault detection on either line can be provided by connecting an MTL4220 earth leakage detector to terminal 6.

SPECIFICATION

See also common specification, cable parameters and approvals

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 if suitably certified

Div.1, Group A, hazardous location

Voltage applied to sensor

7.0V – 9.0V dc from 1k Ω nominal

Input/output characteristics

Output closed if input >2.1mA* (<2k Ω)

Output open if input <1.2mA* (>10k Ω)

Hysteresis: 200 μ A (650 Ω) nominal

*NAMUR and DIN 19234 standards for proximity detectors

Line fault detection (LFD)

Line fault relay and channel relay open if input

<50 μ A (broken line)

or <100 Ω (shorted line)

Note: switch-type sensors must be fitted with resistors as shown in the diagram. LFD cannot be disabled.

'No-fail' earth fault protection

Enabled by connecting terminal 6 to an MTL4220 earth leakage detector

Fault on either line proclaimed: unit continues working

Relay output characteristics

Single-pole on/off, open when relay de-energised

Response time: 2ms maximum

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

Contact life expectancy: 10⁷ operations at maximum load

Note: reactive loads must be adequately suppressed

LED indicators

Amber: one provided for input, ON when output circuit is closed

Red: one provided for LFD, ON when line fault is detected

Green: one provided for power indication

Power requirement, V_s

45mA at 24V dc

50mA at 20V dc

36mA at 35V dc

Power dissipation within unit

1.1W at 24V

1.3W at 35V

Isolation

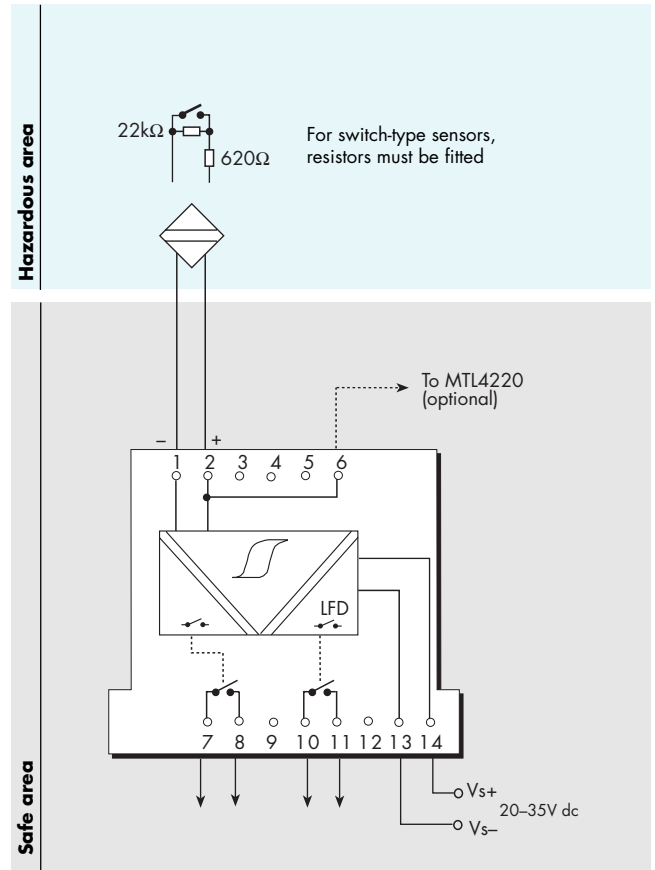
250V ac between safe and hazardous area circuits

Safety description

10.5V, 800 Ω , 14mA

FM entity parameters

V_{oc} = 10.5V dc, I_{sc} = 14mA, C_a = 2.4 μ F, L_a = 165mH



Terminal	Function
1	Input -ve
2	Input +ve
6	Optional link to MTL4220
7,8	Output
10,11	Line fault signal
13	Supply -ve
14	Supply +ve

MTL4015 SWITCH/ PROXIMITY DETECTOR INTERFACE UNIT

dual relay output



With the MTL4015, a switch or proximity detector located in a hazardous area can control two safe-area loads. The two safe-area outputs are made through relays. It is designed for applications where the status of a sensor needs to be fed to two separate systems (eg, control and shutdown). A phase-reversal switch, located on top of the module, allows an alarm signal to be signalled for either state of the sensors. Line fault detection (LFD) for broken or shorted lines is provided as also are facilities for earth fault detection. Power and switch status is indicated by LEDs located on top of the module.

SPECIFICATION

See also common specification, cable parameters and approvals

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 if suitably certified
Div. 1, Group A, hazardous location

Voltage applied to sensor

7.0-9.0V dc from 1k Ω

Input/output characteristics

Outputs closed if $>2.1\text{mA}^*$ ($<2\text{k}\Omega$) in sensor circuit

Outputs open if $<1.2\text{mA}^*$ ($>10\text{k}\Omega$) in sensor circuit

Hysteresis: 200 μA (650 Ω) nominal

**NAMUR and DIN 19234 standards for proximity detectors*

Phase reversal

The operation of the output can be reversed by a switch on top of the unit

Line fault detection (LFD)

By built-in line-fault detection (LFD)

Output opens if input current $<100\mu\text{A}$ (broken line) or $>6.5\text{mA}$ (shorted lines)

Note: to prevent false triggering of LFD, switch-type sensors must be fitted with resistors as shown in the diagram or LFD disabled by the switch on top of the unit

'No-fail' earth fault protection

Enabled by connecting terminal 6 to an MTL4220 earth leakage detector

Fault on either line of each channel proclaimed: unit continues working

Relay output characteristics

Double-pole on/off, open when relay de-energised

Response time: 2ms maximum

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

Contact life expectancy: 10^6 operations at maximum load

Note: reactive loads must be adequately suppressed

LED indicators

Amber: one provided, ON when output circuit is closed

Green: one provided for power indication

Power requirement, Vs

50mA at 24V dc

60mA at 20V dc

45mA at 35V dc

Power dissipation within unit

1.2W at 24V

1.6W at 35V

Isolation

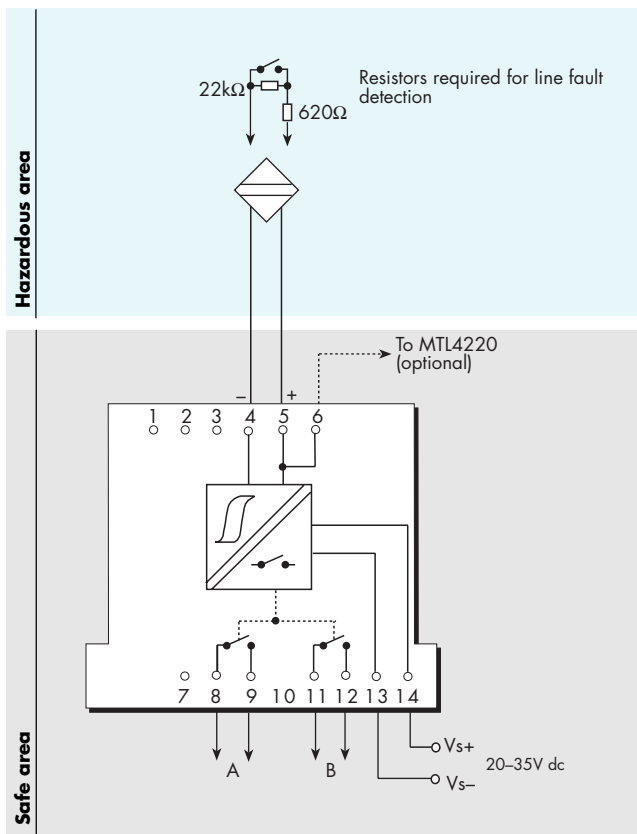
250V ac between safe and hazardous area circuits

Safety description for each channel

10.5V, 800 Ω , 14mA

FM entity parameters

$V_{oc} = 10.5\text{V dc}$, $I_{sc} = 14\text{mA}$, $C_a = 2.4\mu\text{F}$, $L_a = 165\text{mH}$



Terminal	Function
4	Input -ve
5	Input +ve
6	Optional link from input to MTL4220
8,9	Output A
11,12	Output B
13	Supply -ve
14	Supply +ve

MTL4016 SWITCH/ PROXIMITY DETECTOR INTERFACE UNIT

two-channel, dual relay output



With the MTL4016, two switches or proximity detectors located in a hazardous area can each control two safe-area loads. The four safe-area outputs are made through reed relays. It is designed for applications where the status of a sensor needs to be fed to two separate systems (eg, control and shutdown). Independent phase-reversal switches for each channel, located on top of the module, allow alarm signals to be signalled for either state of the sensors. Line fault detection (LFD) for broken or shorted lines is provided as also are facilities for earth fault detection. Power and switch status is indicated by LEDs located on top of the module.

SPECIFICATION

See also common specification, cable parameters and approvals

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 if suitably certified

Div.1, Group A, hazardous location

Voltage applied to sensor

7.0V – 9.0V dc from 1k Ω

Input/output characteristics

Outputs closed if >2.1mA* (<2k Ω) in sensor circuit

Outputs open if <1.2mA* (>10k Ω) in sensor circuit

Hysteresis: 200 μ A (650 Ω) nominal

*NAMUR and DIN 19234 standards for proximity detectors

Phase reversal

The operation of each channel can be reversed by independent switches on top of the unit

Line fault detection (LFD)

By built-in line-fault detection (LFD)

Outputs open if input current <100 μ A (broken line) or >6.5mA (shorted lines)

Note: to prevent false triggering of LFD, switch-type sensors must be fitted with resistors as shown in the diagram or LFD disabled by switches on top of the unit

'No-fail' earth fault protection

Enabled by connecting terminals 3 and 6 to an MTL4220 earth leakage detector

Fault on either line of each channel proclaimed: unit continues working

Note: to maintain isolation between the two channels, separate earth leakage detectors are needed

Relay output characteristics

Double-pole on/off, open when relay de-energised

Response time: 2ms maximum

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

Contact life expectancy: 10⁶ operations at maximum load

Note: reactive loads must be adequately suppressed

LED indicators

Amber: one provided for each channel, ON when output circuit is closed

Green: one provided for power indication

Power requirement, Vs

50mA at 24V dc

60mA at 20V dc

45mA at 35V dc

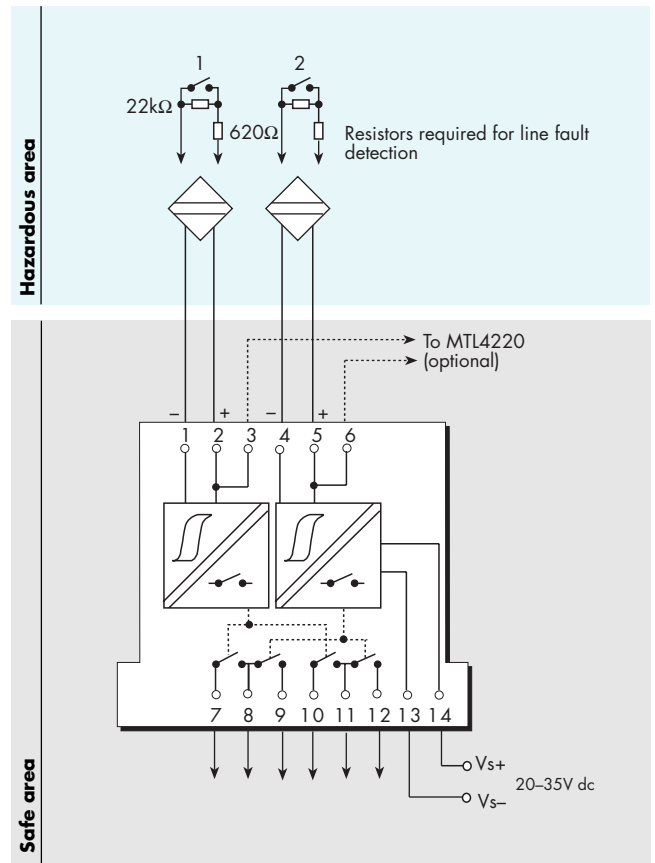
Power dissipation within unit

1.2W at 24V

1.6W at 35V

Isolation

250V ac between safe and hazardous area circuits



Terminal	Function
1	Input 1 -ve
2	Input 1 +ve
3	Optional link from input 1 to MTL4220
4	Input 2 -ve
5	Input 2 +ve
6	Optional link from input 2 to MTL4220
7,8	Output 1A
8,9	Output 2A
10,11	Output 1B
11,12	Output 2B
13	Supply -ve
14	Supply +ve

Safety description for each channel

10.5V, 800 Ω , 14mA

FM entity parameters

V_{oc} = 10.5V dc, I_{sc} = 14mA, C_a = 2.4 μ F, L_a = 165mH

MTL4017 SWITCH/ PROXIMITY DETECTOR INTERFACE

two-channel with line fault detection (€)

With the MTL4017, two switches or proximity detectors located in a hazardous area can each control a safe-area load through a relay. Line faults are signalled through a separate relay. Line fault detection (LFD) can be used with proximity detectors or switches provided in the latter case suitable resistors are added as shown in the circuit diagram. 'No-fail' earth fault detection on either line of each channel can be provided by connecting an MTL4220 earth leakage detector to terminal 6.

SPECIFICATION

See also common specification, cable parameters and approvals

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 if suitably certified
Div. 1, Group A, hazardous location

Voltage applied to sensor

7.0V – 9.0V dc from 1k Ω nominal

Input/output characteristics

Output closed if input > 2.1mA* (<2k Ω)

Output open if input < 1.2mA* (>10k Ω)

Hysteresis: 200 μ A (650 Ω) nominal

*NAMUR and DIN 19234 standards for proximity detectors

Line fault detection (LFD)

Line fault relay and channel relay open if input
<50 μ A (broken line)

or <100 Ω (shorted lines)

Note: switch-type sensors must be fitted with resistors as shown in the diagram. LFD cannot be disabled.

'No-fail' earth fault protection

Enabled by connecting terminal 6 to an MTL4220 earth leakage detector

Fault on either line of each channel proclaimed: unit continues working

Relay output characteristics

Single-pole on/off, open when relay de-energised

Response time: 2ms maximum

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

Contact life expectancy: 10⁷ operations at maximum load

Note: reactive loads must be adequately suppressed

LED indicators

Amber: one provided for each channel, ON when output circuit is closed

Red: one provided for each channel, ON when line fault is detected

Green: one provided for power indication

Power requirement, Vs

52mA at 24V dc

62mA at 20V dc

42mA at 35V dc

Power dissipation within unit

1.25W at 24V

1.5W at 35V

Isolation

250V ac between safe and hazardous area circuits

Safety description for each channel

10.5V, 800 Ω , 14mA

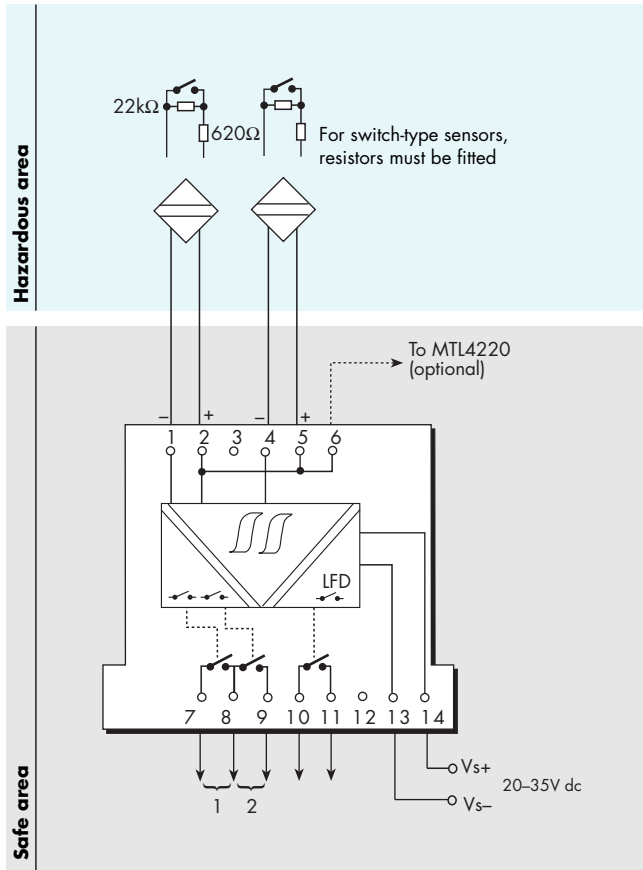
FM entity parameters

Each channel without line fault detection:

V_{oc} = 10.5 V dc, I_{sc} = 14mA, C_a = 2.4 μ F, L_a = 165mH

Each channel with earth leakage detection:

V_t = 17.4 V dc, I_t = 14mA, C_a = 0.36 μ F, L_a = 165mH



Terminal	Function
1	Input 1 -ve
2	Input 1 +ve
4	Input 2 -ve
5	Input 2 +ve
6	Optional link to MTL4220
7,8	Output 1
8,9	Output 2
10,11	Line fault signal
13	Supply -ve
14	Supply +ve

MTL4021 SOLENOID/ ALARM DRIVER



The MTL4021 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. By connecting a second safe-area switch or logic signal, the output can be disabled to enable, for example, a safety system to override a control signal. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 6.

SPECIFICATION

See also common specification, cable parameters and approvals

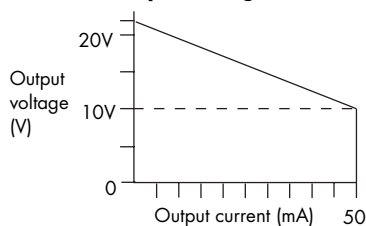
Number of channels

One

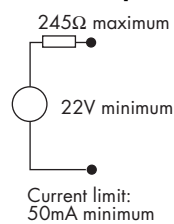
Location of load

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

Minimum output voltage



Equivalent output circuit



Maximum output voltage

25.5V from 232Ω

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 across terminals 10 & 11

1 = input switch open, transistor off or >4.5V applied across terminals 10 & 11

Override input

An open collector transistor or a switch connected across terminals 8 and 9 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

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

No-fail earth fault protection

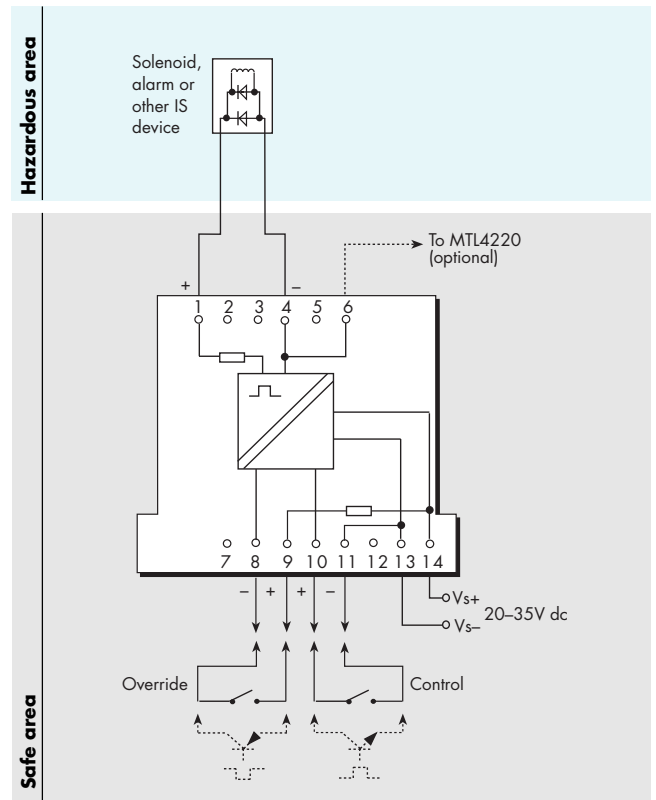
Enabled by connecting terminal 6 to an MTL4220 earth leakage detector

Fault on either line proclaimed: unit continues working

LED indicators

Amber: one provided for status, ON when output circuit is active

Green: one provided for power indication



Terminal	Function
1	Output +ve
4	Output -ve
6	Optional link to MTL4220
8	Override -ve
9	Override +ve
10	Control +ve
11	Control -ve
13	Supply -ve
14	Supply +ve

Power requirement, Vs

100mA at 24V dc

120mA at 20V dc

75mA at 35V dc

Power dissipation within unit

1.3W with typical solenoid valve, output on

1.9W worst case

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

25.5V, 232Ω, 110mA

FM entity parameters

$V_{oc} = 25.5V$ dc, $I_{sc} = 110mA$, $C_a = 0.17\mu F$, $L_a = 3mH$

MTL4021S SOLENOID/ ALARM DRIVER

with 24V logic override facility



The MTL4021S 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. Provided that 24V dc is applied to the override input, the solenoid/alarm can be operated by the control input. However, if the 24V dc signal is removed, the solenoid/alarm is turned off. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 6.

SPECIFICATION

See also common specification, cable parameters and approvals

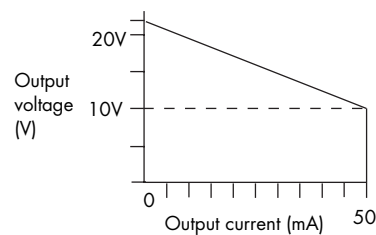
Number of channels

One

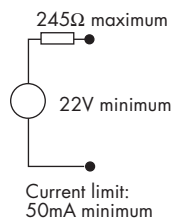
Location of load

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

Minimum output voltage



Equivalent output circuit



Maximum output voltage

25.5V from 232Ω

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 across terminals 10 & 11

1 = input switch open, transistor off or >4.5V applied across terminals 10 & 11

Override input

A 24V logic signal applied across terminals 8 and 9 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

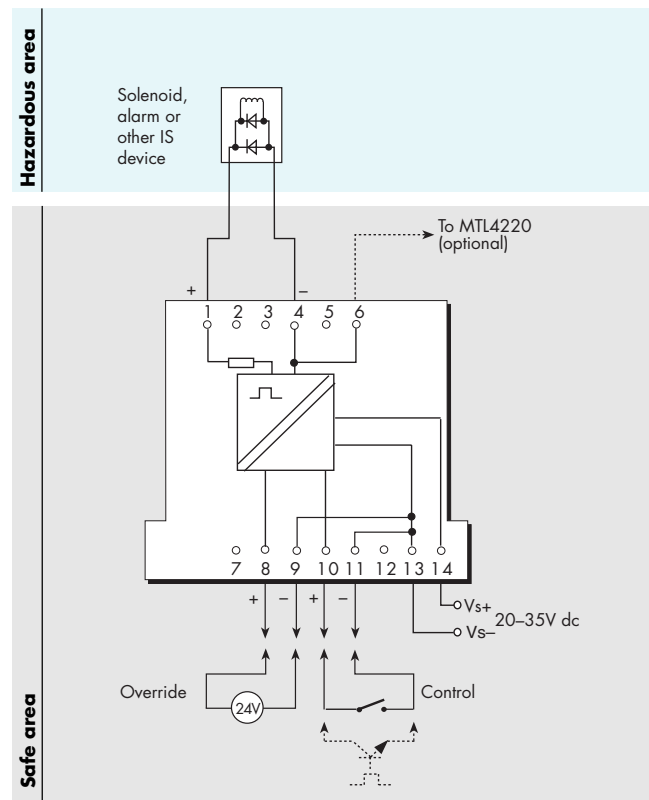
Response time

Output within 10% of final value within 100ms

No-fail earth fault protection

Enabled by connecting terminal 6 to an MTL4220 earth leakage detector

Fault on either line proclaimed: unit continues working



Terminal	Function
1	Output +ve
4	Output -ve
6	Optional link to MTL4220
8	Override +ve
9	Override -ve
10	Control +ve
11	Control -ve
13	Supply -ve
14	Supply +ve

LED indicators

Amber: one provided for status, ON when output circuit is active

Green: one provided for power indication

Power requirement, V_s

100mA at 24V dc

120mA at 20V dc

75mA at 35V dc

Power dissipation within unit

1.3W with typical solenoid valve, output on

1.9W worst case

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

25.5V, 232Ω, 110mA

FM entity parameters

V_{oc} = 25.5V dc, I_{sc} = 110mA, C_a = 0.17μF, L_a = 3mH

MTL4023 SOLENOID ALARM DRIVER

with line fault detection



With the MTL4023 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 if a field line is open or short-circuited. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 6.

SPECIFICATION

See also common specification, cable parameters and approvals

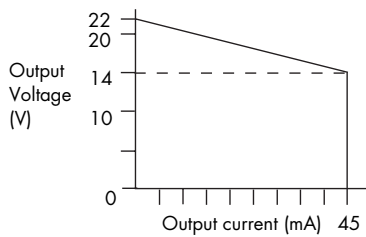
Number of channels

One

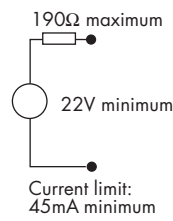
Location of load

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

Minimum output voltage



Equivalent output circuit



Maximum output voltage

25V from 170Ω

Output ripple

< 0.5% of maximum output, peak to peak

Control input

Suitable for switch contacts, an open collector transistor or logic drive

Output turns on if input switch closed, transistor on or

<1.4V applied across terminals 10 & 11

Output turns off if input switch open, transistor off or

>4.5V applied across terminals 10 & 11

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 (MTL4023R transistor is energised when line fault is detected)

LFD is operational irrespective of output state provided that the field circuit impedance is normally >50Ω and <7kΩ. Output off-state LFD current normally <5mA.

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

'No-fail' earth fault protection

Enabled by connecting terminal 6 to an MTL4220 earth leakage detector

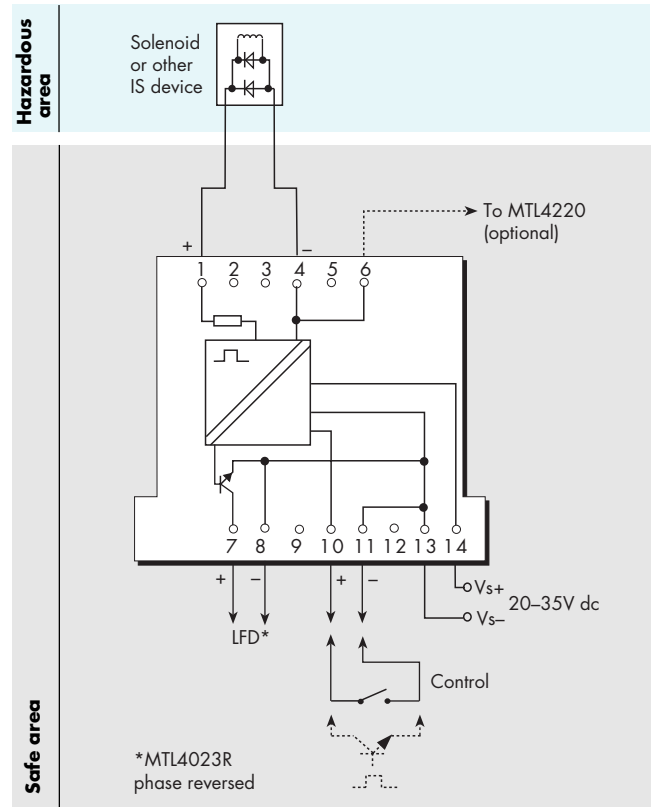
Fault on either line proclaimed: unit continues working

LED indicators

Amber: one provided for status, ON when output circuit is active

Red: one provided for line fault detection, ON when line fault is detected

Green: one provided for power indication



Terminal	Function
1	Output +ve
4	Output -ve
6	Optional link to MTL4220
7	Line fault signal +ve
8	Line fault signal -ve
10	Control +ve
11	Control -ve
13	Supply -ve
14	Supply +ve

Power requirements, Vs

100mA at 24V dc

130mA max at 20V dc

90mA at 35V dc

Power dissipation within unit

1.2W with typical solenoid valve, output on

2.0W worst case

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

25V, 170Ω, 147mA, $U_m=250V$ rms or dc

FM entity parameters

Without earth leakage detection:

$V_{oc} = 25V$ dc, $I_{sc} = 147mA$, $C_a = 0.17\mu F$, $L_a = 1.6mH$

With earth leakage detection:

$V_1 = 31.9V$ dc, $I_1 = 147mA$, $C_a = 0.09\mu F$, $L_a = 1.6mH$

MTL4024 SOLENOID/ ALARM DRIVER

loop powered, for 24V systems



The MTL4024 enables an on/off device in a hazardous area to be controlled by a 24V 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. Provided that 24V dc is applied to the override input, the solenoid/alarm can be operated by a voltage change in the safe area. However, if the 24V dc override signal is removed, the solenoid/alarm is turned off. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 6. The MTL4024R is functionally identical to the MTL4024, but has pin 11 connected internally to pin 13.

SPECIFICATION

See also common specification, cable parameters and approvals

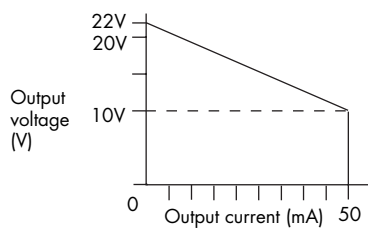
Number of channels

One

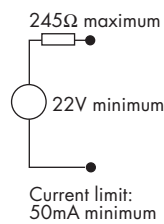
Location of signal load

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

Minimum output voltage



Equivalent output circuit



Maximum output voltage

25.5V from 232Ω

Output ripple

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

Override input

A 24V signal applied across terminals 8 and 9 allows the solenoid/alarm to be operated by the supply across terminals 10 and 11. If the 24V signal is disconnected, the solenoid/alarm is off.

Voltage across terminals 8 and 9	State of solenoid/alarm
<2.0V	Off
>9.0V	Controlled by supply across terminals 10 and 11
>2.0V but <9.0V	Undetermined

Input impedance at terminal 8

Typically 10kΩ

Response time

Output within 10% of final value within 100ms

'No-fail' earth fault protection

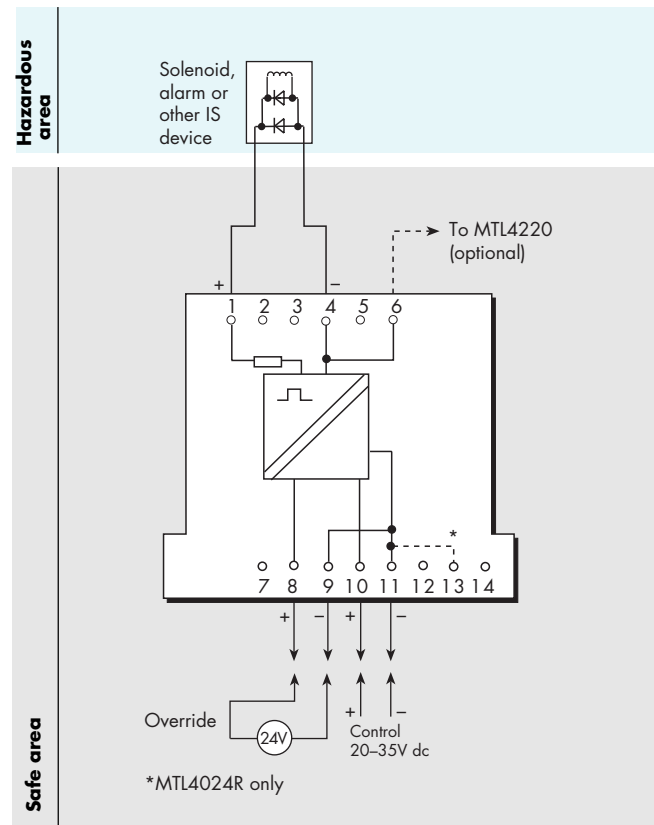
Enabled by connecting terminal 6 to an MTL4220 earth leakage detector
Fault on either line proclaimed: unit continues working

LED indicators

Amber: one provided for status, ON when output circuit is active
Green: one provided for drive status ON when supply is connected

Power requirement (control)

100mA at 24V dc
120mA at 20V dc
75mA at 35V dc



Terminal	Function
1	Output +ve
4	Output –ve
6	Optional link to MTL4220
8	Override +ve
9	Override –ve
10	Supply +ve
11	Supply –ve

Power dissipation within unit

1.3W at 24V with typical solenoid valve, output on
1.9W worst case

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

25.5V, 232Ω, 110mA

FM entity parameters

$V_{oc} = 25.5V$ dc, $I_{sc} = 110mA$, $C_a = 0.17\mu F$, $L_a = 3mH$

MTL4025 SOLENOID/ ALARM DRIVER

low current output



The MTL4025 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 any loads such as solenoids, alarms, and LEDs that are certified as intrinsically safe or are classified as non-energy-storing simple apparatus. It also acts as a power supply for PLMS GD4001 and GD4002 gas detectors. For full configuration details please refer to the PLMS installation instructions. Earth fault detection can be provided by connecting an MTL4220 earth leakage detector to terminal 6.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

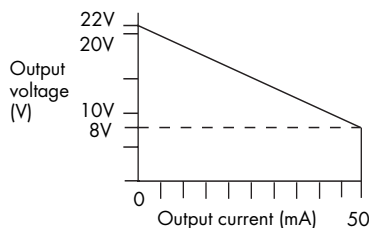
One

Location of load

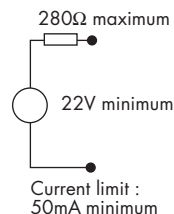
Zone 0, IIC, T4–6 hazardous area if suitably certified

Div.1, Group A, hazardous location

Minimum output voltage



Equivalent output circuit



Maximum output voltage

25V from 269Ω

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 across terminals 10 & 11

1 = input switch open, transistor off or >4.5V applied across terminals 10 & 11

Override input

An open collector transistor or a switch connected across terminals 8 and 9 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

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

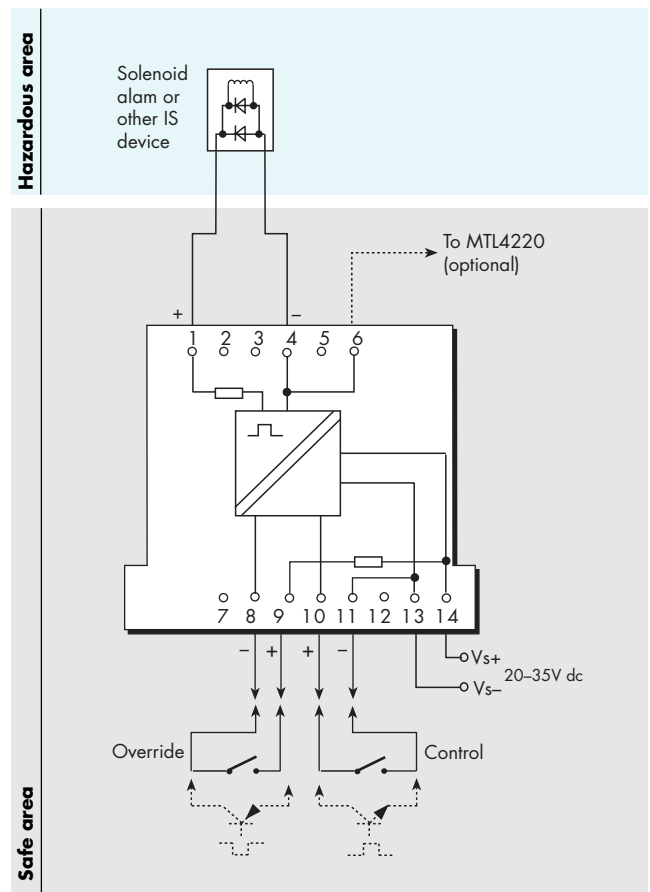
Response time

Output within 10% of final value within 100ms

'No-fail' earth fault protection

Enabled by connecting terminal 6 to an MTL4220 earth leakage detector

Fault on either line proclaimed: unit continues working



Terminal	Function
1	Output +ve
4	Output -ve
6	Optional link to MTL4220
8	Override -ve
9	Override +ve
10	Control +ve
11	Control -ve
13	Supply -ve
14	Supply +ve

LED indicators

Amber: one provided for status, ON when output circuit is active

Green: one provided for power indication

Power requirement, V_s

100mA at 24V dc

120mA at 20V dc

75mA at 35V dc

Power dissipation within unit

1.1W with typical solenoid valve, output on

1.9W worst case

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

25V, 269Ω, 93mA

FM entity parameters

$V_{oc} = 25V$ dc, $I_{sc} = 93mA$, $C_a = 0.17\mu F$, $L_a = 4.2mH$

MTL4031 VIBRATION TRANSDUCER INTERFACE



The MTL4031 is for use with vibration sensors mounted in a hazardous area and connected into monitoring equipment for use with rotating machinery. The interface is compatible with both 3-wire eddy probes and high frequency accelerometers.

SPECIFICATION

See also common specification, cable parameters and approvals

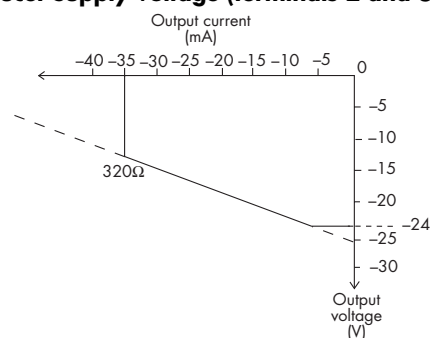
Number of channels

One

Location of signal source

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

Transducer supply voltage (terminals 2 and 6)



Signal range (terminals 5 and 6, 7 and 8)

Minimum: -20V

Maximum: -0.5V

for dc transfer error $< \pm 100\text{mV}$

Signal input impedance (terminals 5 and 6)

10kΩ -1%, +2%

Signal output impedance (terminals 7 and 8)

$< 20\Omega$

DC transfer accuracy at 20°C

$< \pm 100\text{mV}$

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

50ppm/°C (10 to 65°C)

100ppm/°C (-20 to 10°C)

Voltage bandwidth

-3dB at 43kHz (typical)

Phase delay

Less than 14μs, equivalent to:

-1° at 200Hz

-3° at 600Hz

-5° at 1kHz

-50° at 10kHz

-100° at 20kHz

LED indicator

Green: one provided for power indication

Power requirement, V_s , with 22mA transducer load

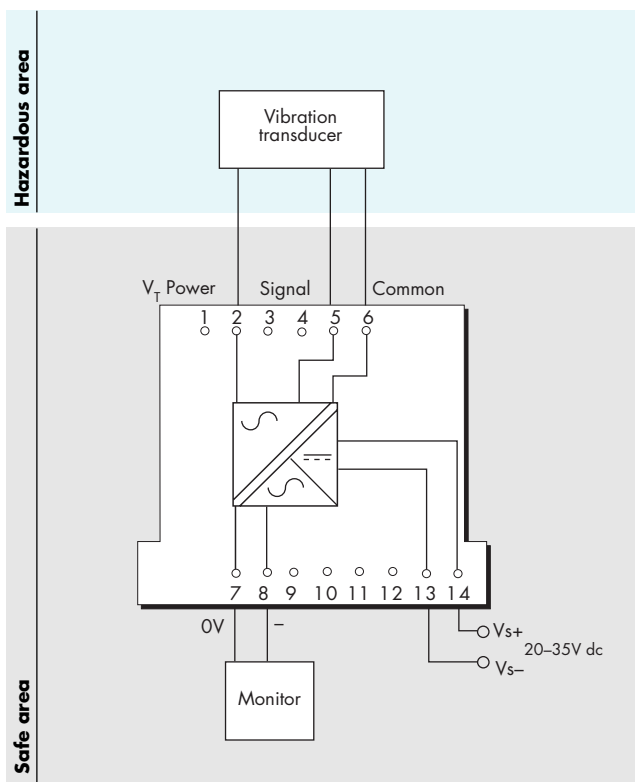
80mA at 24V dc

88mA at 20V dc

63mA at 35V dc

Power dissipation within unit

$< 1.7\text{W}$



Terminal	Function
2	Supply to hazardous area
5	Signal input
6	Common (0V)
7	Signal (0V)
8	Signal output -ve
13	Supply -ve
14	Supply +ve

Isolation

250V ac between input, power and output circuits

Safety description

Terminals 2 to 6

26.6V, 94mA, 0.66W

Terminals 5 to 6

Non-energy-storing apparatus $\leq 1.2\text{V}$, $\leq 0.1\text{A}$, $\leq 20\mu\text{J}$, and $\leq 25\text{mW}$

MTL4032 PULSE ISOLATOR



The MTL4032 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.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One, fully floating

Sensor type

Switch or proximity detector (NAMUR/DIN 19234)
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
Output OFF if switch is open

Proximity detector input:

Excitation: 7.0 to 9.0V dc from 1k Ω nominal
Output ON if input >2.1mA* (<2k Ω)
Output OFF if input <1.2mA* (>10k Ω)
Switching hysteresis: 0.2mA (650 Ω) nominal
*NAMUR and DIN 19234 standards for proximity detectors

Current pulse input:

Transmitter supply: 16.5V dc at 20mA
Short circuit current: 24mA
Output ON if input >9.0mA
Output OFF if input <7.0mA
Switching hysteresis: 0.5mA

Voltage pulse input

Input impedance: >10k Ω
Switching point voltage (V_{sp}): 3, 6, or 12V nominal
(selectable by switch on top of unit)
Output ON if input >V_{sp}
Output OFF if input <V_{sp}
Switching hysteresis: 100mV + (0.1 x V_{sp}) typical

Pulse width

High: 10 μ s min
Low: 10 μ s min

Frequency range

0-50kHz

Output characteristics

Maximum off-state voltage: 35V
Maximum off-state leakage current: 10 μ A
Maximum on-state voltage drop: 1 + (0.1 x current in mA) V
Maximum on-state current: 50mA
Output OFF if supply fails
Note: the output is zener diode protected against inductive loads

LED indicators

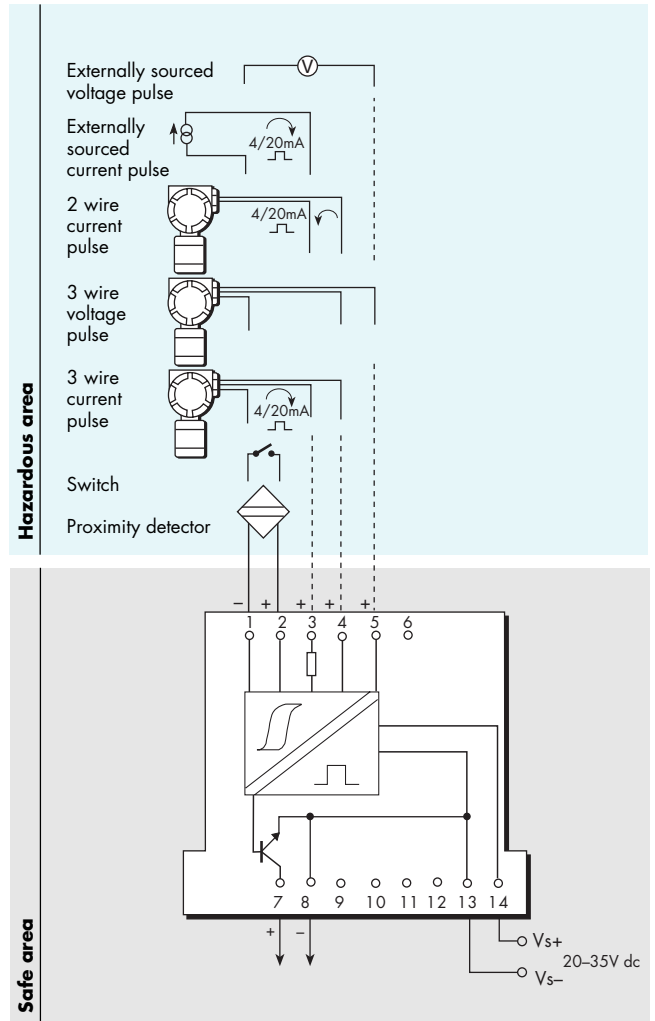
Amber: one provided for input, ON when output circuit is ON
Green: one provided for power indication

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



Terminal	Function
1	Common input -ve
2	Switch/proximity input +ve
3	Current pulse input +ve
4	Tx supply +ve
5	Voltage pulse input +ve
7	Pulse output +ve
8	Pulse output -ve
13	Supply -ve
14	Supply +ve

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

Terminals 2 to 1

10.5V, 800 Ω , 14mA

Terminals 4 to 3 and 1

28V, 300 Ω , 93mA

Terminals 3 to 1

Non-energy storing apparatus $\leq 1.2V$, $\leq 0.1A$, $\leq 20\mu J$ and $\leq 25mW$; can be connected without further certification into any IS loop with open-circuit voltage not more than 28V

Terminals 5 to 4 and 1

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

FM entity parameters

Terminals 1, 4 and 5

$V_i = 27.6V$, $I_i = 94mA$, $C_a = 0.12\mu F$, $L_a = 4.2mH$

Terminals 1, 2

$V_{oc} = 10.5V$, $I_{sc} = 13mA$, $C_a = 2.4\mu F$, $L_a = 200mH$

Terminals 1, 3, 4

$V_i = 27.6V$, $I_i = 155mA$, $C_a = 0.12\mu F$, $L_a = 1.57mH$

Terminals 1, 3

$V_{oc} = 1.1V$, $I_{sc} = 51mA$, $C_a = 1000\mu F$, $L_a = 13.8mH$

MTL4041A CURRENT REPEATER

4/20mA passive input for smart transmitters



The MTL4041A provides an input for separately powered 4/20mA transmitters and also allows bi-directional transmission of digital 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).

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One

Location of transmitter

Zone 0, IIC, T4–6 hazardous area if suitably certified

Div.1, Group A, hazardous location

Input impedance for HART® signals

at terminals 5, 6: $>230\Omega$

Maximum input volt drop

at terminals 5, 6: $<6.2\text{V}$

i.e. a transmitter load of 310Ω at 20mA

Input and output signal range

4 to 20mA

Over-/under-range

1.0mA to 21.5mA

Digital signal bandwidth

50Hz to 8kHz

Safe-area circuit load resistance

Conventional transmitters: 0 to 600Ω

Smart transmitters: $250\Omega \pm 10\%$

Safe-area circuit output resistance

$>1\text{M}\Omega$

Safe-area circuit ripple

$<50\mu\text{A}$ peak-to-peak up to 80kHz

Transfer accuracy at 20°C

Better than $20\mu\text{A}$

Temperature drift

$<1\mu\text{A}/^\circ\text{C}$

Response time

Settles within $200\mu\text{A}$ of final value after 20ms

LED indicator

Green: one provided for power indication

Power requirement, at 20mA

70mA at 24V

85mA at 20V

50mA at 35V

Power dissipation within unit, at 20mA

1.6W at 24V

1.7W at 35V

Isolation

250V ac between safe- and hazardous-area circuits

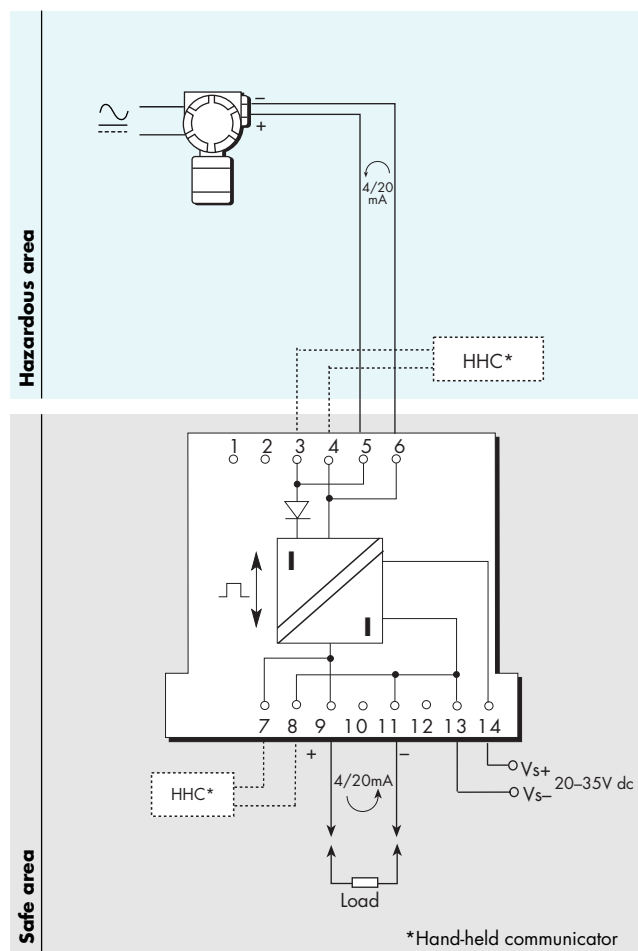
Safety description

Terminals 3 to 4 and 5 to 6

8.6V (diode). This voltage must be considered when calculating the load capacitance.

Simple apparatus

Terminals 3 to 4 and 5 to 6 meet clause 5.4 of EN50020 : 1994 and have the following parameters: $U \leq 1.5\text{V}$, $I \leq 0.1\text{A}$, $P \leq 25\text{mW}$. 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.



Terminal	Function
3	Optional HHC connection +ve
4	Optional HHC connection -ve
5	Tx signal +ve
6	Tx signal -ve
7	Optional HHC connection +ve
8	Optional HHC connection -ve
9	Output +ve
11	Output -ve
13	Supply -ve
14	Supply +ve

MTL4041B REPEATER POWER SUPPLY

4/20mA, smart, for 2- or 3-wire
transmitters



The MTL4041B provides a fully floating dc supply for energising a conventional 2- or 3-wire 4/20mA transmitter or a 'smart' transmitter located in a hazardous area, and repeats the current in another circuit to drive a safe-area load. For smart transmitters, the unit allows bi-directional transmission of digital communication signals superimposed on the 4/20mA signal so that the transmitter can be interrogated either from the operator station or by a hand-held communicator (HHC). The module can also be used with hazardous-area current sources and some vortex and turbine meters.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One

Location of transmitter

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

Voltage available for transmitter and lines

15V minimum at 20mA

Note: maximum open-circuit voltage is 28V

Input and output signal range

4 to 20mA

Over-/under-range

1.0mA to 21.5mA

Digital signal bandwidth

10Hz to 8kHz

Safe-area circuit load resistance

Conventional transmitters: 0 to 650Ω

Smart transmitters: 250Ω ± 10%

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 within 20ms

LED indicator

Green: one provided for power indication

Power requirement, Vs

65mA at 24V dc

75mA at 20V dc

50mA at 35V dc with 20mA signal

Power dissipation within unit

1.2W at 24V with 20mA signal

1.4W at 35V

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

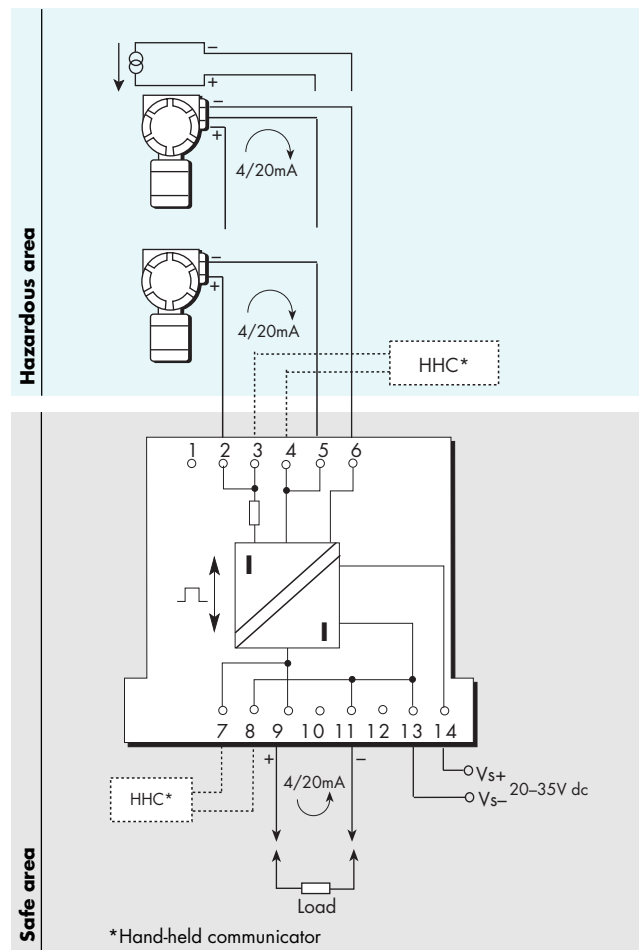
Terminals 2 to 5 and 6

28V, 300Ω, 93mA

Terminals 5 to 6

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 not more than 28V

Note: Terminals 5 and 6 only support HART® communications in one direction from field device to safe-area connections 9 and 11.



Terminal	Function
2	Tx supply +ve
3	Optional HHC connection +ve
4	Optional HHC connection -ve
5	Current input -ve
6	Common
7	Optional HHC connection +ve
8	Optional HHC connection -ve
9	Output +ve
11	Output -ve
13	Supply -ve
14	Supply +ve

FM entity parameters

Terminals 2, 5, 6

$V_i = 28V$, $I_i = 141mA$, $C_a = 0.13\mu F$, $L_a = 1.94mH$

Terminals 2, 4, 5

$V_i = 28V$, $I_i = 93mA$, $C_a = 0.13\mu F$, $L_a = 4.2mH$

MTL4041P HIGH-POWER REPEATER POWER SUPPLY

4/20mA, smart, for 2- or 3-wire transmitters



The MTL4041P provides a fully floating dc supply for energising a conventional 2- or 3-wire 4/20mA transmitter or a 'smart' transmitter located in a hazardous area, and repeats the current in another circuit to drive a safe-area load. For smart transmitters, the unit allows bi-directional transmission of digital communication signals superimposed on the 4/20mA signal so that the transmitter can be interrogated either from the operator station or by a hand-held communicator (HHC). The module can also be used with hazardous-area current sources. The MTL4041P is a high-power version of the MTL4041B, suitable for all gas groups provided that the field equipment is suitably certified.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One

Location of transmitter

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

Voltage available for transmitter and lines

16.3V minimum at 20mA

Note: maximum open-circuit voltage is 28V

Input and output signal range

4 to 20mA

Over-/under-range

1.0mA to 21.5mA

Digital signal bandwidth

10Hz to 8kHz

Safe-area circuit load resistance

Conventional transmitters: 0 to 650Ω

Smart transmitters: 250Ω ±10%

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 within 20ms

LED indicator

Green: one provided for power indication

Power requirement, V_s

65mA at 24V dc with 20mA signal

75mA at 20V dc

50mA at 35V dc

Power dissipation within unit

1.2W at 24V with 20mA signal

1.4W at 35V

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

Terminals 2 to 5 and 6

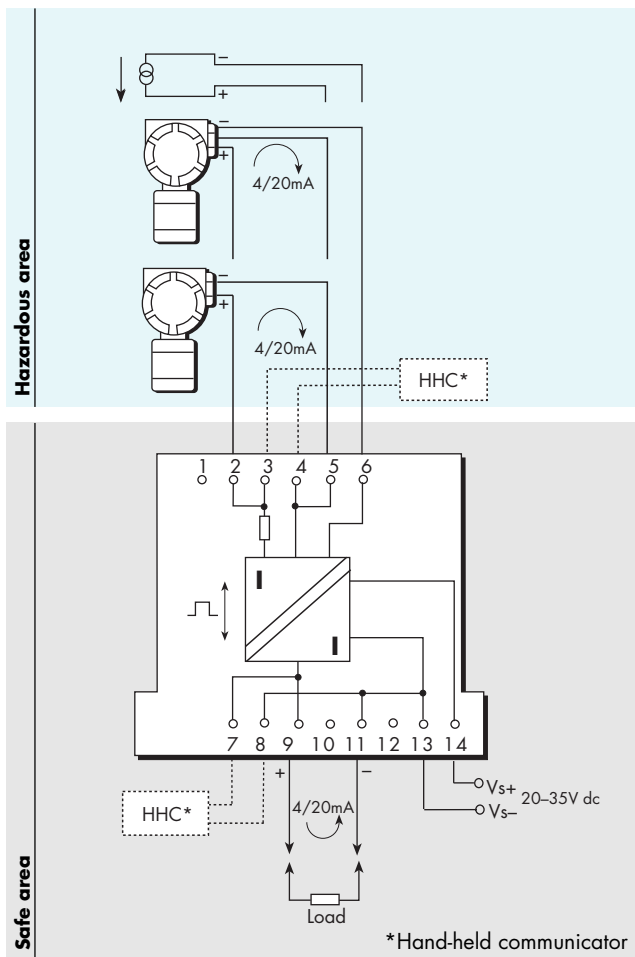
28V, 240Ω, 116.6mA

Terminals 5 to 6

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 not more than 28V

Note: Terminals 5 and 6 only support HART® communications in one direction from field device to safe-area connections 9 and 11.

HART® is a registered trademark of HART Communication Foundation



Terminal	Function
2	Tx supply +ve
3	Optional HHC connection +ve
4	Optional HHC connection -ve
5	Current input
6	Common
7	Optional HHC connection +ve
8	Optional HHC connection -ve
9	Output +ve
10	Output -ve
11	Output -ve
12	Supply -ve
13	Supply -ve
14	Supply +ve

FM entity parameters

Terminals 2 and 5

V_{oc} = 28V dc, I_{sc} = 118mA, C_a = 0.14μF, L_a = 2.76mH

Terminals 2, 3, 4, 5 and 6

V_t = 28V dc, I_t = 166mA, C_a = 0.14μF, L_a = 1.41mH

MTL4042 REPEATER POWER SUPPLY IIB

4/20mA, for 2-wire transmitters



The MTL4042 provides a fully-floating dc supply for energising a conventional 2-wire 4/20mA transmitter located in a hazardous area, and repeats the current in another circuit to drive a safe-area load.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One

Location of transmitter

Zone 0, IIB, T4-6 hazardous area if suitably certified
Div. 1, Group C, hazardous location

Voltage available for transmitter and lines

18.0V minimum at 20mA

Note: maximum open-circuit voltage is 28V

Input and output signal range

4 to 20mA

Over-/under-range

1.0mA to 21.5mA

Safe-area circuit load resistance

Conventional transmitters: 0 to 650Ω

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 within 20ms

LED indicator

Green: one provided for power indication

Power requirement, Vs

65mA at 24V dc

75mA at 20V dc

50mA at 35V dc

Power dissipation within unit

1.2W at 24V with 20mA signal

1.4W at 35V

Isolation

250V ac between safe- and hazardous-area circuits

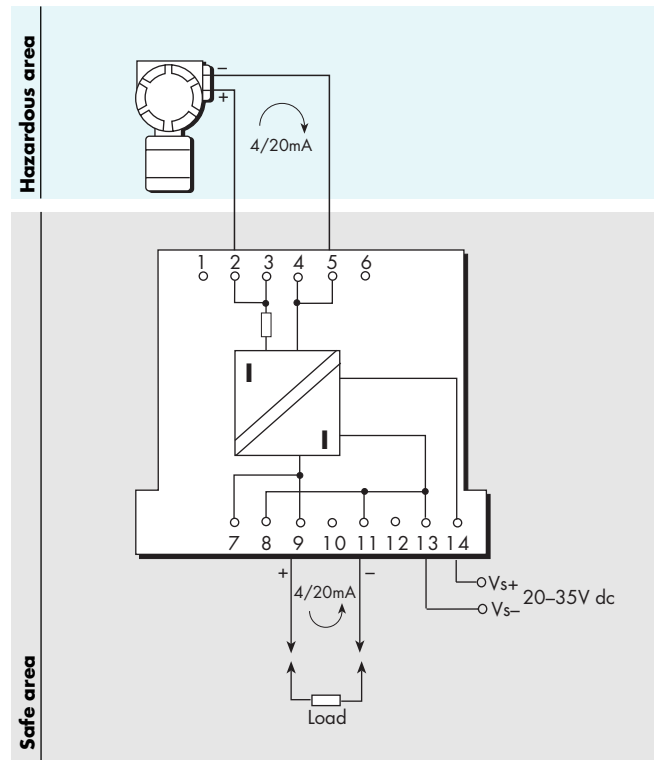
Safety description

Terminals 2 to 5

28V, 150Ω, 187mA, $U_m = 250V$ rms or dc

FM entity parameters

$V_{oc} = 28V$ dc, $I_{sc} = 185.5mA$, $C_a = 0.39μF$, $L_a = 4.5mH$



Terminal	Function
2	Tx supply +ve
3	Optional connection +ve
4	Optional connection -ve
5	Current input -ve
7	Optional connection +ve
8	Optional connection -ve
9	Output +ve
11	Output -ve
13	Supply -ve
14	Supply +ve

MTL4043 REPEATER POWER SUPPLY

4/20mA, HART, current sinking



The MTL4043 provides a fully floating dc supply for energising a conventional 2- or 3-wire 4/20mA transmitter or a 'HART' transmitter located in a hazardous area, and controls the current in another safe area circuit. For HART® transmitters, the unit allows bi-directional transmission of digital communication signals superimposed on the 4/20mA signal so that the transmitter can be interrogated either from the operator station or by a hand-held communicator (HHC). The safe-area connections (terminals 9 and 11) are 'current sinking' making the MTL4043 suitable for use with analogue inputs which act as the current source.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One

Location of transmitter

Zone 0, IIC, T4-6 hazardous area if suitably certified

Div.1, Group A, hazardous location

Voltage available for transmitter and lines

15V minimum at 20mA

Note: maximum open-circuit voltage is 28V

Input and output signal range

4 to 20mA

Over-/under-range

1.0mA to 21.5mA

Digital signal bandwidth

50Hz to 8kHz

Safe-area load

Source voltage: 30V max

Minimum load resistance: 0Ω at up to 20V source voltage

200Ω at up to 24V source voltage

500Ω at up to 30V source voltage

Load resistance for HART operation: 250Ω ±10%

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 within 20ms

LED indicator

Green: one provided for power indication

Power requirement, Vs, with 20mA signal

49mA at 24V dc

57mA at 20V dc

36mA at 35V dc

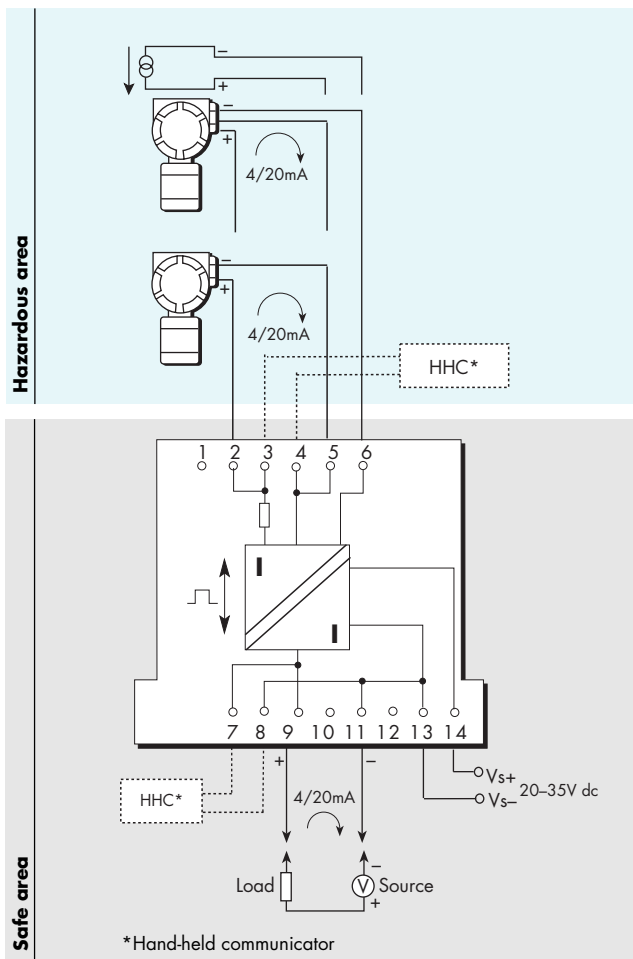
Power dissipation within unit, with 20mA signal

1.2W at 24V

1.4W at 35V

Isolation

250V ac between safe- and hazardous-area circuits



Terminal	Function
2	Tx supply +ve
3	Optional HHC connection +ve
4	Optional HHC connection -ve
5	Current input -ve
6	Common
7	Optional HHC connection +ve
8	Optional HHC connection -ve
9	Output +ve
11	Output -ve
13	Supply -ve
14	Supply +ve

Safety description

Terminals 2 to 5 and 6

28V, 300Ω, 93mA

Terminals 5 to 6

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 not more than 28V

Note: terminals 5 to 6 only support HART communications in one direction from field device to safe-area connections 9 and 11.

FM entity parameters

Terminals 2, 5 and 6

$V_i = 28V$ dc, $I_i = 141mA$, $C_o = 0.13\mu F$, $L_o = 1.9mH$

Terminals 2, 4 and 5

$V_i = 28V$ dc, $I_i = 93mA$, $C_o = 0.13\mu F$, $L_o = 4.2mH$

MTL4044 REPEATER POWER SUPPLY

two channel, 4/20mA, smart,
for 2-wire transmitters



The MTL4044 provides fully floating dc supplies for energising two conventional 2-wire 4/20mA or 'smart' 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 signal so that the transmitter can be interrogated either from the operator station or by a hand-held communicator (HHC).

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

Two

Location of transmitter

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

Voltage available for transmitter and lines

15V minimum at 20mA

Note: maximum open-circuit voltage is 28V

Input and output signal range

2.0mA to 22mA

Digital signal bandwidth

Hazardous-to-safe dc to 10kHz

Safe-to-hazardous 2Hz to 10kHz

Safe-area circuit load resistance

Conventional transmitters: 0 to 300Ω

Smart transmitters: 250Ω ±10%

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 within 20ms

LED indicator

Green: one provided for power indication

Power requirement, Vs

(with both channels carrying 20mA signal)

90mA at 24V dc

105mA at 20V dc

65mA at 35V dc

Power dissipation within unit

(with both channels carrying 20mA signal)

1.2W at 24V dc

1.3W at 35V dc

Isolation

250V ac between safe- and hazardous-area circuits

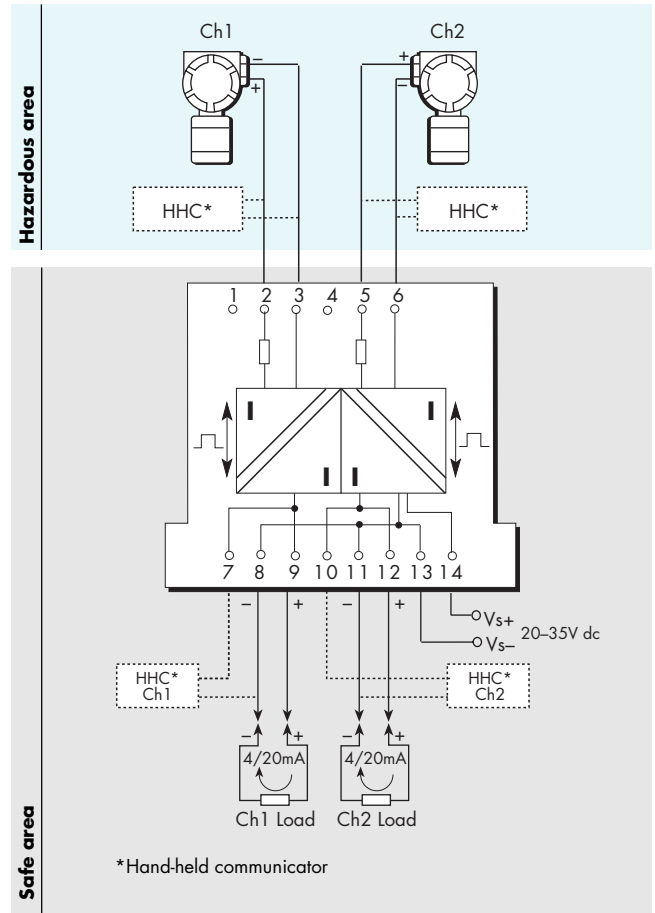
Safety description

Terminals 2 to 3 and 5 to 6

28V, 300Ω, 93mA

FM entity parameters

$V_{oc} = 28V$ dc, $I_{sc} = 93mA$, $C_a = 0.13\mu F$, $L_a = 4.2mH$



Terminal	Function
2	Ch1 tx supply +ve
3	Ch1 tx supply -ve
5	Ch2 tx supply +ve
6	Ch2 tx supply -ve
7	Ch1 optional HHC connection +ve
8	Ch1 output -ve/HHC -ve
9	Ch1 output +ve
10	Ch2 optional HHC connection +ve
11	Ch2 output -ve/HHC -ve
12	Ch2 output +ve
13	Supply -ve (internally connected to terminals 8 and 11)
14	Supply +ve

MTL4045B/4045C

ISOLATING DRIVERS

4/20mA, with line fault detection



The MTL4045B accepts a 4/20mA signal from a safe-area controller and repeats it to drive a current/pressure (I/P) converter or any other load up to 800Ω in a hazardous area. The output capability is 16V at 20mA and the drop across the input terminals is low (4V). The input and output circuits float independently. Process controllers with a readback facility can detect an open or short circuit in the field wiring since, if this occurs, the resistance across the input terminals will change to a preset high value.

The MTL4045C is identical to the MTL4045B except that it provides open circuit detection only (no short circuit detection). The MTL4045B short circuit detection feature may not be compatible with some I/P positioners which have a high self-inductance. Consult your MTL representative for advice.

SPECIFICATION

See also common specification, cable parameters and approvals

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

Maximum load resistance

800Ω (16V at 20mA)

Minimum load resistance (MTL4045B only)

90Ω (short circuit detection at <50Ω)

Output resistance

>1MΩ

Under/over range capability

1.0 to 21.4mA

Input and output circuit ripple

<40μA peak-to-peak

Input parameters

≤200Ω with the field wiring intact
>47kΩ with the field wiring open-circuit
<0.75mA with the field wiring short-circuit (MTL4045B only)

Transfer accuracy at 20°C

Better than 20μA

Temperature drift

<1.0μA/°C

Response time

Settles within 200μA of final value within 100ms

LED indicator

Green: one provided for power indication

Power requirement, Vs

50mA at 24V dc with 20mA signal
55mA at 20V dc
40mA at 35V dc

Power dissipation within unit

1.0W maximum at 24V with 20mA signal
1.2W at 35V

Isolation

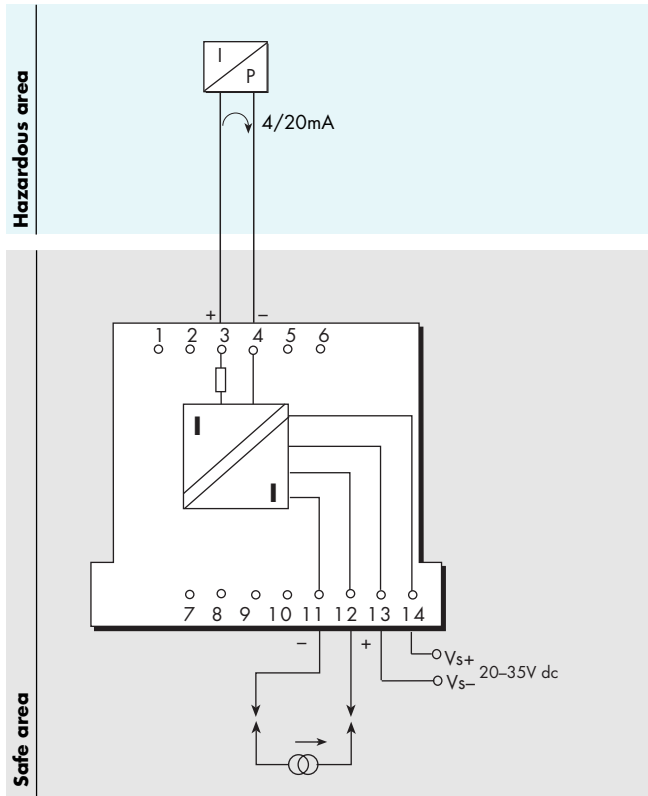
250V ac between safe- and hazardous-area circuits.
Input circuit is floating; clamped to less than 10V above supply –ve permitting the use of a 250Ω current sense resistor in the return path.

Safety description

28V, 300Ω, 93mA; $U_m = 250V$ rms or dc

FM entity parameters

$V_{oc} = 28V$ dc, $I_{sc} = 93mA$, $C_a = 0.12μF$, $L_a = 4.2mH$



Terminal	Function
3	Output +ve
4	Output –ve
11	Input –ve
12	Input +ve
13	Supply –ve
14	Supply +ve

MTL4046/4046C

ISOLATING DRIVER

for 4–20mA HART® valve positioners
with line fault detection



The MTL4046 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 so that the device can be interrogated either from the operator station or by a hand-held communicator (HHC). 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 MTL4046C is identical to the MTL4046 except that it provides open circuit detection only (no short-circuit detection).

SPECIFICATION

See also common specification, cable parameters and approvals

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 = 1.0mA

Over range = 26.0mA (load ≤520Ω)

Input and output circuit ripple

<40μA peak-to-peak

Transfer accuracy at 20°C

Better than 20μA

Input characteristics

<4.0V with the field wiring intact

<0.9mA with the field wiring open-circuit (and short-circuit on the MTL4046)

Response time

Settles within 200μA of final value within 100ms

Temperature drift

<1.0μA/°C

LED indicator

Green: one provided for power indication

Power requirement, Vs

58mA at 24V dc

70mA at 20V dc

40mA at 35V dc

Power dissipation within unit

1.2W typical at 24V with 20mA loop current

1.4W worst case

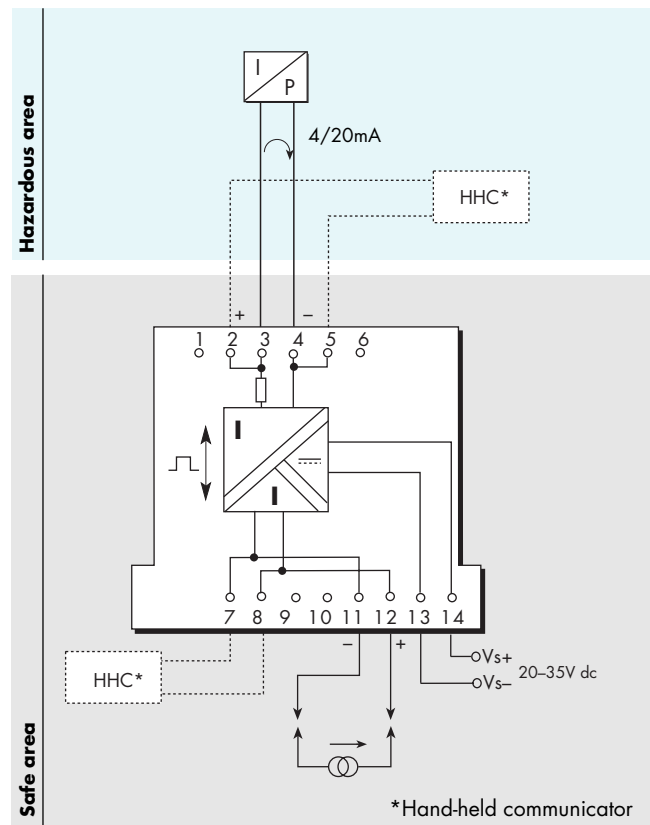
Isolation

250V ac between safe- and hazardous-area circuits

Input circuit is floating

Safety description

28V, 300Ω, 93mA, $U_m = 250V$ rms or dc



Terminal	Function
2	Optional HHC connection +ve
3	Output +ve
4	Output -ve
5	Optional HHC connection -ve
7	Optional HHC connection -ve
8	Optional HHC connection +ve
11	Input -ve
12	Input +ve
13	Supply -ve
14	Supply +ve

MTL4046P HIGH POWER ISOLATING DRIVER

4–20mA with line fault detection for HART® valve positioners



The MTL4046P accepts a 4/20mA floating signal from a safe-area controller to drive a current/pressure converter (or any other floating load up to 870Ω) in a hazardous area. For HART valve positioners, the module also permits bi-directional transmission of digital communication signals so that the device can be interrogated either from the operator station or by a hand-held communicator (HHC). 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.

SPECIFICATION

See also common specification, cable parameters and approvals

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

870Ω (17.4V at 20mA)

Minimum load resistance

90Ω (short circuit detection at <50Ω)

Output resistance

>1MΩ

Under/over range capability

Under range = 1.0mA

Over range = 26.0mA (load ≤600Ω)

Input and output circuit ripple

<40μA peak-to-peak

Transfer accuracy at 20°C

Better than 20μA

Input characteristics

<4.0V with the field wiring intact

<0.9mA with the field wiring open- or short-circuit

Response time

Settles within 200μA of final value within 100ms

Temperature drift

<1.0μA/°C

LED indicator

Green: one provided for power indication

Power requirement, Vs

58mA at 24V dc

70mA at 20V dc

40mA at 35V dc

Power dissipation within unit

1.2W typical at 24V with 20mA loop current

1.4W worst case

Isolation

250V ac between safe- and hazardous-area circuits

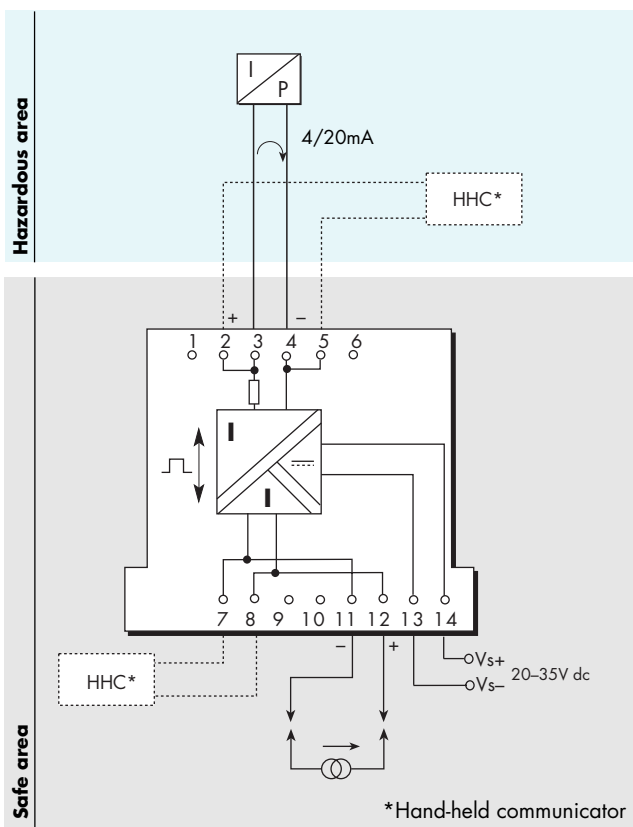
Input circuit is floating

Safety description

28V, 240Ω, 116mA, $U_m = 250V$ rms or dc

FM entity parameters

$V_t = 28V$ dc, $I_{sc} = 117mA$, $C_d = 0.14\mu F$, $L_d = 2.6mH$



Terminal	Function
2	Optional HHC connection +ve
3	Output +ve
4	Output -ve
5	Optional HHC connection -ve
7	Optional HHC connection -ve
8	Optional HHC connection +ve
11	Input -ve
12	Input +ve
13	Supply -ve
14	Supply +ve

MTL4047 REPEATER

POWER SUPPLY

4/20mA, for Bailey 'smart' transmitters

The MTL4047 performs a similar function to the MTL4041B, but is suitable for use with the Bailey BCN/EQN/PTS Series of 'smart' transmitters. The unit provides a minimum of 15.6V at 24mA to energise the transmitter while at the same time repeating the current accurately in a separate circuit to drive a load in the safe area. The Bailey transmitter also operates in multi-drop applications, and in this configuration up to six transmitters (if suitably certified) can be connected in parallel to a single MTL4047 with each transmitter drawing 4mA, thereby using the maximum 24mA supplied by the MTL4047.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One

Location of transmitter

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

Voltage available for transmitter and lines

15.6V minimum at 24mA

Note: maximum open-circuit voltage is 22.8V

Maximum permitted line resistance

(15.6 minus transmitter voltage requirement) x 50Ω (at 20mA)

(15.6 minus transmitter voltage requirement) x 41.5Ω (at 24mA)

Input and output signal range

0 to 24mA with superimposed digital signal

Digital signal transmission

Compatible with Bailey BCN, EQN and PTS transmitters

Safe-area circuit load resistance

Conventional transmitters: 100Ω to 550Ω

Bailey smart transmitters: 250Ω ±10%

Safe-area circuit output resistance

>1MΩ

Safe-area circuit ripple

<50μA peak-to-peak up to 80kHz

Transfer accuracy at 20°C

<20μA from 4mA to 20mA

Temperature drift

<1μA/°C

Response time

Settles within 200μA of final value within 60ms

LED indicator

Green: one provided for power indication

Power Requirement, Vs

65mA at 24V dc with 20mA signal

75mA at 20V dc

50mA at 35V dc

75mA at 24V dc with 24mA load current

85mA at 20V dc

55mA at 35V dc

Power dissipation within unit

1.2W typical at 24V with 24mA load current

1.4W maximum at 35V with 24mA load current

Isolation

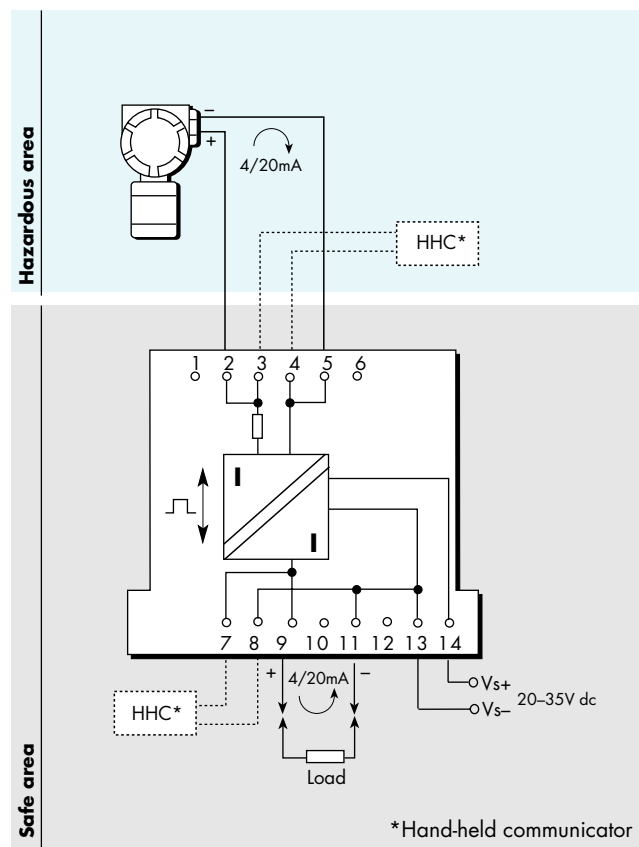
250V ac between safe- and hazardous-area circuits

Safety description

22.8V, 116Ω, 197mA

FM entity parameters

$V_{oc} = 23.3V$ dc, $I_{sc} = 197.3mA$, $P_o = 1.15W$



Terminal	Function
2	Tx supply +ve
3	Optional HHC connection +ve
4	Optional HHC connection -ve
5	Tx supply -ve
7	Optional HHC connection +ve
8	Optional HHC connection -ve
9	Output +ve
11	Output -ve
13	Supply -ve
14	Supply +ve

MTL4048 LOOP-POWERED ISOLATOR

4/20mA, for Foxboro 'intelligent' transmitters



The MTL4048 is designed primarily for use with Foxboro 'intelligent' transmitters operating in the digital mode. It acts like a direct-current transformer. Being powered from the safe-area side, the same current flows in both hazardous and safe-area circuits and can be controlled from either. It provides bi-directional transmission of digital communication signals so that the transmitter can be interrogated either from the operator station or by a hand-held communicator (HHC).

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One, fully floating

Location of transmitter

Zone 0, IIC, T4-6 hazardous area if suitably certified

Div. 1, Group A, hazardous location

Input and output signal range

4 to 20mA

Input voltage, V_s

9 to 35V dc

Minimum output voltage

Input voltage V_{in}	Minimum output voltage V_{out}
<24V	$V_{in} - (0.4 \times \text{current in mA}) - 1V$
>24V	$23V - (0.4 \times \text{current in mA})$

Input and output ripple

<100µA peak-to-peak

Transfer accuracy at 20°C

Better than 400µA

Temperature drift

<5µA/°C (0 to 60°C)

<8.5µA/°C (-20 to 0°C)

Response time

Settles within 10% of final value within 100ms

Digital signal bandwidth

3kHz to 15kHz

Power dissipation within unit

0.4W typical at 24V with 20mA signal

0.6W typical at 35V

Safety description

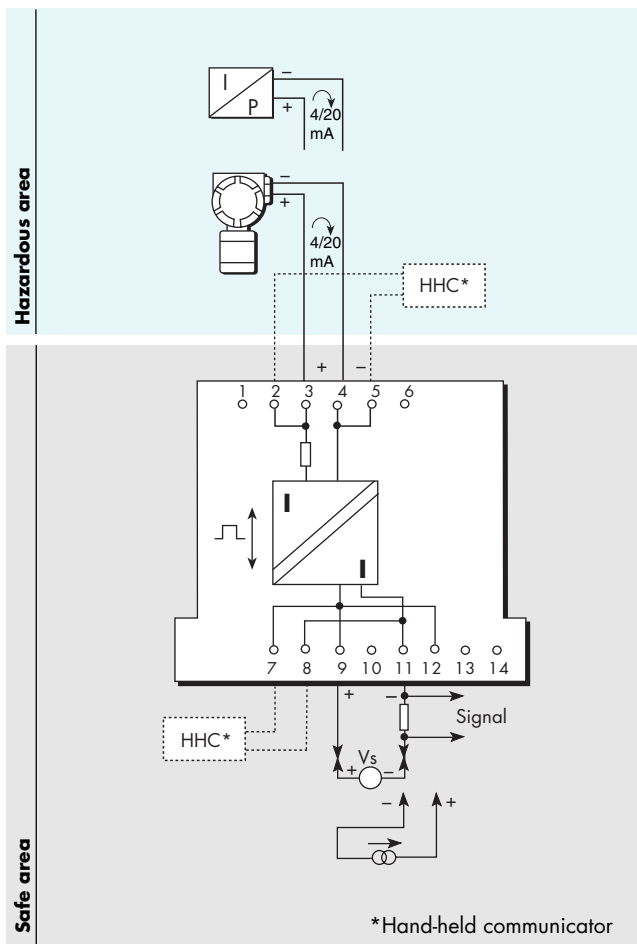
28V, 300Ω, 93mA, $U_m = 250V$ rms or dc

FM entity parameters

Not yet available

Isolation

250V ac between safe- and hazardous-area circuits



*Hand-held communicator

Terminal	Function
2	Optional HHC connection +ve
3	Tx or I/P connection +ve
4	Tx or I/P connection -ve
5	Optional HHC connection -ve
7	Optional HHC connection +ve
8	Optional HHC connection -ve
9	Load connection +ve
11	Controller or load connection -ve
12	Controller connection +ve

MTL4061 FIRE AND SMOKE DETECTOR INTERFACE

two-channel



The MTL4061 is a loop-powered 2-channel interface for use with conventional fire and smoke detectors located in hazardous areas. In operation, the triggering of a detector causes a corresponding change in the safe-area current. The unit features reverse input polarity protection, while 'no-fail' earth fault detection on either line can be provided by connecting an MTL4220 earth leakage detector to terminal 1 or 4.

SPECIFICATION

See also common specification, cable parameters and approvals

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 35V 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

'No-fail' earth fault protection

Enabled by connecting terminals 1 and 4 to an MTL4220 earth leakage detector

Fault on either line of each channel proclaimed: unit continues working

Note: 1. To maintain isolation between the two channels, separate earth leakage detectors are needed

2. The earth leakage detectors introduce a 100µA, 1Hz ripple to the field circuit

Minimum output voltage V_{out} at 20°C

$V_{in} - (0.38 \times \text{current in mA}) - 2V$

$21V - (0.35 \times \text{current in mA})$

whichever is lower

Maximum output voltage

28V from 300Ω

Transfer accuracy at 20°C

Better than 400µA

Temperature drift

<10µA/°C (–20 to 60°C)

Response time to step input

Settles to within 500µA of final value within 30ms

Power dissipation within unit

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

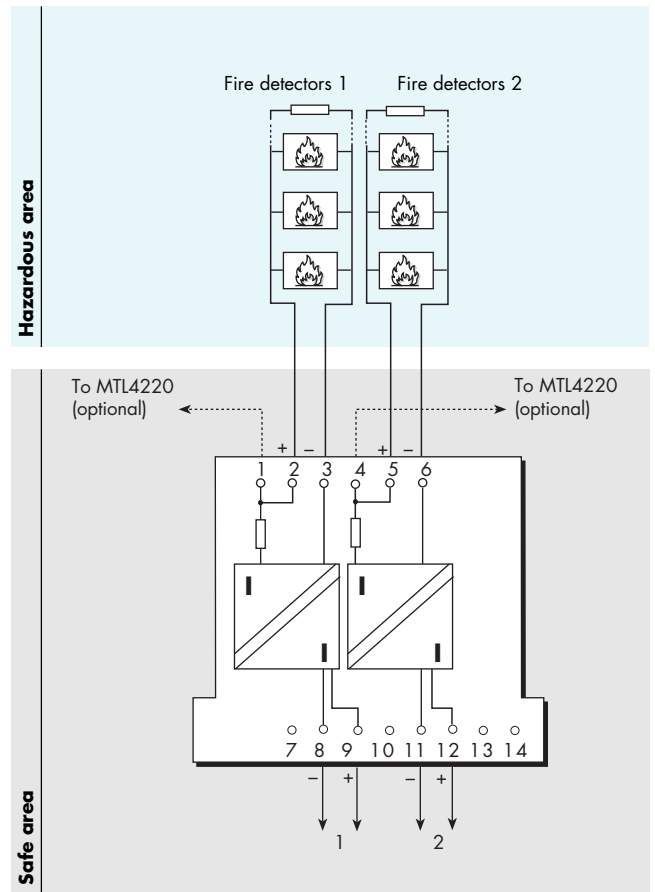
1.2W maximum at 35V with 40mA signal (each channel)

Isolation

250Vac between safe- and hazardous-area circuits

Safety description for each channel

28V, 300Ω, 93mA.



Terminal	Function
1	Optional link from input 1 to MTL4220
2	Output 1 +ve
3	Output 1 –ve
4	Optional link from input 2 to MTL4220
5	Output 2 +ve
6	Output 2 –ve
8	Input 1 –ve
9	Input 1 +ve
11	Input 2 –ve
12	Input 2 +ve

MTL4073 TEMPERATURE CONVERTER

THC or RTD input



The MTL4073 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 eight thermocouple types and 2-, 3-, and 4-wire RTDs. For THC inputs requiring cold-junction compensation, an SCJ01 hazardous-area connector (which is provided with an integral CJC sensor) should be used, refer to page 3-89 for details. Configuration is carried out through a port on top of the module using an MTL611B IS pocket data terminal or a personal computer.

SPECIFICATION

See also common specification, cable parameters and approvals and details of SCJ01 hazardous-area connector, with integral CJC sensor, for thermocouple inputs requiring cold junction compensation, in 'MTL4000 Series Accessories'

Number of channels

One

Signal source

Types J, K, T, E, R, S, B or N THCs to BS 4937
EMF input
2/3/4-wire platinum RTDs to BS 1904/DIN 43760 (100Ω at 0°C)

Location of signal source

Zone 0, IIC, T4 hazardous area
Div.1, Group A, hazardous location

Input signal range

-75 to +75mV, or 0 to 400Ω

Input signal span

3 to 150mV, or 10 to 400Ω

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

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)

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)

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 burnout

Upscale, downscale, or off

Output range

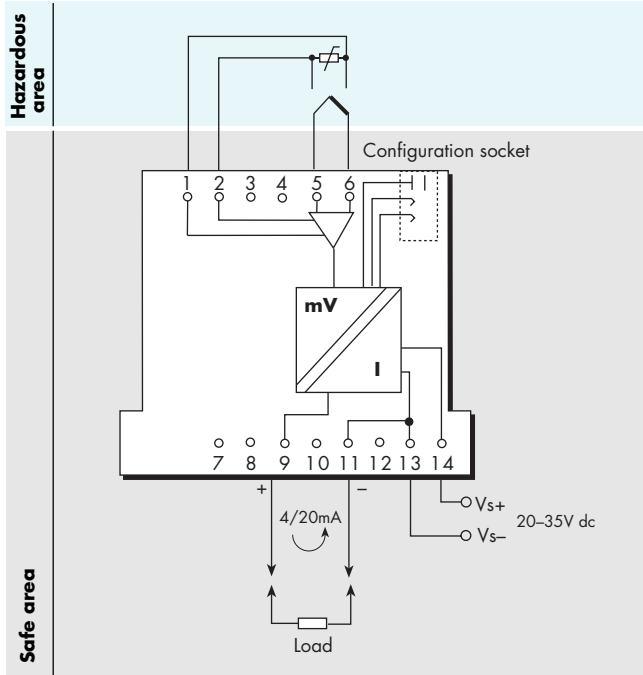
4 to 20mA nominal (direct or reverse)

Maximum load resistance

600Ω

LED indicator

Green: one provided for power and status indication



Terminal	Function
1	3-wire RTD input -ve
2	4-wire RTD input +ve
5	THC/EMF/RTD input +ve
6	THC/EMF/RTD input -ve
9	Output +ve
11	Output -ve
13	Supply -ve
14	Supply +ve

Power requirement, Vs

57mA at 24V

55mA at 20V

60mA at 35V with 20mA signal

Power dissipation within unit

1.2W at 24V with 20mA signal

2.0W at 35V

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

Terminals 5 and 6

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 not more than 10V.

Terminals 1 and 2

7.2V, 950Ω, 8mA

Configuration socket

U_{max}: in = 11.2V, I_{max}: in = 12mA, W_{max}: in = 280mW

U_{max}: out = 7.2V, I_{max}: out = 8mA, W_{max}: out = 15mW

FM entity parameters

Terminals 1, 2, 5 and 6

V_t ≤ 7.2V, I_t ≤ 11.5mA, C_a ≤ 11.0μF, L_a ≤ 245mH

Terminals 5 and 6 only

V_t ≤ 1.2V, I_t ≤ 3.8mA, C_a ≤ 1000μF, L_a ≤ 3.6mH

Standard configuration

Input type	Type K thermocouple
Linearisation/CJ Compensation	enabled/enabled
Units	°C
Damping/Smoothing value	0 seconds/0 seconds
Output zero	0°C
Output span	250°C
Tag and description fields	blank
Open circuit alarm	set high (upscale)
Transmitter failure alarm	set low (downscale)
CJ failure alarm	set low (downscale)
Line frequency	50Hz

Configurator

MTL611B IS pocket data terminal fitted with a CNF41 interface and CAB73 cable assembly or a personal computer running MTL PCS45 software with a PCL45 interface

MTL4081 MILLIVOLT/ THERMOCOUPLE ISOLATOR

for low-level signals



The MTL4081 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 strain-gauge bridges or thermocouples utilising external cold-junction compensation. A switch located on top of the module 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, cable parameters and approvals

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 $\pm 55\text{mV}$

Output resistance

60Ω nominal

Transfer accuracy

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 on top of the module enable or disable the safety drive and select upscale or downscale operation

LED indicator

Green: one provided for power indication

Power requirement, V_s

26mA max, 20V dc to 35V dc

Power dissipation within unit

0.6W typical at 24V
0.9W at 35V

Isolation

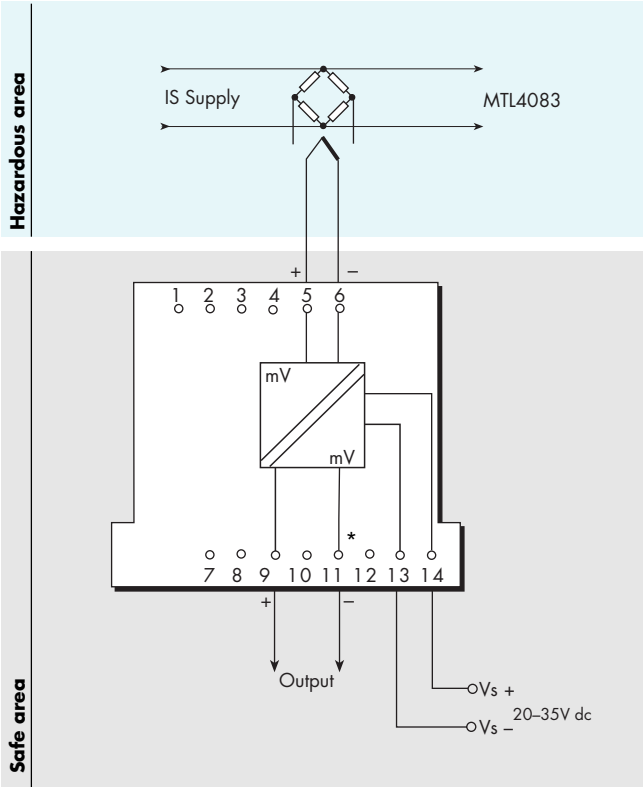
250V ac between safe- and hazardous-area circuits

Safety description

Terminals 5 and 6

$U_{\text{max out}}$ 1.0V
 $I_{\text{max out}}$ 47.8mA
 $P_{\text{max out}}$ 0.012W

Non-energy-storing apparatus $\leq 1.2\text{V}$, $\leq 0.1\text{A}$, $\leq 20\mu\text{J}$ and $\leq 25\text{mW}$.
Can be connected without further certification into any IS loop with open-circuit voltage not more than 28V.



* Note: output negative (terminal 11) is clamped to supply negative (terminal 13) through two series diodes

Terminal	Function
5	THC/EMF input +ve
6	THC/EMF input -ve
9	Output +ve
11	Output -ve
13	Supply -ve
14	Supply +ve

MTL4083 VOLTAGE ISOLATOR



The MTL4083 takes a dc signal from a voltage source in a hazardous area, isolates it, and passes it to a receiving instrument located in the safe area. It is intended for use with strain-gauge bridges, slide-wire transducers and various voltage sources.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One

Location of source

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

Input and output signal range

0 to 12V, over range to +12.5V

Signal input resistance

>10M Ω

Output resistance

<50 Ω (recommended load resistance \geq 10k Ω)

Transfer accuracy

Linearity and repeatability <0.05% of reading (input \geq 1V)

Temperature drift

<600 μ V/ $^{\circ}$ C

Response time

Settles to within 10% of final value typically within 200 μ s

Frequency response

DC to 4kHz nominal

LED indicator

Green: one provided for power indication

Power requirement, Vs

31mA max, 20 to 35V dc

Power dissipation within unit

0.7W typical at 24V

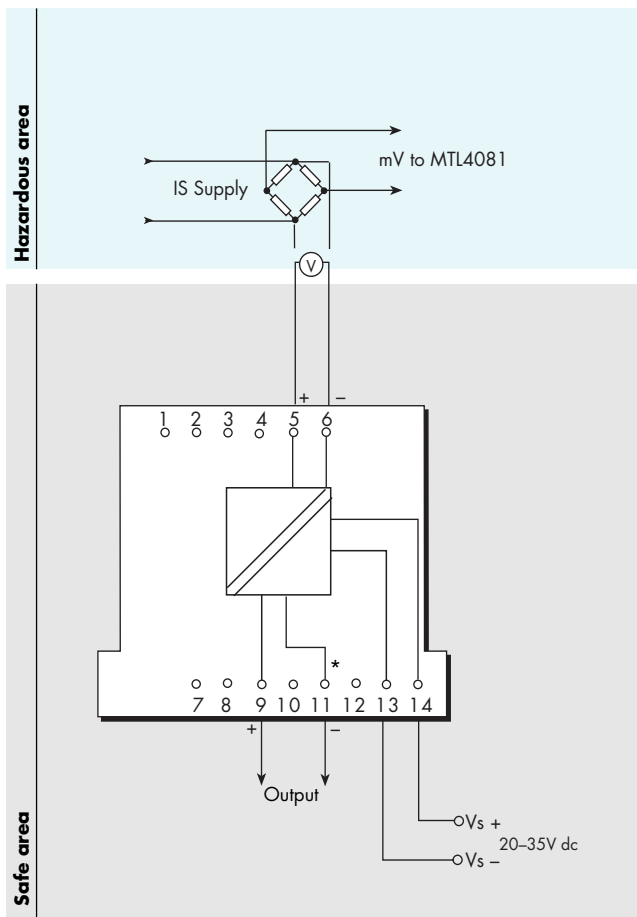
1.1W at 35V

Isolation

250V ac between safe- and hazardous-area circuits

Safety description

16V, 950 Ω , 17mA



* Note: output negative (terminal 11) is clamped to supply negative (terminal 13) through two series diodes

Terminal	Function
5	Voltage input +ve
6	Voltage input -ve
9	Voltage output +ve
11	Voltage output -ve
13	Supply -ve
14	Supply +ve

MTL4113x AND 4114x SWITCH/PROXIMITY DETECTOR INTERFACE

fail-safe, TÜV-approved, LFD option 

With the MTL4113x/4114x, a fail-safe proximity switch detector located in the hazardous area can control an isolated fail-safe electronic output. The MTL4113x units provide line fault detection alarm contacts. There are two versions of each of these interface units. The MTL4113P and MTL4114P are for use with P + F TÜV approved fail-safe sensors; MTL4113T and MTL4114T units are for use with Turck TÜV approved fail-safe sensors.

SPECIFICATION

(For both MTL4113x and MTL4114x unless otherwise indicated)

See also common specification, cable parameters and approvals

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 Ω

Input/output characteristics

Input value in sensor circuit	Fail-safe output	Operation	LFD contacts (MTL4113x only)
MTL4113P, MTL4114P 2.9mA < I_s < 3.9mA	ON	Normal	CLOSED
MTL4113T, MTL4114T 3.65mA < I_s < 4.3mA			
MTL4113P, MTL4114P I_s < 1.9mA & I_s > 5.1mA	OFF	Normal	CLOSED
MTL4113T, MTL4114T I_s < 3.3mA & I_s > 5.3mA			
MTL4113P & MTL4113T I_s < 50 μ A	OFF	Broken line	OPEN
MTL4113P & MTL4113T I_s > 6.6mA	OFF	Shorted line	OPEN

Note: I_s = Sensor current

Fail-safe electronic output

Output on: 24V \pm 1.2V dc

Output off: 0V dc, max < 5V dc

Load: 2.4k Ω to 10k Ω

Maximum on-state current: 11mA

Short-circuit current: 25mA

Line fault detection (LFD), MTL4113x only

Relay output for line fault (contacts open when line fault detected)

Switch characteristics: 35V ac/dc, 1A

LED indicators

Amber: one provided for output status, ON when fail-safe output is energised

Green: one provided for power indication

Red: one provided for LFD, ON when line fault is detected (MTL4113x only)

Power requirements, V_s

MTL4113x MTL4114x

80mA 70mA at 20V dc

70mA 60mA at 24V dc

65mA 45mA at 35V dc

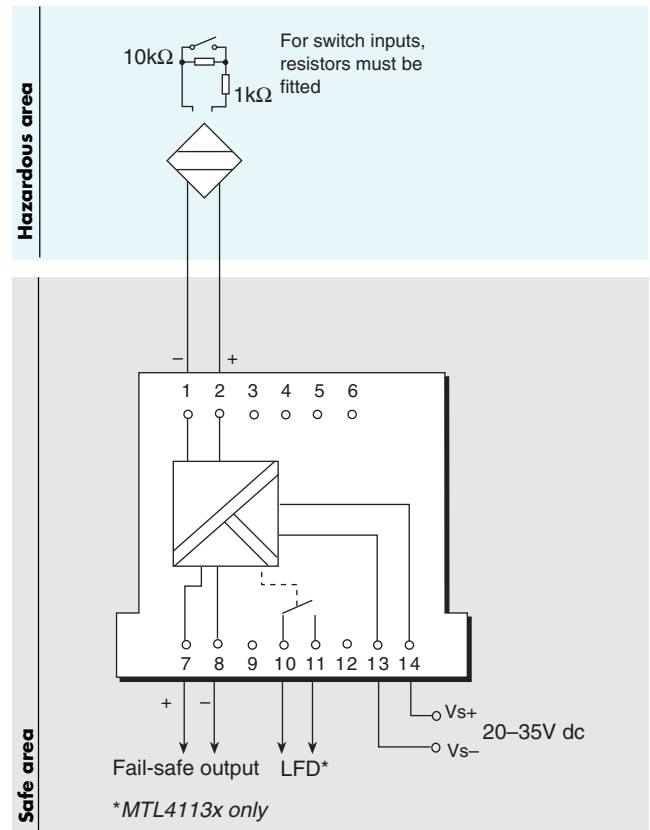
Power dissipation within unit

MTL4113x MTL4114x

1.4W 1.2W at 20V dc

1.5W 1.3W at 24V dc

2.0W 1.4W at 35V dc



Terminal	Function
1	Input -ve
2	Input +ve
7	Output +ve
8	Output -ve
10	LFD (MTL4113x only)
11	LFD (MTL4113x only)
13	Supply -ve
14	Supply +ve

Isolation

253V ac between safe- and hazardous-area circuits

Safety description

U_o = 8.6V, I_o = 26mA, P_o = 56mW

Note: switch-type sensors must be fitted with resistors as shown

MTL4215 SWITCH OPERATED RELAY

IS-output



The MTL4215 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 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 still remain safe if connected together.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of channels

One, fully floating

Location of control circuit

Safe area

Input/output characteristics

Input suitable for switch contacts, an open-collector transistor or logic drive.

Relay energised if $<27k\Omega$ or $<1V$ applied

Relay de-energised if $>54k\Omega$ or $>2V$ applied (50V maximum)

Hysteresis, nominal $15k\Omega$ or $0.5V$

Power supply failure protection

Relay de-energised if supply fails

Response time

25ms nominal

Contacts (suitable for connection to IS circuits)

2-pole changeover

Contact rating

100V dc, limited to 30V dc for IS applications, 250mA

5VA (reactive loads must be suppressed)

$<150m\Omega$ contact resistance

Contact life expectancy

2×10^5 operations at maximum load

LED indicators

Amber: one provided for relay status, ON when relay energised

Green: one provided for power indication

Power requirement, V_s

25mA at 24V dc

20mA at 20V dc

40mA at 35V dc

Power dissipation within unit

0.6W maximum at 24V dc

1.4W maximum at 35V dc

Isolation

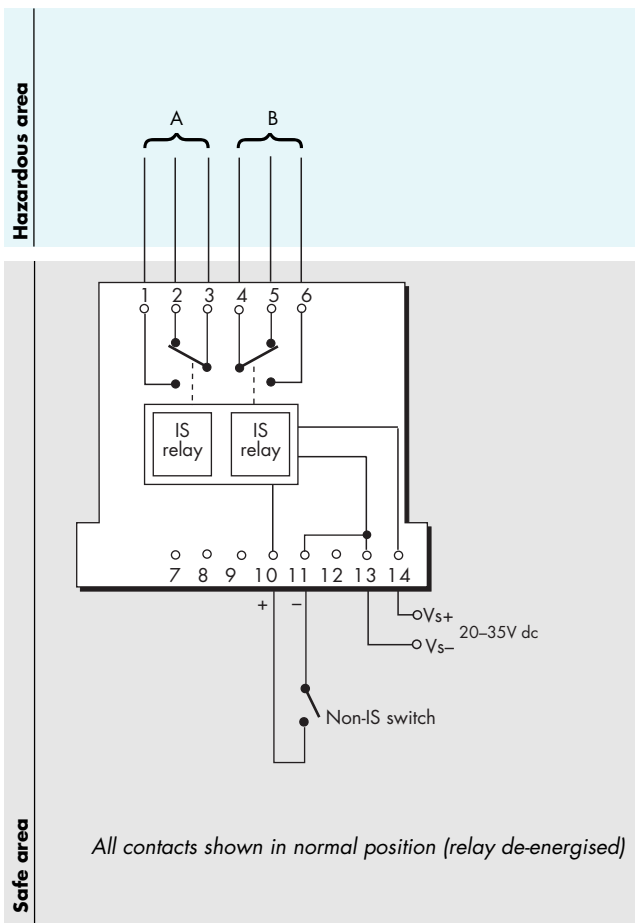
250V ac between safe- and hazardous-area circuits

Safety description (each channel)

Non-energy storing apparatus: relay contacts may be connected to any IS circuit without further consideration

FM entity parameters

$V_{oc} = 0V$, $I_{sc} = 0mA$, $C_a = 10,000\mu F$, $L_a = 1.0mH$



Terminal	Function
1	IS relay output A (normally open)
2	IS relay output A (normally closed)
3	IS relay output A (common)
4	IS relay output B (common)
5	IS relay output B (normally closed)
6	IS relay output B (normally open)
10	Relay control +ve
11	Relay control -ve
13	Supply -ve
14	Supply +ve

MTL4216 SWITCH OPERATED RELAY

two-channel IS-output

CE

The MTL4216 enables two separate IS circuits in a hazardous area to be relay-contact controlled by two on-off switches or logic 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, cable parameters and approvals

Number of channels

Two, fully floating

Location of control circuit

Safe area

Input/output characteristics

Inputs suitable for switch contacts, an open-collector transistor or logic drive

Relay energised if $<27k\Omega$ or $<1V$ applied

Relay de-energised if $>54k\Omega$ or $>2V$ applied (50V maximum)

Hysteresis, nominal $15k\Omega$ or 0.5V

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

100V dc, limited to 30V dc for IS applications, 250mA

5VA (reactive loads must be suppressed)

$<150m\Omega$ contact resistance

Contact life expectancy

2×10^5 operations at maximum load

LED indicators

Amber: one provided for each channel, ON when relay is energised

Green: one provided for power indication

Power requirement, V_s

25mA at 24V dc

20mA at 20V dc

40mA at 35V dc

Power dissipation within unit

0.6W maximum at 24V

1.4W worst case

Isolation

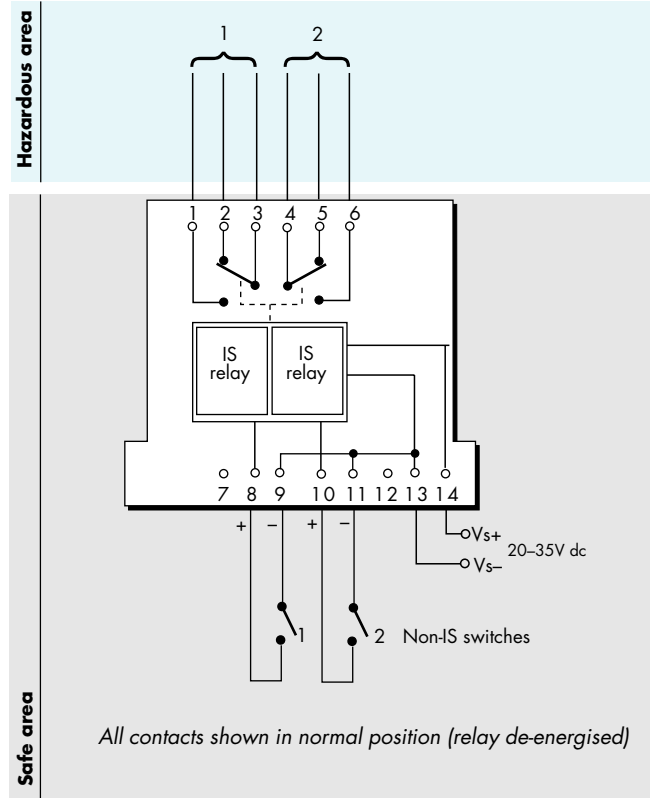
250V ac between safe- and hazardous-area circuits

Safety description (each channel)

Non-energy-storing apparatus: relay contacts may be connected to any IS circuit without further consideration

FM entity parameters

$V_{oc} = 0V$, $I_{sc} = 0mA$, $C_a = 10,000\mu F$, $L_a = 1.0H$



Terminal	Function
1	IS relay output 1 (normally open)
2	IS relay output 1 (normally closed)
3	IS relay output 1 (common)
4	IS relay output 2 (common)
5	IS relay output 2 (normally closed)
6	IS relay output 2 (normally open)
8	Relay 1 control +ve
9	Relay 1 control -ve
10	Relay 2 control +ve
11	Relay 2 control -ve
13	Supply -ve
14	Supply +ve

MTL4220 EARTH LEAKAGE DETECTOR



The MTL4220 scans up to eight floating electrical circuits, hazardous or safe area, and warns if the resistance to earth on any input falls below 10k Ω . It enables other MTL4000 Series units to be used in the 'no-fail' mode, whereby earth faults on field lines can be detected and rectified without upsetting control or needing emergency action. Eight LED indicators enable faults to be easily located to any input. A self-test facility enables the unit to be checked automatically or manually to ensure the integrity of the whole system. During test the relay is de-energised and the eight LED indicators are illuminated if the unit is healthy. This has no effect on the monitored circuits.

SPECIFICATION

See also common specification, cable parameters and approvals

Number of inputs

Eight independent inputs

Signal source

MTL4000 Series modules with provision for earth leakage detection

Note: inputs are not isolated from each other

Monitoring signal

5V, 0.1mA, 1Hz, intrinsically safe

Earth fault resistance to de-energise relay (7-8 closed)

<10k Ω , on any input

Earth fault resistance that will not de-energise relay (8-9 closed)

>50k Ω , on all inputs

Response time

<50s for 8 input scan

Series mode rejection

60V dc, 10V rms 50Hz

Relay output characteristics

Single pole changeover

Contact rating: 35V dc, 250mA, 5VA

Contact life expectancy: 10⁵ operations at maximum load

Note: reactive loads must be adequately suppressed

LED indicators

Red: one provided for each of eight inputs, ON when earth fault detected on the corresponding input

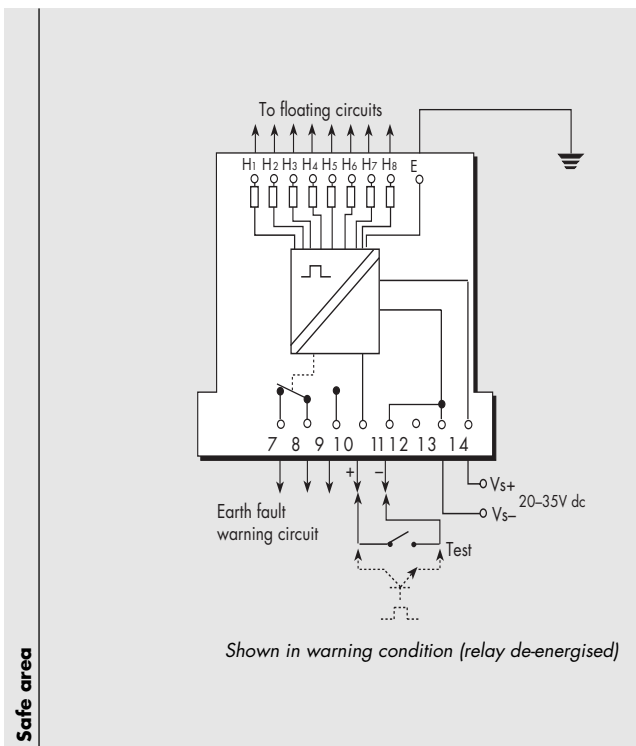
Green: one provided for power indication

Test facility

Terminals 10 and 11 are suitable for switch contacts, an open-collector transistor or logic drive:

TEST = input switch closed, transistor on or <1.4V applied across terminals 10 and 11; relay will de-energise within 1s and all red LED indicators light

OPERATE = input switch open, transistor off or >4.5V applied across terminals 10 and 11; relay will return to normal operating mode within 50s



Terminal	Function
H ₁ – H ₈	Connections to MTL4000 Series modules
E	Earth
7	Earth fault signal (normally closed)
8	Earth fault signal (common)
9	Earth fault signal (normally open)
10	Test +ve
11	Test –ve
13	Supply –ve
14	Supply +ve

Power requirement, Vs

35mA max at 20 to 35V

18mA typical at 20 to 35V

Power dissipation within unit

0.9W max. at 24V

1.3W max. at 35V

0.45W typical at 24V

Isolation

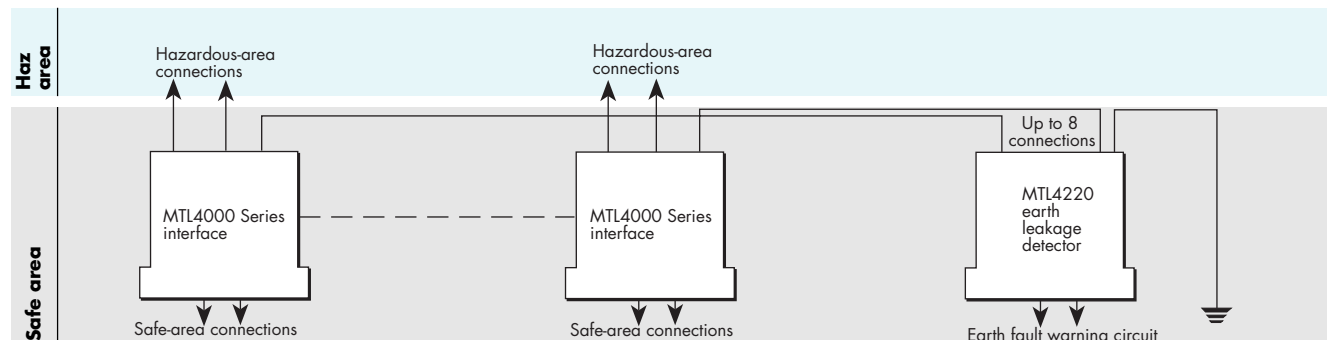
250V ac between safe- and hazardous-area circuits

Safety description

9V, 65k Ω , 0.14mA, U_m=250Vrms or dc

Note: Three 3-way connectors are supplied with this unit as standard.

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



Note: some MTL4000 Series modules are multichannel and could require one connection for each channel.

MTL4401 DE TRIP

AMPLIFIER

SSI 3000



The MTL4401 SSI 3000 operates in a similar manner to that of conventional analogue trip amplifiers by monitoring a critical variable and providing controlled failure handling in case of failures in the primary monitoring control system. The SSI 3000 monitors the digital signal across a safe-area load and switches a relay if the digitally represented value crosses a threshold set by the user.

SPECIFICATION

See also common specification

Number of channels

One

Input signal

1–5V DE data
Input impedance >1MΩ
(Honeywell standard SW-927020-1010)

Power supply failure protection

Relay de-energises if supply fails

Response time

100ms

Relay contacts

Single-pole change-over
Response time: 10ms
Contact rating: 3VA, 30V, 100mA
Contact life expectancy: 10⁵ operations at maximum load.

Note: reactive loads must be adequately suppressed.

Switch functions

Test: Sets output to trip status
HI/LO: Selects high or low alarm action
Rotary number switches (3 off):
Set alarm level 00.0 to 99.9%

LED indicators

Green: 'POWER' Power on
Amber: 'RELAY' Relay status
Red: 'FAULT' Fault

Power requirements, Vs

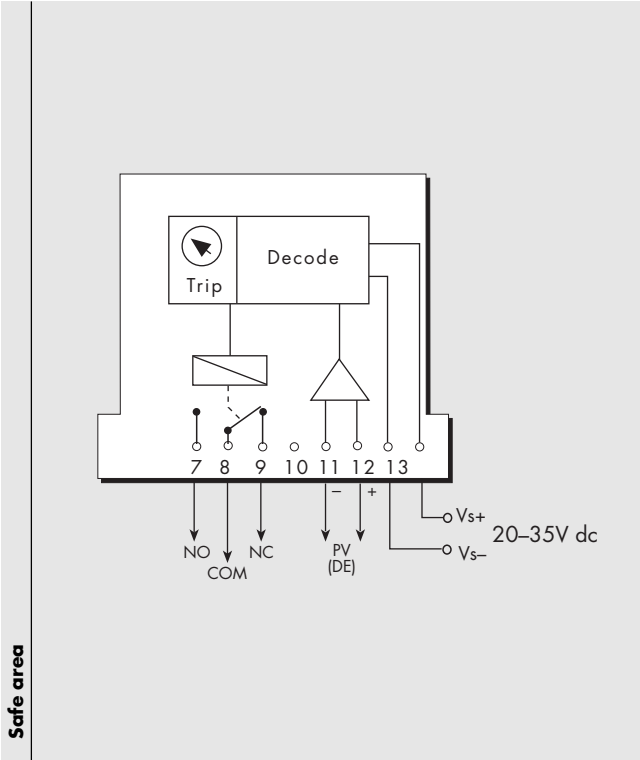
35mA max at 20 to 35V dc

Power dissipation within unit

0.54W at 20V
1.10W at 35V

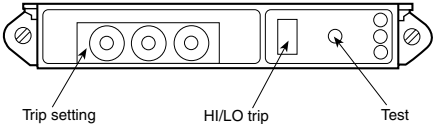
Long term drift

No recalibration necessary



Terminal	Function
7	Relay (normally open)
8	Relay (common)
9	Relay (normally closed)
11	Input – (DE)
12	Input + (DE)
13	Supply –ve
14	Supply +ve

Switch functions



MTL4403 HIGH-LEVEL TRIP AMPLIFIER



This single-channel non-IS unit derives its input from the safe-area output of the MTL4041B or MTL4073 and compares the loop current with a trip level in the range 4 to 20mA. Two trip points are provided and may be set by multiturn potentiometers accessible on the top of the unit. Each trip can be set to indicate a high or low alarm. Test points are provided so that the approximate trip value (1 to 5V) may be measured using a portable voltmeter. A normally-open relay contact and amber LEDs indicate the trip condition.

SPECIFICATION

See also common specification

Number of channels

One

Location of signal source

Safe area only. Interface to hazardous area via suitable barrier/isolator.

Input range

4 to 20mA into 25 Ω

Common-mode input voltage: 8V max

Hysteresis: 1% nominal of input range

Trip-point adjustment

Within 0.1% of input range over whole range

Supply voltage effect on trip point

<0.1% for supply voltage change 20 to 35V dc

Temperature effect on trip point

<0.02% of input range per °C

Response time

20ms nominal

Alarm functions

High alarm: relay energised when input less than trip point

Low alarm: relay energised when input greater than trip point

Power supply failure protection

Relay de-energises if supply fails

Alarm relay contacts

Single pole, normally open

Contact rating

3A at 35V dc (on standard MTL backplanes)

Note that reactive loads must be adequately suppressed.

LED indicators

Amber: one provided for each relay, ON when relay energised (not tripped)

Green: one provided for power indication

Power requirements

37mA at 24V dc

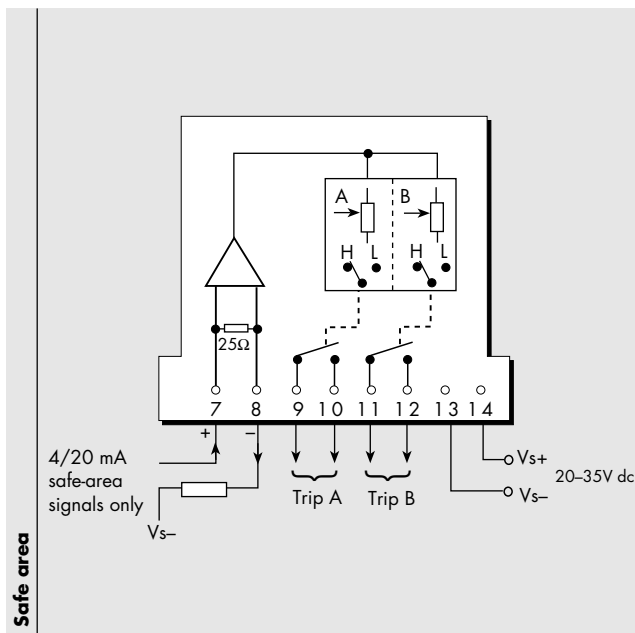
40mA at 20V dc

30mA at 35V dc

Power dissipation within unit

0.8W at 24V

0.9W at 35V



Terminal	Function
7	Input +ve
8	Input -ve
9	Output trip A (normally open)
10	Output trip A (common)
11	Output trip B (normally open)
12	Output trip B (common)
13	Supply -ve
14	Supply +ve

MTL4421RS GENERAL PURPOSE SWITCH OPERATED RELAY

with 24V logic override facility CE

The MTL4421RS enables an on/off device in a non-hazardous area to be controlled by a volt-free contact or logic signal from the control unit. It can drive loads such as solenoids, alarms, LEDs and other devices. Provided that 24V dc is applied to the override input, the solenoid/ alarm can be operated by the control input. However, if the 24V dc signal is removed, the solenoid/alarm is turned off.

SPECIFICATION

See also common specification

Number of channels

One

Location of the load

Safe-area

Control input

Suitable for switch contacts or an open collector of logic drive

0= input switch closed, transistor on or <4V applied across terminals 10 & 11

1= input switch open, transistor off or >15V applied across terminals 10 & 11

Override input

A 24V logic signal applied across terminal 8 and 9 allows the solenoid/alarm to be operated by the control input. If it is disconnected, the solenoid/alarm is off.

Control and override inputs

Control input state	Override input	Output relay
0 (closed)	0V	open
1 (open)	0V	open
0 (closed)	24V	closed
1 (open)	24V	open

Relay output characteristic

Normally open contacts

Contact rating: 60W, 125VA

Contact life expectancy: 0.5A, 15W /2A, 60W

$1.8 \times 10^7 / 10^6$ operations at maximum load

Response time

set-/release-/ reset time

3ms/ 5ms/ 2ms

LED indicators

Green: one provided for power indication

Amber: one provided for status, ON when relay is closed

one provided for status, ON when output circuit is active

Power requirements

28mA at 24V dc

24mA at 20V dc

37mA at 35V dc

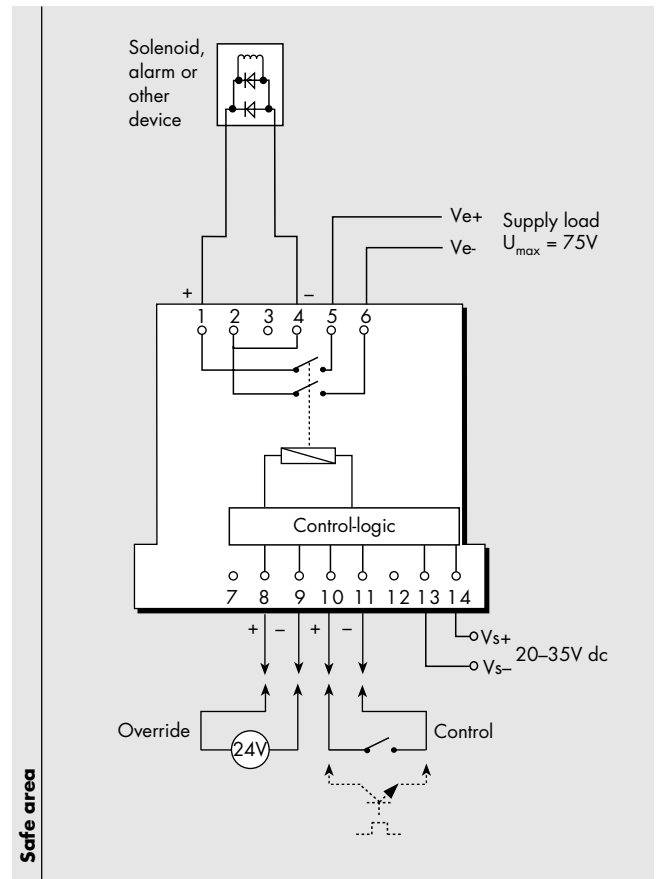
Power dissipation within unit

0.7W typical

Mounting

This module must not be placed next to intrinsic safety modules.

Mounting on an alternative backplane is recommended. If mounted on the same backplane, 3 module positions must be left blank between IS and non-IS circuits. IS and non-IS wiring must be routed to maintain 50mm segregation.



Terminal	Function
1	Output +ve
4	Output -ve
5	Supply load +ve
6	Supply load -ve
8	Override +ve
9	Override -ve
10	Control +ve
11	Control -ve
13	Supply -ve
14	Supply +ve

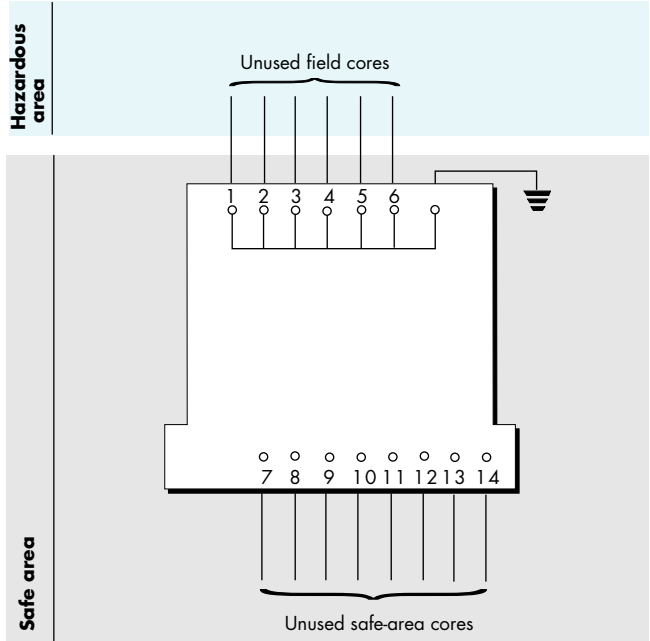
MTL4099 DUMMY ISOLATOR

The primary function of the MTL4099, which can be used with all other MTL4000 Series units, is to provide termination and earthing facilities for unused cable cores from hazardous areas.

SPECIFICATION

See also common specification

Weight
60g



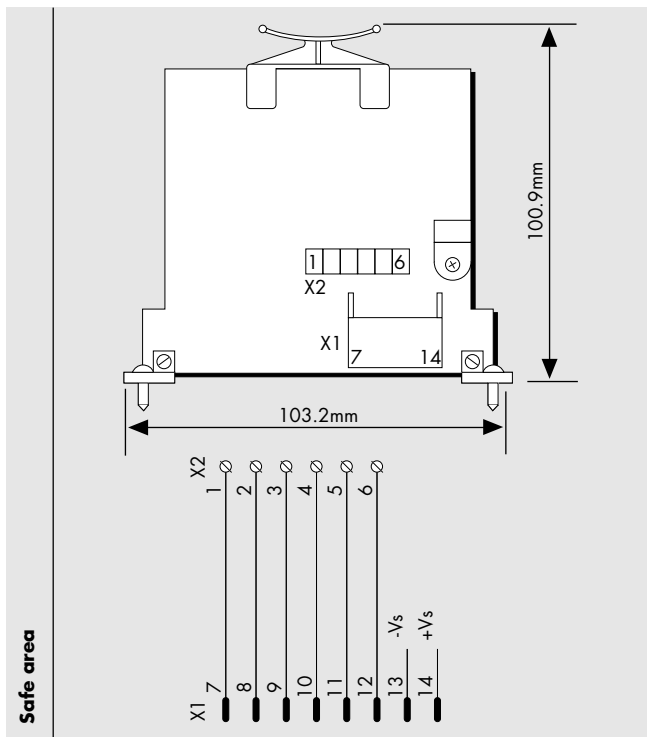
MTL4099N GENERAL PURPOSE FEED THROUGH MODULE

The feed-through termination module allows non-IS connections to the MTL4000 backplanes. The wires from the field are connected using screw terminals. Six terminals are provided for each contact of 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

Weight
30g



MTL4000 SERIES COMMON SPECIFICATION

Location of units

Safe area

Isolation

250V rms between safe-area and hazardous-area terminals tested at 1500V rms min between safe and hazardous terminals

Long term drift

No recalibration necessary

Maximum safe-area voltage

$U_m = 250V$ rms or dc

Hazardous-area connectors

SCC01: Screw-clamp connector accommodates conductors of 14AWG max.

CCH01: Crimp-contact header accommodates:
CRC01 crimps for conductors of 14–20AWG, or
CRC02 crimps for conductors of 18–24AWG

Ambient temperature limits

–20 to +60°C (–4 to 140°F) continuous working

–40 to +80°C (–40 to 176°F) storage

Humidity

5 to 95% RH

Mounting

On MTL or user-supplied backplanes which in turn can be surface, DIN-rail or 19-inch rack mounted

Weight

100g approximately

0

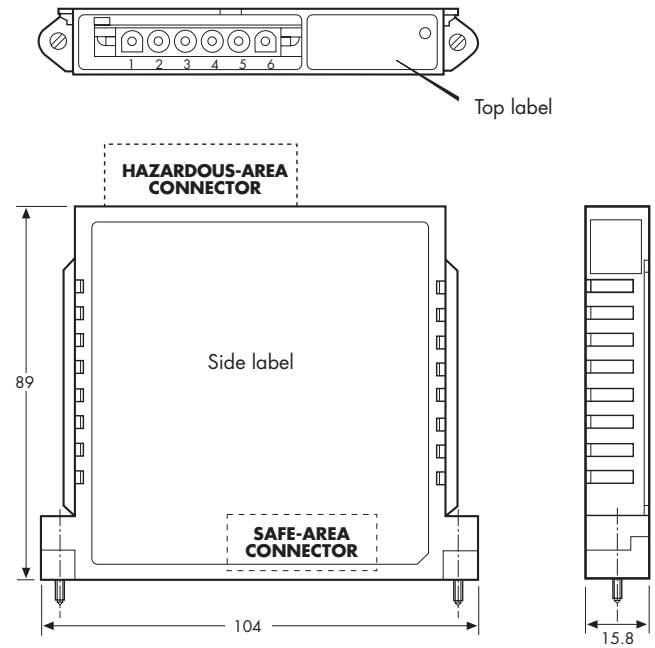
CONDITIONS OF USE

The conditions governing the use of MTL4000 Series interface units are given in the relevant certificates and schedules, copies of which are available from Measurement Technology Ltd.

TO ORDER

See MTL4000 series ordering information

DIMENSIONS (mm)



MAXIMUM CABLE PARAMETERS

Module	BASEEFA					FM		
	Group	μF	mH	or	μH/Ω	Group	μF	mH
MTL4013/ 4014/4015/ 4016/4017	IIC	2.4	165		825	A+B	2.4	165
	IIB	7.2	495		2475	C	7.2	495
	IIA	19.2	1320		6600	D	19.2	1320
MTL4021/ 4021S/4024	IIC	0.17	3		51	A+B	0.17	3
	IIB	0.51	9		153	C	0.51	9
	IIA	1.36	24		408	D	1.36	24
MTL4023	IIC	0.17	1.32		37	A+B		
	IIB	0.51	3.96		111	C		
	IIA	1.36	10.56		296	D		
MTL4025	IIC	0.17	4.2		60	A+B		
	IIB	0.51	12.6		180	C		
	IIA	1.36	33.6		480	D		
MTL4031	IIC	0.13	4.2		55	A+B		
	IIB	0.39	12.6		165	C		
	IIA	1.04	33.6		440	D		
MTL4032	terminal 2 to 1							
	IIC	2.4	165		825	A+B	2.4	165
	IIB	7.2	495		2475	C	7.2	495
	IIA	19.2	1320		6600	D	19.2	1320
	terminal 4 to 3 and 1							
	IIC	0.13	4.2		55	A+B	0.13	4.2
	IIB	0.39	12.6		165	C	0.39	12.6
	IIA	1.04	33.6		440	D	1.04	33.6
MTL4041A	IIC	6.2	6.2		1674			
	IIB	55	22.5		6695			
	IIA	1000	50		13395			
MTL4041B	IIC	0.13	4.2		55	A+B	0.13	4.2
	IIB	0.39	12.6		165	C	0.39	12.6
	IIA	1.04	33.6		440	D	1.04	33.6
MTL4041P/ 4046P	terminals 2, 3, 4, 5 and 6							
	IIC	0.13	2.47		42	A+B	0.4	1.41
	IIB	0.39	7.41		126	C	0.43	5.75
	IIA	1.04	19.76		336	D	1.14	10.8
MTL4042	IIB	0.39	4.5		106			
	IIA	1.04	12.0		282			
MTL4043	IIC	0.083	4.2		55	terminals 2, 4 and 5		
	IIB	0.249	12.6		165	A+B	0.13	4.2
	IIA	0.664	33.6		440	C	0.39	12.6
						D	1.04	33.6
						terminals 2, 5 and 6		
						A+B	0.13	1.94
						C	0.39	7.83
						D	1.04	14.9
MTL4045B/C	IIC	0.13	4.2		55	A+B	0.13	4.2
	IIB	0.39	12.6		165	C	0.39	12.6
	IIA	1.04	33.6		440	D	1.04	33.6
MTL4044/4046/ 4046C	IIC	0.083	4.30		56			
	IIB	0.650	17.72		210			
	IIA	2.150	36.02		444			
MTL4047	IIC	0.22	0.45		30	A+B		
	IIB	0.66	1.35		90	C		
	IIA	1.76	3.6		240	D		
MTL4048	terminals 2 and 3 to 4 and 5					A+B	0.13	4.2
	IIC	0.13	4.2		55	C	0.39	12.6
	IIB	0.39	12.6		165	D	1.04	33.6
	IIA	1.04	33.6		440			
MTL4061	terminals 1 and 2 to 3 and terminals 4 and 5 to 6					A+B	0.13	4.2
	IIC	0.13	4.2		55	C	0.39	12.6
	IIB	0.39	12.6		165	D	1.04	33.6
	IIA	1.04	33.6		440			
MTL4081/4083	Consult MTL							
MTL4215/4216	Cable parameters defined by the circuit that is being switched							
MTL4220	For parameters when using other modules with MTL4220, refer to MTL							

Module	Grp	BASEEFA						FM					
		μF		mH		or	$\mu H/\Omega$	Con 1 terms 1&2		Con 1 terms 5&6		Con 2	
		Con 1	Con 2	Con 1	Con 2	Con 1	Con 2	μF	mH	μF	mH	μF	mH
MTL4073	IIC	0.26	0.60	6.0	47.0	164	135	A+B	11.0	500	1000	3.6	0.6
	IIB	0.78	1.80	18.0	141	492	405	C	33.0	1500	1000	10.8	1.8
	IIA	2.08	4.80	48.0	376	1312	1080	D	88.0	4000	1000	27.8	4.8

Module	TÜV		mH
	Grp	μF	
MTL4113x/MTL4114x	IIC	6.2	45
	IIB	55	150

APPROVALS

Region (Authority)	Australia (NSW M) Mines	Australia (SA)	Canada (CSA)	China (NEPSI)	CIS (ISC VE) (FTZU)	Czech Republic	Germany (TÜV)	Hungary (BKI)	Japan (TIS)	Korea (KRS)	Poland (KDB)	UK (BASEFA to CENELEC- standards)	UK (BASEEFA) Systems (to CENELEC-standards)	USA (FM)
Standard	CMRA67-1982	AS2380.1/7	C22.2 No.157	GB3836-1/7	EN 50020 GOST22782.5-78	CSN33 0380	EN 50014 EN 50020 DIN VDE0160 (04/89) DIN VDE0160 (10/89) Abschn.8.7 AK5 gem. DIN19250 (01/89) /SIL 3 gem. Draft IEC1508	MSZEN 50014 & 50020	New Gijyubukijyun		PN-83/E8110 PN-84/E8107	EN 50014(1977) EN 50020(1977)	EN 50039 BS 5501: P9 1982	3610 Entity
Approved for	Coal mines	Ex (ia) IIC	Class I, II, III Div.1 Gps A-G	Ex (ia) IIC T6	Ex ia IIC	Ex ia IIC	EEx ia IIC/IIb EEx Ib IIC/IIb	[EEx ia] IIC	Ex ia IIC	Ex ia IIC	EEx ia IIC	[EEx ia] IIC T4 or T6*	EEx ia IIC	Class I, II, III, Div.1, 2, Gps A-G IS circuits. Units can also be sited in Class I, II, III, Div.2 in appropriate enclosures
Model no.	* T6 for switches or if the hazardous area device is suitably certified													
MTL4013	MDA Ex ia 10084	Ex 1438X	IR36637-86	GYJ00106	218				Ex-97_C.300		95.087W	Ex92C2322	Ex92C2323	J.I. 5W3A4 AX
MTL4014			IR36637-131X									Ex93C2386	Ex93C2387	
MTL4015		Ex 1438X	IR36637-49			99Ex0771						Ex91C2450		
MTL4016	MDA Ex ia 10084	Ex 1438X	IR36637-49	GYJ00106	218	99Ex0771		Ex-97_C.300		97-25.48-Q1	95.086W	Ex91C2450	Ex91C2451	J.I. 0W2A6 AX
MTL4017			IR36637-87		218						95.085W	Ex93C2386	Ex93C2387	J.I. 4V5A6 AX
MTL4021	MDA Ex ia 10084	Ex 1438X	IR36637-49	GYJ00106	221			Ex-97_C.300		97-25.49-Q1	95.085W	Ex92C2001	Ex92C2002	J.I. 0W2A6 AX
MTL4021S		Ex 1438X									95.084W	Ex92C2001/9	Ex92C2002/3	J.I. 5V7A1 AX
MTL4023			IR36637-87								95.083W	Ex93C2499	Ex93C2500	J.I. 4V5A6 AX
MTL4024			IR36637-131							97-25.49-Q1	Ex92C2001/6	Ex92C2002/2	J.I. 5V7A1 AX	J.I. 5V7A1 AX
MTL4025			IR36637-49								95.084W	Ex92C2001/5	Ex92C2002/1	J.I. 0Z6A6 AX
MTL4031												Ex94C2265	Ex94C2266	
MTL4032												Ex94C2174	Ex94C175	J.I. 4V5A7 AX
MTL4041A			IR36637-87		172	99Ex0834						BAS99ATEX7028	Ex99E2029	
MTL4041B												Ex92C2003/4	Ex92C2004	J.I. 1X6A4 AX
MTL4041P	MDA Ex ia 10084	Ex 1438X	IR36637-68	GYJ00106	171	99Ex0773		Ex-97_C.300	C13408		95.082W	Ex92C2003/7	Ex92C2004/2	J.I. 4X5A3 AX
MTL4042											95.082W	Ex94C2306		J.I. 5V7A1 AX
MTL4043												Ex97D2264		J.I. 4D0A8 AX
MTL4044												BAS99ATEX7061		
MTL4045B/C												Ex93C2478	Ex93C2479	J.I. 0D7A0 AX
MTL4046		Ex 1438X	IR36637-87		220	98Ex0023		Ex-97_C.300		97-2550-Q1	95.080W	BAS98ATEX7293	Ex98E2294	
MTL4046C												BAS98ATEX7293		
MTL4046P		Ex 2320X	IR36637-87			97Ex0070					96.472W	Ex94C2193	Ex94C2194	J.I. 4V5A6 AX
MTL4047												Ex94C2092	Ex94C2125	J.I. 4D0A0 AX
MTL4048						99Ex0774						Ex94C2068	Ex94C2069	
MTL4061												Ex94C2040	Ex94C2041	
MTL4073		Ex 1438X	IR36637-72	GYJ00106	222	99Ex0775		Ex-97_C.300				Ex93C2173	Ex93C2174	J.I. 2X8A5 AX
MTL4081		Ex 2342X										Ex94C2502		
MTL4083		Ex 3549X	IR36637-132									Ex97D2139	Ex97D2140	J.I.6D1A8 AX
MTL4113x							TÜV97 ATEX1202 08/220/1203/17							
MTL4114x			IR36637-132				TÜV97 ATEX1202 08/220/1203/17							
MTL4215											95.079W	Ex94C2015		J.I. 4V5A7 AX
MTL4216												Ex94C2015		J.I. 5V7A1 AX
MTL4220												Ex95C2288	Ex95C2291	