



VIBRATION ANALYSIS HARDWARE

IS111-1A (MTL7700) User Manual

HOW THEY WORK

All MIL7700 Series barriers are based on the same simple principle. Each channel contains two stages of pulse-tested Zener or forward-connected diodes and an 'infallible' terminating resistor. In the event of an electrical fault in the safe area, the diodes limit the voltage that can reach the hazardous area and the resistor limits the current. A fuse protects the diodes, and the two stages of voltage limitation ensure continued safety if either stage should fail. No active output-current limiting circuits are employed. All models are certified 'ia' for all zones and 'IIC' for all explosive atmospheres (except MII7707I+ and MTL7729P+, 'ia' 'IIB').

TERMINOLOGY

1. Safety description

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

2. Polarity

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

3. End-to-end resistance

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

4. Working voltage (Vwkg)

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

5. Maximum voltage (Vmax)

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

6. Fuse rating

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

7. Star connection

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

8. Maximum safe-area voltage (U_m)

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

GENERAL SPECIFICATION

Ambient temperature and humidity limits

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

Leakage current

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

Terminations

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

Colour coding of barrier label

Grey: non-polarised
Red: positive polarity (MTL7706 negative to transmitter)
Black: negative polarity
White: dummy barrier, MIL7799

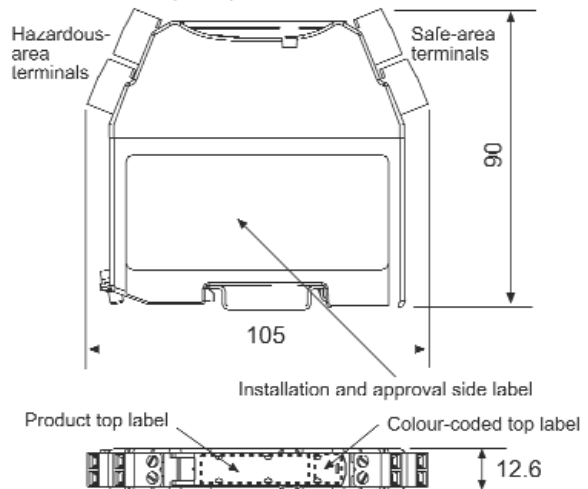
Weight

140g approx

Mounting and earthing

By 35mm Top Hat DIN rail

DIMENSIONS (mm)



KEY MTL7700 SERIES BARRIERS SUMMARISED

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

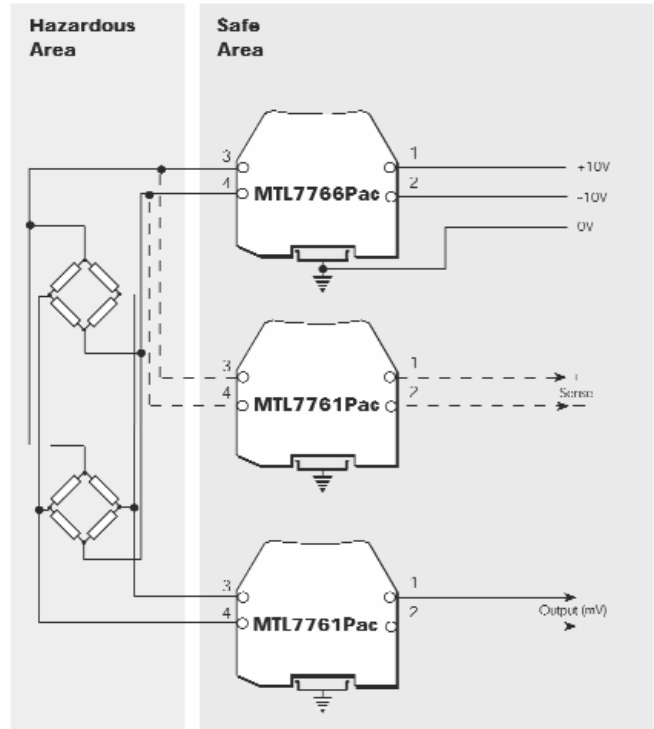
STRAIN-GAUGE BRIDGES (cont)

Double strain-gauge bridges

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

Here, the lower voltage drop of the MTL7766Pac is an advantage. The MTL7766Pac supplies power to the bridge(s) whilst two MTL7761Pac barriers interface with the sense and pick-off circuits. Using 350Ω bridge systems, the following voltages are available from an MTL7766Pac with a ±10V supply:

- 1 bridge: 13.11V
- 2 bridges: 9.75V



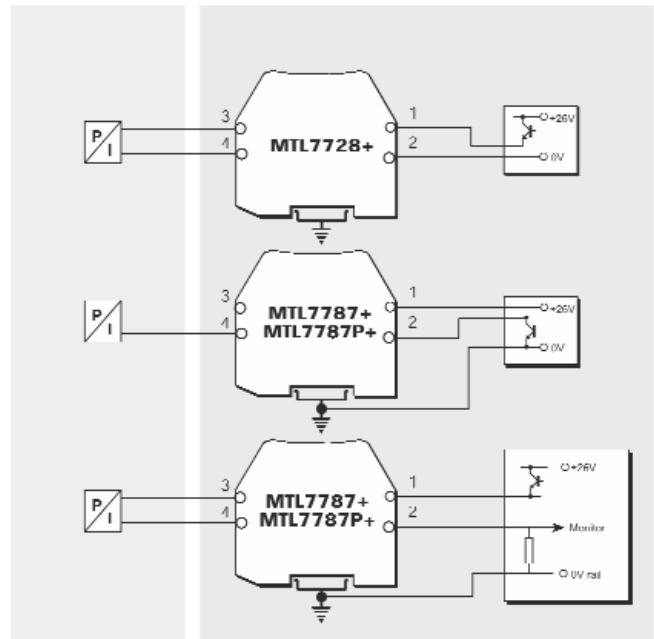
ANALOGUE OUTPUTS

Controller outputs (I/P converters)

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

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

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



DIGITAL (ON/OFF) INPUTS

Switches

The normal choice is the MTL7787_I/7787P_I with a regulated supply. The MTL774X modules are recommended for applications where an unregulated supply of up to 30V for relay output modules, or 35V for solid state output modules, is used.

The MII7789+ offers a dual channel passive barrier for switch inputs where the input current for each channel is <10mA.

Switches / Proximity detectors

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

The MTL7741 is single channel with a changeover relay output.

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

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

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

DIGITAL (ON/OFF) OUTPUTS

Alarms, LEDs, solenoids valves, etc

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

If the control switch is to earth, then the 2-channel MII7787+ barrier should be used, or, alternatively, the MII7787P_I higher-power version. If the supply is poorly regulated use the MTL7707_I.

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

