

MTL830C

Temperature Multiplexer

system for Zone 0 hazardous area applications

- Reduce the cost of installing hazardous-area cabling
- Save installation time, space and weight
- Highlight problems quickly with status reporting systems
- Protect the process with sensor failure detection and safety drives
- Connect directly to host systems through serial-data outputs
- Analog inputs to controllers with Modbus® communications



MTL830C analog multiplexer system with Modbus® outputs provide a cost-effective alternative to single-loop isolation. The cost of installed wiring is reduced by up to 50% by communicating the input of multiple hazardous-area sensors over a single twisted pair data highway. Further savings are achieved by reducing the number of inputs to the host, cabinet space and weight.

An analog transmitter, mounted in the hazardous area, supports thermocouple, RTD, potentiometer and mV analog inputs. A compatible safe-area receiver provides serial Modbus® outputs for feeding to host PLC, PC or DCS controllers.

The data highway cable, a simple twisted pair or a pair of wires within a core cable, connects the transmitter and receiver for carrying both power and data over distances up to 2km. If the analog transmitter is located in the hazardous area, the data highway must be protected by an MTL5553 digital isolator.

Multiplexer systems can communicate the status of up to 32 inputs, reducing the number of hazardous area wiring pairs from 32 to one.

Reduce costs by eliminating long runs of expensive thermocouple compensation cable from the hazardous to the safe area. Also, if 3- or 4-wire RTDs are used, costs are reduced by terminating each RTD at the transmitter or its enclosure.

Accessories include stainless-steel enclosures, a USB cable, and a PC-based configuration software package.

MTL831C ANALOG TRANSMITTER

MTL831C analog transmitters are normally sited in the hazardous area. They are connected to sensors in the field and communicate these inputs to the safe area via single-pair data highway. The data highway supports communication between the safe and hazardous areas, and also provides power to the transmitters – no additional field power is required.

The MTL831C would typically be mounted close to the field instruments in an enclosure.

MTL831C ANALOG TRANSMITTER

Monitors inputs from up to 16 THC or millivolt sources (max $\pm 100\text{mV}$) or up to 16 2-, 3- or 4-wire RTDs or 16 potentiometers within a hazardous area.

- Intrinsically safe; Zone 0 location
- Communication and power pass over a single data highway
- Any combination of thermocouples, RTDs, millivolt sources, and potentiometers may be mixed on each transmitter

MULTI-DROPPING TWO MTL831C UNITS

Two MTL831C multiplexer transmitters can share the same single-pair highway to a single safe-area isolator/receiver combination, providing up to 32 multiplexed inputs.

DATA HIGHWAY CABLING

Twisted shielded pair cabling with low capacitance and resistance is recommended to achieve greater distances between transmitters and receivers. See cable parameters in 'Basic Specifications' for specific requirements, and contact Eaton's MTL product line support for latest cable recommendations.

ENCLOSURES

A range of stainless steel enclosures are available for mounting MTL831C units in the field providing protection for a single MTL831C. The enclosures are dust-tight and waterproof to IP66. Please see ordering information (on the last page) for further detail.

MTL838C RECEIVER

MTL838C receivers translate the information transmitted from the MTL831C via the data highway. The MTL838C provides a Modbus® or Honeywell LLMUX serial-data output representation of the inputs together with status information.

By default the MTL838C RS-485 ports are configured to communicate using the Modbus protocol. The MTL83xC Configurator Software is required to configure it to communicate with the Honeywell LLMUX.

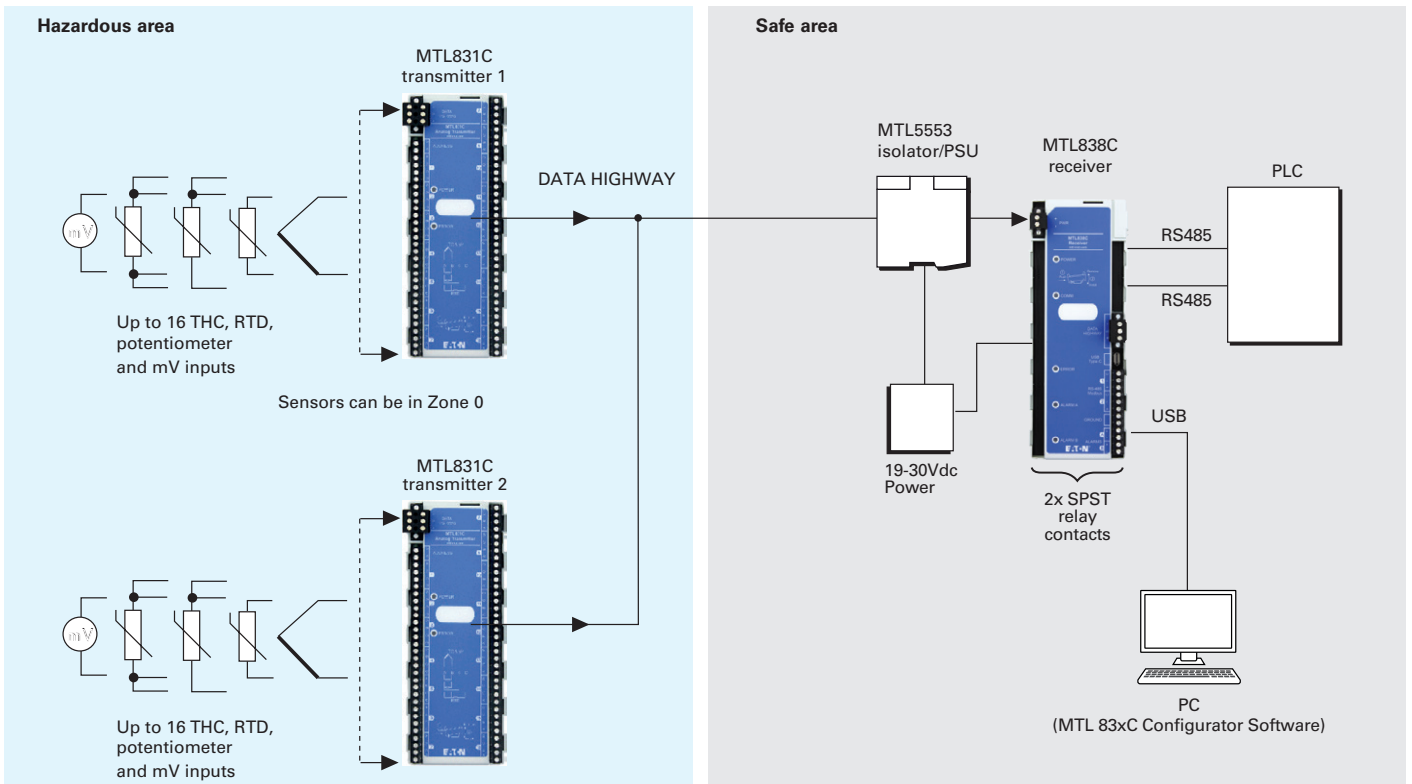
MULTI-DROPPING MTL838C RECEIVERS

Up to 31 MTL838C receivers can be multi-dropped on a single RS-485 link to the host system. MTL838C receivers can be controlled by any suitable Modbus® master. The receivers may be used with other Modbus® slaves on the same RS-485 link.

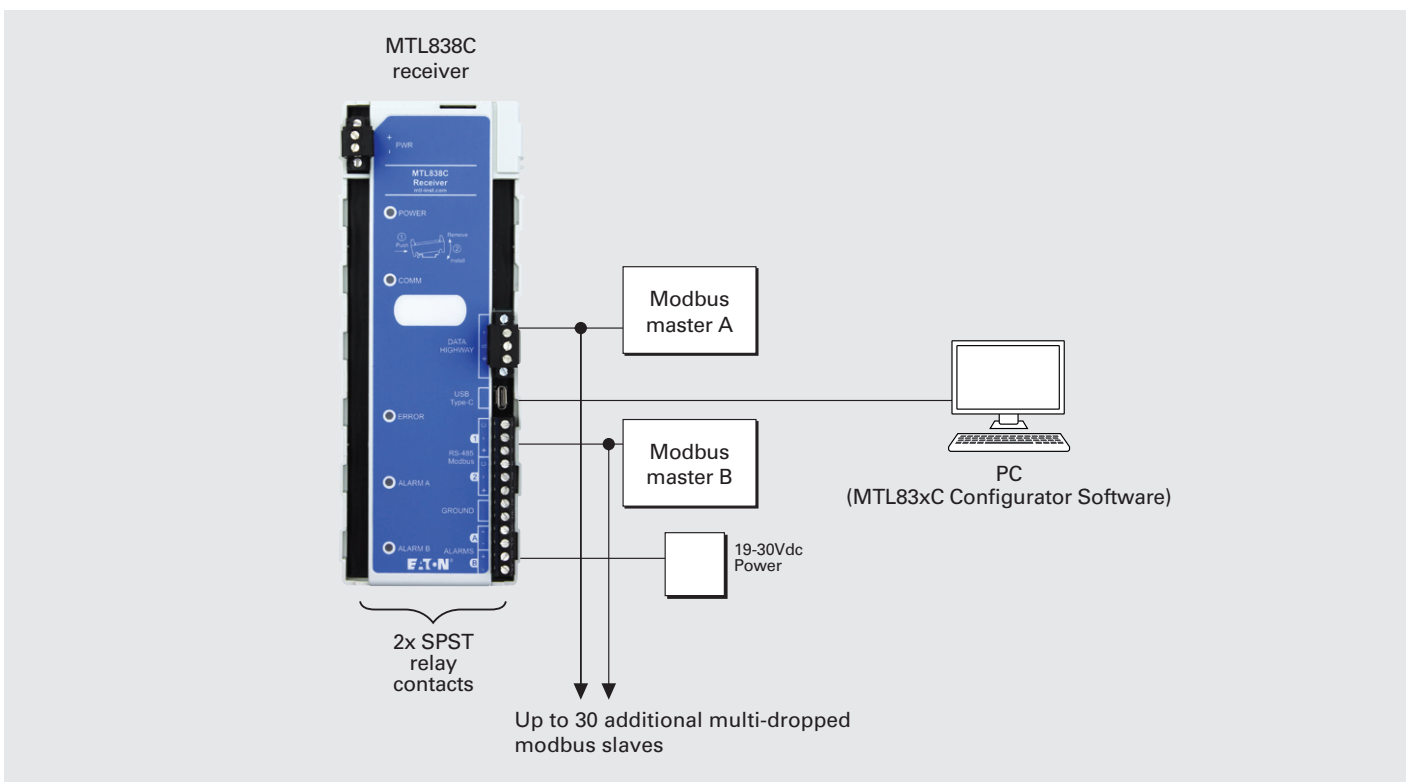
MTL5553 DATA HIGHWAY ISOLATOR

An MTL5553 isolator is required for the data highway, when the transmitter is located in a hazardous area. It is not required for safe-area applications.

MTL830C MULTIPLEXER SYSTEM DIAGRAM



MTL838C MODBUS SYSTEM DIAGRAM



MTL831C ANALOG TRANSMITTER

BASIC SPECIFICATIONS

(see also 'Common specification')

Number of input channels	16 – any combination of TC, mV, RTD, and potentiometer (up to 550Ω) sources
(IS segregated and fully floating when used with MTL5553)	
Location of input sources	Zone 0, Ex ia IIC T4 Ga
Location of unit	Zone 0, Ex ia IIC T4 Ga
Power requirement	Loop-powered through data highway from receiver. No hazardous-area power supply required
Multi-transmitter facility	1 or 2
Ambient temperature limits	-40 to +70°C working -40 to +85°C storage
Weight	0.26kg
Typical response time (input to Modbus register)	500ms
Entity input parameters (Data Highway)	U _i = 24V I _i = 250mA P _i = 1.2W C _i = 0, L _i = 0
Entity output parameters (each sensor input)	U _o = 5.88V I _o = 48.1mA P _o = 71mW

Sensor input cable parameters (based on Simple Apparatus or Other (not simple) Apparatus attached as a sensor)

Gas Group	Simple Apparatus		Other	
	C _O (μF)	L _O (mH)	C _O (μF)	L _O (mH)
IIA	987	369	487	184
IIB	987	189	487	94
IIC	30	49	9.4	24

ADDITIONAL SPECIFICATIONS

MTL831C

Each input terminal block is user-selectable by software for mixed mV, TC, potentiometer, 2-, 3-, or 4-wire RTD input.

mv measuring range

±100mV

mV signals

Accuracy at 21°C (including non-linearity and hysteresis)

Greater of +/- 0.045% of input or +/- 20uV

Temperature effects on accuracy

+/- 0.0008% of input / °C

Thermocouple signals

Accuracy at 21°C (including non-linearity and hysteresis)

Greater of +/- 0.04% of input or +/- 18uV

Temperature effects on accuracy

+/- 0.0008% of input / °C

Thermocouple range supported

Types B, C, E, J, K, N, R, S, T, and Russian XK THCs to BS EN 60584-1:1996.

Other options are available. Please contact Eaton's MTL product line for details.

RTD signals

RTD range

-200 to +850°C (Pt100 type, BS EN 60751:2008)

-200 to +200C (Cu50)

-50 to +200C (Cu53)

-60 to +250C (Ni100)

RTD excitation current

200μA

RTD Accuracy

+/- 135 milliohm

Accuracy at 21°C (including non-linearity and hysteresis)

<0.1% of measuring range

Temperature effects on accuracy

4 Wire +/- (0.001% of input) / °C

3 Wire +/- (0.001% of input + 2mΩ) / °C

2 Wire +/- (0.001% of input + 11mΩ) / °C

Isolation

500V withstand isolation from the Data Highway port to the sensor input ports.

LEDs

POWER LED, green

ON when power is supplied to the transmitter. Blinking when receiving transmissions.

FAULT LED, red

ON when a Comm error is detected.

MTL838C RECEIVER

BASIC SPECIFICATIONS

(see also 'Common specification')

Location of unit	Safe area
Type of Outputs	Dual RS-485 Modbus [®] protocol , USB, 2 alarm relay contact pairs
Output Protocol	Modbus RTU
Serial communication Parameters	Baud rate: 300 to 19200 Stop bits: 1 Data bit: 8 Parity bits: odd, even or none
Multi-receiver facility	Up to 31 MTL838C units can be connected to communicate with one Modbus [®] master controller
Power requirement	19-30Vdc 300mA max.
Ambient temperature limits	-40 to +70°C working -40 to +85°C storage
Weight	0.19kg
Typical response time (input to Modbus register)	500ms

ADDITIONAL SPECIFICATIONS

MTL838C

System configuration

Serial communications parameters and system parameters are entered via the USB port using the MTL83xC Configurator Software. Configuration parameters are saved in onboard memory to retain the configuration even during loss of power.

Linearisation

Calculation by microprocessor (output is linearised and cold junction compensated)

Broken TC indication

Serial output drives upscale or downscale

Alarm facilities

High and low alarms are indicated in the serial data and can be set for each input

Alarm relays

Two programmable alarm relays are available for wiring into plant alarm circuitry. The alarm conditions that trigger the relays are programmable via the MTL83xC Configurator Software. The alarm relay contacts open when an alarm condition occurs.

Isolation

Input power, the RS485 ports, the Data Highway port, and the USB port are all isolated from each other at a 500V withstand rating. The alarm relays have 250V withstand isolation to each other and the Data Highway port, 500V withstand isolation to the power, RS485, and USB ports. Isolation from power for safety purposes must be provided by using an input power supply compliant with local electrical codes (i.e. an SELV rated 24V supply).

LEDs

PWR LED, green

ON when adequate power is supplied to the receiver

COMM LED, green

Blinking when communication is established with at least one transmitter

ERROR LED, red

Blinking when a communication problem is detected by the receiver

ALARM 1 and 2 LEDs, red

ON when the associated alarm relay is in the alarm condition (contacts open).

MTL83xC Configurator Software

Function: Software configuration of multiplexer system

Format: Downloadable

Requires: PC with Windows 7, 8, or 10 and a USB port.
USB Type A male to USB Type C male cable.

MTL830C COMMON SPECIFICATION

COMMON SPECIFICATION

Humidity

5–95% RH (without condensation)

EMC compliance

IEC 61326-1, Electrical equipment for measurement, control and laboratory use – EMC requirements.

Terminals

Pluggable terminals 5.08mm pitch, 2.5mm²
Fixed Screw Terminals 5.08mm pitch, 1.5mm²

Casings

Moulded polycarbonate

Transmission distance (transmitter to receiver)

1km typically (IS applications)
2km typically (non-IS applications)

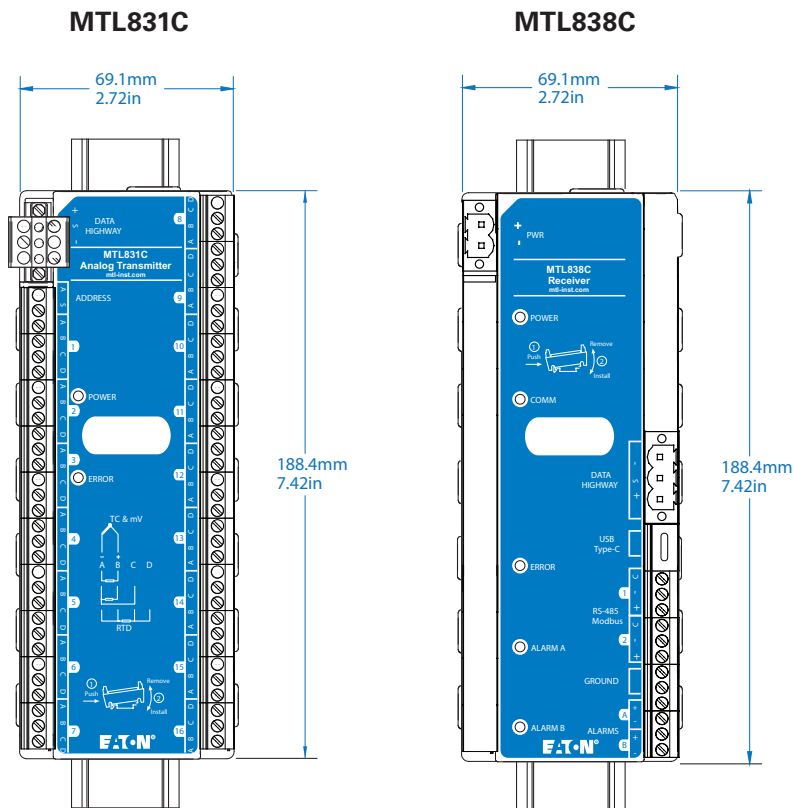
Intrinsically safe interface (IS applications)

1 MTL5553 isolating interface unit for the data highway

CONDITIONS FOR SAFE USE

The conditions governing the use of MTL800 range of multiplexers are given in the relevant certificates and schedules, copies of which are available from Eaton's MTL product line.

DIMENSIONS*



MTL831C APPROVALS

COUNTRY	INTERNATIONAL	EUROPE
Authority	Intertek (IECEX)	Intertek (ATEX)
Standard	IEC 60079-0, IEC 60079-11	EN 60079-0, EN 60079-11
Approved for	Ex ia IIC T4 Ga	II 1 G Ex ia IIC T4 Ga
Certificate/ File No.	IECEX ETL 18.0030X	ITS18ATEX23750X

TO ORDER, SPECIFY:

Transmitters

MTL831C Analog transmitter

Receivers

MTL838C Receiver, RS485 outputs for Modbus®

Isolating interface units

MTL5553 Isolator/Power Supply

Enclosures

FCS-9616	16 sensor outlets + data highway (for 1 x MTL831C)
FCS-9632	32 sensor outlets + data highway (for 2 x MTL831C)

Further details (datasheet and drawing) can be found in the 'MTL Process Junction Boxes' page (under MTL Fieldbus section) on the MTL website.

Literature

INM838C MTL838C Receiver manual

INM831C MTL831C Analog Transmitter manual

AN9003 Application Note: A Users Guide to Intrinsic Safety



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