

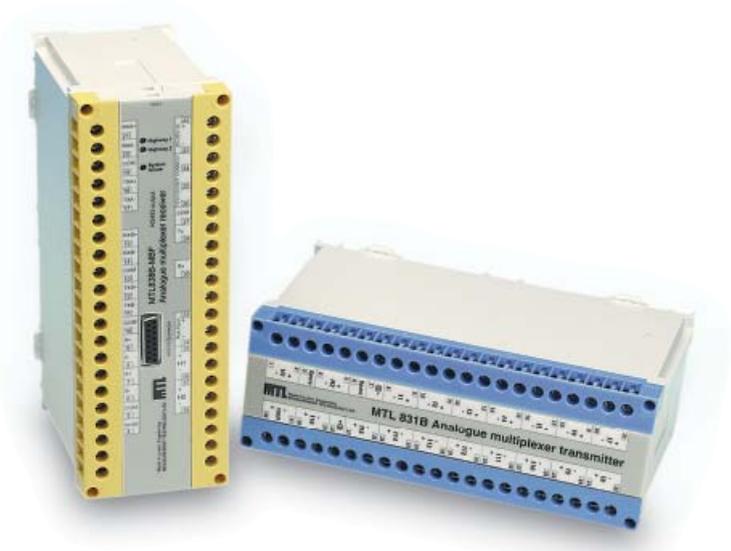


technical datasheet

## MTL830 Series

Multiplexers 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
- Analogue inputs to controllers with Modbus® communications
- Redundant data highways



**MTL830 Series multiplexers** 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 dual-redundant data highways. Further savings are achieved by reducing the number of inputs to the host, cabinet space and weight.

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

**Dual-redundant data highways** between the transmitter and the receiver allow continuous normal operation with only one highway connected. The highway cable, a simple twisted pair or a pair of wires within an IS multi-core cable, carries both power and data, over distances up to 2km. If the multiplexer transmitter is located in the hazardous area, each data highway must be protected by an MTL3052 digital isolator.

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

**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.

**Dual redundant highways** increase system reliability. Failure detectors and safety drives protect against the consequences of sensor failure, while built-in systems report failures to the host controller.

**Accessories** include steel and stainless-steel enclosures, earth-leakage detectors and a PC-based configuration software package.

For more information see AN9010, 'A user's guide to multiplexers' and TP1098, 'Cut the cost of intrinsic safety – by multiplexing!'

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**COOPER** Crouse-Hinds

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

## MTL831B MULTIPLEXER TRANSMITTER

MTL831B multiplexer 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 highways. The data highways support communication between the safe and hazardous areas, and also provide power to the transmitters – no additional field power is required.

The MTL831B would typically be mounted close to the field instruments in an enclosure such as the ENC8 or ENC83 (see 'MTL800 Series Enclosures').

### MTL831B ANALOGUE INPUT TRANSMITTER

Monitors inputs from up to 16 THC or millivolt sources (max  $\pm 60\text{mV}$ ) or up to 15 2-, 3- or 4-wire RTDs within a hazardous area.

- Intrinsically safe; Zone 0 location
- Communication and power pass over twin data highways
- Powered by the data highway
- Thermocouples and RTDs may be mixed on one transmitter

### MULTI-DROPPING TWO MTL831BS

Two MTL831B 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

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 MTL for latest cable recommendations. The system is designed to use both data highways, although it can be used with only one data highway in place. However, use of a single highway will increase response time.

Data highway lengths of up to 2km in hazardous areas and 3km in safe areas have been achieved.

### ENCLOSURES

A range of steel and stainless steel enclosures is available for mounting MTL831B units in the field (see 'MTL800 Series Enclosures'). ENC8 and ENC8SS (stainless steel) enclosures provide protection for a single MTL831B. The enclosures are dust-tight and waterproof to IP67.

When using 4-wire RTDs, ENC83 and ENC83SS (stainless steel) enclosures provide additional terminals to accommodate the third and fourth RTD wires, which are not connected to the MTL831B itself.

## MTL838B-MBF RECEIVERS

MTL838B-MBF receivers translate the information transmitted from the MTL831B via the data highway. The MTL838B-MBF provides a Modbus® serial-data output representation of the inputs together with status information.

### MTL838B-MBF MODBUS® ANALOGUE RECEIVER

Translates data received from the MTL831B in the hazardous area and makes it available as twin RS485 Modbus® serial data outputs. The MTL838B-MBF is configured by personal computer for thermocouple and RTD type, safety drive, high and low alarm and any other operational parameters.

### MTL3052 DATA HIGHWAY ISOLATOR

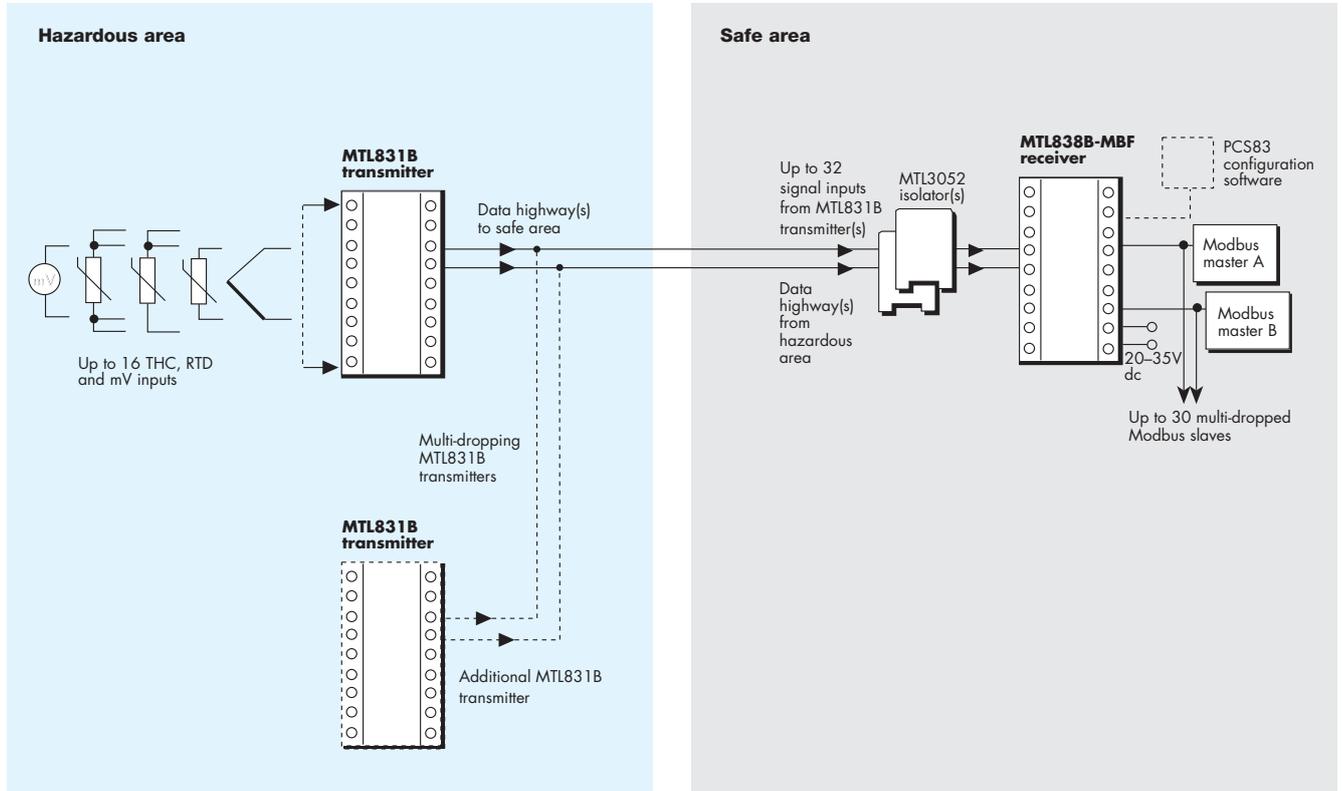
An MTL3052 isolator is required for each data highway, when the transmitter is located in a hazardous area. It is not required for safe-area applications.

### MULTI-DROPPING MODBUS® RECEIVERS

Up to 31 Modbus receivers can be multi-dropped on a single RS485 link to the host system. Modbus® receivers can be controlled by any suitable Modbus® master. The receivers may be used with other Modbus® slaves on the same RS485 link.



# MTL830 SERIES MULTIPLEXER SYSTEM DIAGRAM



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# MTL831B

## TRANSMITTERS

### BASIC SPECIFICATIONS

(see also 'Common specification')

#### Number of input channels

(IS segregated and fully floating when used with MTL3052)

#### Location of input sources

#### Location of unit

#### Number of data highways

#### Power requirement

#### Multi-transmitter facility

#### Ambient temperature limits

#### Weight

#### Typical response time

#### (input to receiver output)

#### Electrical safety (each input circuit)

#### Input sensor cable parameters

#### BASEEFA values (C,L or L/R)

#### (IIC)

#### (IIB)

#### (IIA)

#### Electrical safety (data highway circuit[s]) maximum input parameters

#### MTL831B

#### (mV input)

16 THC or mV sources, potentiometer inputs up to 1k $\Omega$   
15 (RTD or mixed)

Zone 0, IIC, T4

Zone 0, IIC, T4

Dual redundant (either or both)

Loop-powered through data highway from receiver

No hazardous-area power supply required

1 or 2

-20 to +60°C working

-40 to +80°C storage

1.3kg

1s for each transmitter

U<sub>max:out</sub> = 15V

I<sub>max:out</sub> = 16.3mA

W<sub>max:out</sub> = 60mW

0.58 $\mu$ F, 127mH or 535 $\mu$ H/ $\Omega$

3.55 $\mu$ F, 486mH or 1087 $\mu$ H/ $\Omega$

14 $\mu$ F, 903mH or 1087 $\mu$ H/ $\Omega$

U<sub>max:in</sub> = 30V

I<sub>max:in</sub> = 300mA

W<sub>max:in</sub> = 1.2W

C<sub>eq</sub> = 0, L<sub>eq</sub> = 0

### ADDITIONAL SPECIFICATIONS

#### MTL831B

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

#### Measuring ranges

$\pm$ 60mV or  $\pm$ 25mV or  $\pm$ 10mV, auto ranging

#### Common mode voltage

Maximum 5V common mode between input channels of one transmitter

#### mV signals

##### Accuracy at 20°C (including non-linearity and hysteresis)

<0.1% of measuring range

##### Temperature effects on accuracy

{(greater of 0.01% of range or 2 $\mu$ V) + 0.01% of reading} /°C

#### Thermocouple signals

##### Accuracy at 20°C (including non-linearity and hysteresis)

<0.1% of measuring range  $\pm$ 0.7°C

Upscale/downscale drive does not introduce any accuracy errors

##### Temperature effects on accuracy

{(greater of 0.01% of range or 2 $\mu$ V) + 0.01% of reading + 0.03°C} /°C

#### RTD signals

##### RTD range

-200 to +850°C (Pt100 type, DIN 43760, IEC751: 1983)

##### RTD excitation current

100 $\mu$ A

##### Accuracy at 20°C (including non-linearity and hysteresis)

<0.1% of measuring range

##### Temperature effects on accuracy

{(greater of 0.01% of range or 0.025°C) + 0.005% of reading} /°C

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# MTL838B-MBF RECEIVERS

## BASIC SPECIFICATIONS

(see also 'Common specification')

**Number of data highways**  
**Location of unit**  
**Input noise rejection**

**Type of output(s)**  
**System protocol**  
**Serial communication parameters**

**Multi-receiver facility**

**Power requirement**  
**Ambient temperature limits**

**Weight**

### MTL838B-MBF

#### (Modbus® output)

2, dual redundant (either or both may be used)  
Safe area  
Up to 0.5mA peak-to-peak at 100 to 1000Hz, or up to 1mA peak-to-peak at 50Hz  
Dual RS485 Modbus® protocol  
Modbus® ASCII or RTU  
Baud rate: 300 to 19200  
Stop bits: 1 or 2  
Data bits: 7 or 8  
Parity bit: odd, even or none  
Up to 31 MTL838B-MBF units can be connected to communicate with one Modbus® master controller  
500mA at 20–35V dc  
–20 to +50°C working  
–40 to +80°C storage  
840g

## ADDITIONAL SPECIFICATIONS

### MTL838B-MBF

#### Thermocouple range supported

Types E, J, K, N, R and T THCs to IEC 584. Other options are available, please contact MTL for details.

#### System configuration

Serial communications parameters and system parameters entered using PCS83 software program, by downloading from process controller. Configuration parameters are retained by using battery-backed RAM.

#### Linearisation

Multi breakpoint calculation by microprocessor (output is linearised and cold junction compensated)

#### Broken THC 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

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# MTL3052

## DIGITAL ISOLATOR

for signals up to 10kHz

This unit is similar in principle to the MTL3042 but operates at a higher frequency for use with digital signals. Its primary application is to provide IS protection for the data highways and transmitters in MTL800 Series multiplexer systems. The MTL3052 features two output circuits: one with a 15V, 180Ω safety description, and an alternative 15V, 100Ω circuit which can be used if higher loop resistances need to be accommodated, for example when surge protectors are incorporated in the data highways. If the low-resistance outputs are used on two units fitted to a dual-highway system however, the multiplexer transmitters are restricted to location in IIB atmospheres.

### SPECIFICATION

See also 'Common specification'

#### Number of channels

One, fully floating

#### Location of load

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

Div 1, Group A, hazardous location

Zone 0, IIB, T4–6 (Div 1, Group C, hazardous location)

for multiplexer transmitters in dual-highway systems using the low-resistance outputs of two MTL3052s

#### Input voltage

4 to 12V dc

#### Signal bandwidth

dc to 10kHz

#### Minimum output voltage

$[V_{in} \text{ minus } (0.25 \times \text{current in mA})]$  V

#### Input and output circuit ripple

<1mA peak-to-peak

#### Power dissipation within unit

160mW maximum at 12V with 20mA signal

#### Replaceable fuse

50mA, 5 x 20mm glass to DIN 41571 sht. 2, semi-time-lag (M)

#### 'No-fail' earth fault protection (optional)

Enabled by connecting terminal 8 to MTL4220

Fault on either line proclaimed: unit continues working

#### Safety description

##### Terminals 5 & 6

15V, 100Ω, 150mA,  $U_m = 250V$  rms or dc

##### Terminals 7 & 8

15V, 180Ω, 83.3mA,  $U_m = 250V$  rms or dc

#### FM max entity parameters

$V_{OC} = 15V$ ,  $I_{SC} = 83.3mA$ ,  $C_a = 0.75\mu F$ ,  $L_a = 5.2mH$

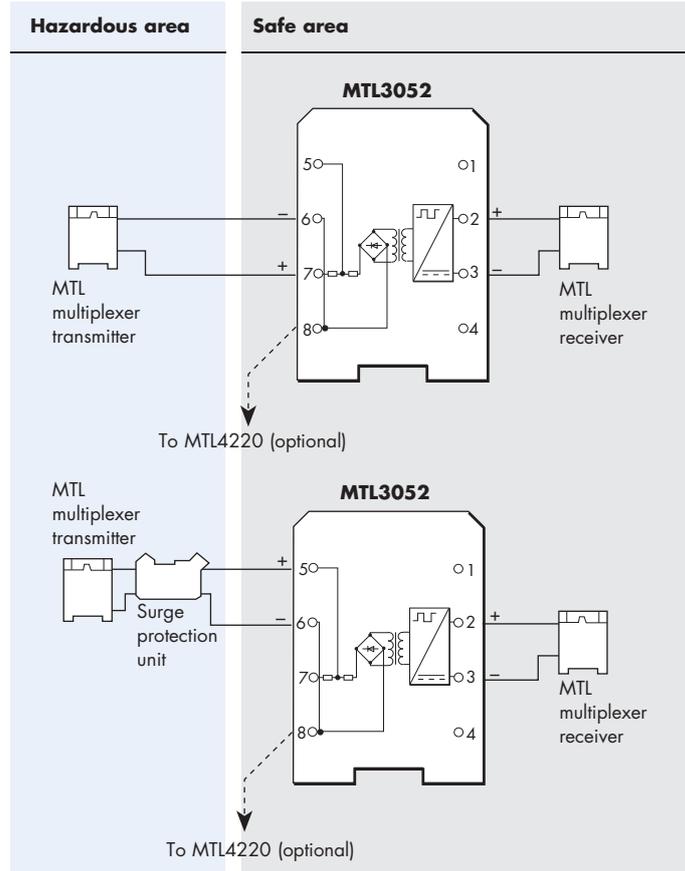
#### Weight

130g

#### Cable parameters - BASEEFA values

(data highway circuits, each highway)

Grp	Terminals 7 & 8			Terminals 5 & 6		
	C μF	L mH	L/R μH/Ω	C μF	L mH	L/R μH/Ω
IIC	0.58	5.2	109	0.58	1.65	65
IIB	3.55	15.6	327	3.55	4.95	195
IIA	14	41.6	872	14	13.2	520



### OTHER APPLICATIONS

The MTL3052 is suitable for a variety of other applications, such as bringing back the status of a hazardous-area mechanical or opto-transistor switch, or a magnetic shaft encoder (all via suitable current limiting resistors).

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# MTL800 SERIES COMMON SPECIFICATION

# MTL800 SERIES SYSTEM SPECIFICATION

## Humidity

5–95% RH (without condensation)

## EMC compliance

EN 50081-2/EN 50082-2, generic emission/immunity standards. These refer to appropriate IEC/CISPR standards.

## Terminals

Detachable, each accommodates two 2.5mm<sup>2</sup> conductors

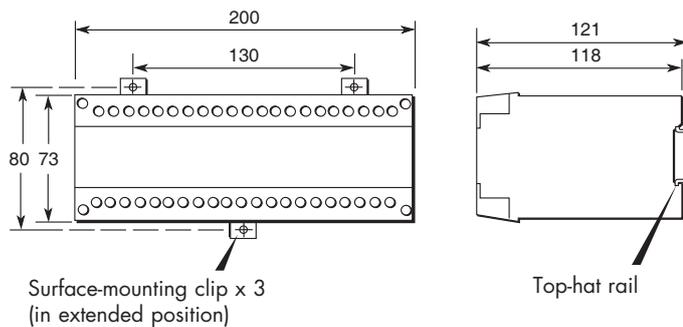
## Casings

Moulded polycarbonate

## CONDITIONS OF USE

The conditions governing the use of MTL800 Series multiplexers are given in the relevant certificates and schedules, copies of which are available from MTL.

## DIMENSIONS (mm)



## Maximum loop impedance (each data highway)

50Ω when using MTL3052 interface (terminals 7 & 8)  
130Ω when using MTL3052 interface (terminals 5 & 6)  
300Ω for non-IS applications

## Transmission distance (transmitter to receiver)

0.5km typically (IS applications)  
1.5km typically (non-IS applications)  
For many applications it is possible to use longer distances up to 3km, for details consult MTL

## Intrinsically safe interface (IS applications)

1 MTL3052 isolating interface unit for each data highway

## Earth fault protection (optional)

An optional MTL4220 earth leakage detector will detect line-to-earth faults on either line of either highway.

## Data highway monitoring

### Highway 1 LED, green (located on receiver)

ON when highway 1 connected and operating

### Highway 2 LED, green (located on receiver)

ON when highway 2 connected and operating

### Highway 1 & 2 status

Serial output receivers: condition of highway(s) transmitted in unit status word to process controller

## System failure monitoring

### System failure LED, red (located on receiver)

ON when both highways disconnected or faulty or when there is an internal receiver fault

### System failure signal

Serial output receivers: derived from status word

## Power supply failure

All relays and LEDs de-energise

## APPROVALS

Country	Canada	Czech	Russia	UK	USA
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### MTL831B

(Authority)	(CSA)	(FTZU)	(GosGor TechNadzor)	(BASEEFA)	(FM)
<b>Standard</b>	C22.2 No.157	CSN EN 50014 CSN EN 50020	–	EN 50014 EN 50020 EN 50284	3610 Entity
<b>Approved for</b>	Class 1, Div 1, Gps A-D	Ex ia IIC T4	EEx ia IIC T4	EEx ia IIC T4	Class 1, Div 1, Gps A-D
<b>Certificate/ File No.</b>	1192829	FTZU98Ex0025	PPC00-25146	03ATEX0006X	J.I.5B0A8.AX-1

### MTL3052

(Authority)	(CSA)	(FTZU)	(GosGor TechNadzor)	(BASEEFA)	(FM)
<b>Standard</b>	C22.2 No.157	CSN E33 0380	–	EN 50014 EN 50020	3610 Entity
<b>Approved for</b>	Class 1, II, III Div 1, Gps A-G	[ Ex ia IIC ]	[ Ex ia ] IIC T4	[ EEx ia ] IIC	Class 1, II, III Div 1, Gps A-G
<b>Certificate/ File No.</b>	LR36637-42	J02043	PPC00-25146	03ATEX0034	J.I.0Q4A0.AX

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## MTL800 SERIES ENCLOSURES

### SPECIFICATIONS

**ENC8/ENC8SS:** for  
1 MTL831B transmitter, or  
1 MTL838B receiver

**ENC83/ENC83SS:** for  
1 MTL831B transmitter  
(for use with 4-wire RTDs)

#### Location

Zone 0, 1 or 2

#### Protection

Dust-tight and waterproof to IEC529:IP67

#### Construction (ENC8 and ENC83)

Sheet steel, zinc sprayed and painted RAL7015 grey

#### Construction (ENC8SS and ENC83SS)

Stainless steel

#### Lid

Detachable with lift-off hinges, secured by captive fixing screws with a padlock hasp

#### Earth terminals

Fitted on internal earth rails; accommodate conductors up to 4mm<sup>2</sup>

#### Number of earth terminals

ENC8/ENC8SS: 22  
ENC83/ENC83SS: 18

#### 4-wire RTD terminals (ENC83/ENC83SS only)

32 ready-mounted terminals to accommodate conductors up to 4mm<sup>2</sup>

#### Gland fixing

Top and bottom gland plates detachable for drilling by user

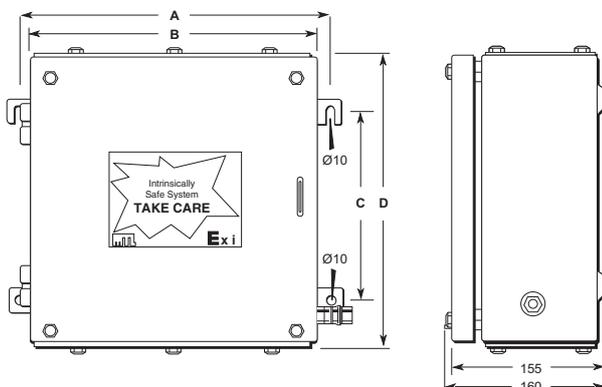
#### Mounting

By fixed mounting lugs

#### Weight (excl. transmitters/receivers)

ENC8: 7kg  
ENC83: 9.8kg

### DIMENSIONS (MM)



	A	B	C	D
ENC8	331	306	203	306
ENC83	407	380	305	466

## MTL800 SERIES ACCESSORIES

### SPECIFICATIONS

#### PCS83 software package (for MTL838B-MBF)

**Function:** Software configuration of multiplexer system  
**Format:** 3.5 inch diskette  
**Requires:** PC with DOS 2.2, or higher, and a serial (COM) port.

### TO ORDER, SPECIFY:

#### Transmitters

**MTL831B** Analogue transmitter

#### Receivers

**MTL838B-MBF** Analogue receiver, RS485 and/or RS422 outputs for Modbus®

#### Analogue receiver accessories

**PCS83** PC software configuration package

#### Process controller interface software

Contact MTL for details of software for interfacing with proprietary process controllers

#### Isolating interface units and earth leakage detectors

**MTL3052** Digital isolator interface unit  
**MTL4220** Earth leakage detector

#### Enclosures

**ENC8** General-purpose enclosure  
**ENC8SS** General-purpose enclosure (stainless steel)  
**ENC83** Enclosure for MTL831B transmitter  
**ENC83SS** Enclosure for MTL831B transmitter (stainless steel)

#### Literature

**INM838B-MBF** System protocol manual:  
**MTL838B-MBF** Modbus® receivers  
**INM831B** MTL831B manual  
**AN9010** Application Note: A user's guide to intrinsically safe input multiplexer systems  
**INS831B** MTL831B mV Multiplexer transmitter  
**INS838B** MTL838B-MBF Multiplexer receiver - Modbus® output

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